

Ph.D. Dissertation Structure and Content (博士論文の要約)

This PhD dissertation empirically and systematically examines various topics concerning the relationship between foreign direct investment (FDI), international trade (exports and imports), firm heterogeneity, and productivity using micro-level data from Thailand. The dissertation is divided into *eight chapters* and can be read independently. The main content, contribution, and conclusions of each chapter are briefly explained as follows.

Chapter 1: Introduction is the background and overview of the conceptual framework of this dissertation. It proposes key research questions and contribution of the study, and describes the data coverage utilized in this dissertation. To summarize, with the growing availability of micro-level datasets, recent years have seen a huge increase in the number of empirical studies concerning firm heterogeneity, FDI, trade and productivity in both developed and developing countries. However, there have been few empirical studies for Thailand regarding this field of economic analysis. Importantly, results from Thailand can be used to provide an example and illustrate the issue at hand for at least two reasons. First, Thailand has been a large FDI recipient throughout the past decades, and only few studies so far have utilized micro-level datasets to conduct empirical studies for the Thai case. Second, the Thai manufacturing and services sectors are broad-based as opposed to those of neighboring countries, covering a wider range of industries from traditional labor-intensive industries to several capital-intensive industries such as food products, textiles, automotive, electronics, electrical appliances, and so forth. Furthermore, the Thai experience regarding industrialization appears to be one of the most successful cases among developing economies over the past two decades. Thus, evidence from Thailand concerning FDI, trade, and firm performance may provide a good model for other developing countries.

Concerning the data used in this dissertation, there are three types of data sets which can be used for the firm-level analysis in Thailand in this dissertation. First, apart from the data from the manufacturing sector, two other surveys are used in this dissertation to conduct separate analysis, namely; the 2006 Business Trade and Services Survey and the 2009 Construction Industry Survey of Thailand. Second, for the manufacturing sector, comprehensive datasets and samples are available in the National Statistical Office's (NSO) Industrial Census for 1997 and 2007 (data collected in 1996 and 2006, respectively). The 1997 and 2007 censuses are by far the most comprehensive data available on Thai manufacturing. However, the main drawback of this census data is that it is cross-sectional

data, which limits its use for sophisticated research such as panel data analysis, and so forth. Third, another micro-level data set in Thai manufacturing can be found in the Manufacturing Industry Survey by the NSO, which covers data from 1991 to 2003. In spite of this, the coverage in this survey is inconsistent in that, although having been collected continuously for many years since 1991, the data for certain years are not electronically accessible, leading to difficulties in creating complete panel data from these surveys. This lack of complete panel data in many developing countries, including Thailand, is one of the main reasons there have been so few studies using firm/plant-level analysis.

The remainder of this dissertation is organized as follows. Chapter 2 presents empirical evidence for the estimation of production function and firm productivity in Thai manufacturing industries. Chapter 3 contains empirical studies on productivity and wage spillovers from FDI in the Thai manufacturing sector. Similarly, Chapter 4 addresses empirical evidence on FDI export spillovers. Chapter 5 contains empirical results from FDI spillover effects in the Thai business trade, services, and construction sectors. Chapter 6 examines the relationship between innovation, R&D (Research and Development), and productivity. Next, chapter 7 explores the connection between exporting, importing and firm performance in Thailand. Finally, chapter 8 concludes the overall study and provides practical policy implications and suggestions for further studies.

Chapter 2: Firm Productivity in Thai Manufacturing contains parts of the paper titled “Firm Productivity in Thai Manufacturing Industries: Evidence from Firm-level Panel Data”. This chapter uses data from the Manufacturing Industry Survey in Thailand to obtain TFP (Total Factor Productivity) measures for 1999-2003 following various estimations for production function and firm TFP, and empirically investigates the determinants of firm TFP at the establishment level. In this chapter, the results identify many important determinants of firm TFP, controlling for industry, location, and year fixed effects. Empirically, the results reveal that smaller firms are significantly more productive than larger ones. Firm age and TFP exhibit a negative relationship. Firms with a more educated workforce are also more productive. Firm TFP benefits from integration into world markets; foreign-owned firms and exporters have significantly higher TFP. Private and Head Branch typed firms are more productive than other firms on average. However, firms in the central region and firms in industries faced with fierce competition for total sales are less productive in terms of TFP. These findings point to several key areas of policy relevance in which improvements are likely to bring benefits for firm TFP in Thailand. Policies promoting labor quality at various levels may have significant benefits for firm TFP. Additionally, progress in international

integration of firms into international markets through their participation in export markets and attraction of foreign capital is also likely to have large benefits in terms of TFP. Despite some limitations in the study, the results from this chapter may be treated as a new aspect for examining empirically and thoroughly the production function estimation and determinants of total factor productivity for manufacturing firms in Thailand.

Chapter 3: Productivity and Wage Spillovers from FDI in the Manufacturing Sector presents parts of the paper titled “Productivity and Wage Spillovers from FDI in Thailand: Evidence from Plant-level Analysis”. This chapter analyzes productivity and wage spillovers from FDI in Thailand using many plant-level analyses. It utilizes cross-sectional data from the 2007 Industrial Census of Thailand. This study is one of the few studies in the Thai case to investigate productivity and wage spillovers simultaneously and to examine a wide range of spillover features regarding the impact and effects of FDI on productivity and wage spillovers.

The main contribution of this chapter is as follows. Firstly, I consider the impact of foreign ownership on labor productivity and average wages which is observed by both foreign employment share and foreign output share at both the 2-digit and 4-digit industry levels. Secondly, I consider the impact of foreign presence conditioned by plant size, location and form of organization, and extend the effects of foreign presence into regional level. Thirdly, I examine the effects of foreign presence in each industry for both productivity and wage spillovers. The major finding is that increases in foreign equity participation (foreign presence) are positively correlated with increases in labor productivity and average wages of domestic plants. The impact of FDI on labor productivity and average wages in the Thai manufacturing sector is examined on the basis of a number of relevant variables such as capital intensity, material and labor inputs, labor equality, years of operation of establishment, investment promotion status from the BOI (Thai Board of Investment), and trade policy effect by Effective Rate of Protection (ERP), and so forth. The analysis shows that the coefficients of the two proxy variables for the influence of foreign plants are significant on average, signifying that FDI plays a positive role in enhancing labor productivity and average wages in the Thai manufacturing sector. Similarly, capital intensity, material and labor inputs, labor equality, years of operation of establishment, and investment promotion status from BOI are all shown to positively affect domestic labor productivity. Moreover, other control variables such as capacity utilization, import status, and location dummies are also shown to positively affect labor productivity and average wages. Conversely, as expected, ERP appears to negatively affect labor productivity and the form of legal organization (Government) and technology gap also seem to negatively affect average wages of domestic plants.

The results from this chapter allow us to draw attention to some policy implications for Thai government representatives and business managers. Since, on balance, FDI has a positive impact on productivity and wage, the country's investment-friendly policy should continue to be adopted and implemented so that more inward FDI might be attracted. However, it would be desirable to examine the issue of spillovers more closely in the Thai case, especially for wage spillovers of which there are few studies at the moment, to provide more solid evidence concerning the impact of FDI spillover effects on productivity and wage which can occur in various industry levels by horizontal spillovers. Another implication is that the government should cautiously observe some industries which face significant pressures from foreign competition due to the inflows of FDI because there is evidence suggesting negative spillovers from FDI to domestic plants in some industries. Lastly, we should not consider results based on a single sample of plants using only one methodology and one period of time as conclusive facts and careful interpretation of estimated results should be made for possible policy implications regarding FDI spillover effects.

Chapter 4: Export Orientation and Spillovers from FDI in the Manufacturing Sector contains parts of the paper titled "Export Orientation and Spillovers from FDI in Thailand: Evidence from Plant-level Analysis". This chapter aims to study the factors that influence a plant's export decision and export intensity, and export spillovers from FDI by using a plant-level dataset of Thailand in 2007. The main study concentrates on the roles of Multinational Enterprises/Corporations (MNEs/MNCs) in export. This chapter contributes to the existing literature that deals with the impact of spillovers arising from FDI-generated linkages between domestic and foreign plants on exporting activities in various aspects. In order to examine the impact of the horizontal linkages between domestic and foreign plants on export performance of domestic plants in Thai manufacturing, I utilize the Heckman's selection models and estimate the models by means of Heckman's maximum likelihood estimator in selection models. The empirical analysis, which is based on plant-level data from the Thai manufacturing sector, generally reveals that the presence of foreign plants has a positive and significant effect on (i) the decision of domestic plants to export and (ii) the export share of domestic plants through horizontal linkages. The estimated results show and confirm findings of previous studies where FDI horizontal linkages have resulted in positive and significant export spillover effects from foreign plants to domestic plants. Firm heterogeneity and other plant-level characteristics also have a significant impact on the export participation and export intensity of domestic plants. The empirical analysis further shows that plant size, plant location, and form of organization affect the decision and intensity to export. As a result,

more focus should be paid to industry policies in order to help domestic plants face the challenge of FDI and to maximize export benefits in Thai manufacturing.

In general, the results emphasize that the presence of foreign plants has a positive effect on the export decision and export intensity of domestic plants. It also implies that domestic plants are more likely to export if they operate in a sector where the presence of foreign plants is relatively high. The main results show that domestic plants in Thailand indeed gain from FDI (measured by the presence of foreign-owned plants operating in the same and across industries), and that foreign presence is one of the important determinants of export probability of domestic plants in Thailand. The results also suggest that while domestic plants may not rely solely on FDI to successfully enter the export market, the presence of FDI in exporting plants helps contribute to their success in the export market. Plant characteristics such as size, location, and form of organization are also the vital determinants for domestic plants in deciding whether to export and how much to export.

Chapter 5: FDI Spillovers in the Business Trade, Services, and Construction Sectors presents many parts of the two papers titled “FDI and Spillovers on Productivity and Wage in the Business Trade and Services Sector: A Case of Thailand” and “Foreign Ownership and Firm Performance in the Thai Construction Industry”. The first half of this chapter analyzes productivity and wage spillovers from FDI in the business trade and services sector using cross-sectional data from the 2006 Business Trade and Services Survey of Thailand. Spillover effects are examined horizontally at the 2-digit industry level by spillover variables, foreign employment share and foreign output share. The results indicate that foreign firms are generally more productive and pay higher average wages than domestically-owned firms. Partly due to the short interval of analysis and data available, for productivity spillovers, I find no clear evidence for FDI spillovers in the whole sample, but find mixed results when analyzing the data conditionally by firm size and form of organization of domestic firms. For wage spillovers, I observe negative horizontal spillovers from FDI in the whole sample, especially in large firms, and find negative spillovers in some divisions of industry.

Since business trade and services can be an engine of export growth for some countries such as Thailand, they are a key determinant of the competitiveness of firms in open economies. For this reason, more research is needed on the interaction between business trade and services policies and regulation, and the presence of FDI and MNCs. It should be noted that main problems in estimating output and productivity in service-producing industries for many developing countries arise largely because of the lack of complete survey information covering these industries that can be used for detailed analysis, and Thailand is no exception

in this regard. In terms of policy implications, the findings presented in the first half of this chapter provide encouraging support for the role that FDI may play in the development of the Thai economy and in the welfare of its citizens in the business trade and services sector. However, we should understand that the impacts of FDI are multi-dimensional, and in this study, only horizontal aspect of productivity and wages spillovers was addressed due to data limitation. In conclusion, as suggested by the estimated results, the majority of business establishments in Thailand have no foreign investment. FDI and MNCs are still not prevalent in these industries. I conclude that there are both advantages and disadvantages regarding FDI spillovers from foreign firms to domestic firms in this analysis.

The second half of this chapter analyzes the relationship and impact of foreign ownership on domestic firms operating in the construction industry using cross-sectional data from the 2009 Construction Industry Survey of Thailand. It covers the empirical analysis for representative firms in the construction industry, while most existing studies deal only with manufacturing industries. This study seeks to add to our understanding of the value of FDI in Thailand, where foreign MNCs are expanding in almost every industry, including the construction industry. The estimated results show that foreign presence has a significant and positive effect on domestic firms in this sector. I find that foreign firms are generally more productive and pay higher average wages than domestic firms and can conclude that the relationship between construction productivity and foreign ownership in general is rather weak, while the relationship between wages and foreign ownership is stronger. This fact is also true for the case of Thai manufacturing. The main finding from this part of analysis is that allowing foreign MNCs to enter and attracting more FDI in construction industries may be the key channel through which FDI spillovers contribute to the improved performance of firms and establishments in the construction industry. Therefore, policy implications that help decrease the barrier of entry of FDI into the Thai construction industry might be adopted in order to attract more FDI into this industry, and promote the beneficial effect of spillovers from foreign firms operating in the construction industry.

The analysis in this chapter provides the Thai government with potentially useful information for industrial policies regarding FDI. Hosting FDI could benefit domestic firms via increased productivity and average wages paid within the industry.

Chapter 6: Innovation, R&D and Productivity addresses the main part of the paper titled “Innovation, R&D and Productivity: Evidence from Thai Manufacturing”. In response to recent concerns about lagging productivity and poor innovative performance of firms in Thailand, this chapter empirically investigates the relationship between innovation, R&D, and

productivity in the Thai manufacturing sector, using cross-sectional data from the 2007 Industrial Census of Thailand. I utilize a simplified structural model (CDM model) that describes the link between innovation output, R&D and productivity for the Thai case. Various estimation techniques; namely, ordinal probit/logit regression, univariate and bivariate probit models, Heckman selection model, and various OLS (Ordinary Least Squares) estimators are used to compare and provide evidence for empirical results. This study is one of the first studies for the Thai case to empirically estimate a structural model that describes the explicit link between R&D, innovation output, and productivity using the enriched Industrial Census data of Thailand, as a case study for other developing countries.

The major finding is that government aid or funding and firm characteristics may play an important role regarding the decision for a plant to engage in R&D and to be innovative both in terms of process innovation and product innovation. Exporting plants, plants in the central region, and plants that are categorized as Head Branch type are more likely to engage in R&D. Specifically, The results reveal that plants in the food production industry and the chemical production industry are also more likely to invest in R&D and are more innovative compared to plants in other industries. The estimated results from the structural model provide further insights into the complex relationship between innovation, R&D and productivity. The type of industry and specific technological characteristics of firms are shown to influence the decision to undertake R&D. In summary, capital and material intensity, exporting status, plant size, and product innovation appear to be important determinants of productivity in Thai manufacturing. In contrast, depending on research methodology (univariate probit and bivariate probit) and the nature of data (cross-sectional data), process innovation might exhibit unexpected signs or a negative relationship with productivity.

Generally, firms in Thailand tend to lag behind firms in other Southeast Asian countries in innovative performance whether they are multinational enterprises, state-owned enterprises, or small-medium enterprises. Innovation effort in Thai manufacturing has been limited due to a failure to coordinate agencies and policies and to distribute funds effectively. Further improvements are needed, specifically in the institutional arrangements for the coordination of national science and technology policies. Nevertheless, from the empirical results, product innovation is one of the important drivers of productivity growth in Thai manufacturing apart from exporting and foreign direct investment.

Chapter 7: Exporting, Importing, and Firm Performance presents many parts from the paper titled “Exporting, Importing and Firm Performance: Evidence from Thai Manufacturing”. This chapter mainly examines the relationship between exporting, importing

and firm productivity using a firm-level panel data set from the Manufacturing Industry Survey of Thailand from 1999 to 2003. I divide the analysis of this chapter into three parts. First, I measure export and import premia for different firm performance measures such as employment, value added per worker, capital per worker, average wage, and sales. Second, I further test for export and import premia by running regressions of different performance measures on export and import status using probit/logit models to confirm and compare results. Third, I examine whether or not exporting and importing activities improve output and productivity at the firm level. On average, the results show that exporters (and importers) are more productive, more capital-intensive, have more employees and total sales, and pay higher average wages than those of non-exporters (and non-importers). Even after controlling for industry, year, and size effects, exporting and importing firms significantly perform better than domestic counterparts. The study in this chapter sheds light on several policy issues and provides some empirical evidence that is necessary to evaluate various measures to promote exports and imports for manufacturing firms in Thailand. Especially, with regard to the learning effect, if there are no post-entry rewards from exporting (and importing), then policies designed to increase the number of exporters (and importers) might be considered inefficient, as domestic firms may not receive any extra benefits.

Chapter 8: Conclusions elaborates and summarizes the main findings and implications of this dissertation. In this last chapter, I provide concluding remarks for the overall study and recommend suggestions for further studies. Importantly, I mention that while this dissertation conveys valuable information on the dynamics of firms and plants in various aspects from many industries and sectors in Thailand, the empirical studies are based on surveys and census that does not cover every firm and plant in Thailand in terms of sample size and coverage. As a result, engaging in a similar type of analysis using different types of data, or data collected in a more comprehensive fashion, would be beneficial to provide and confirm more reliable and significant empirical results. Moreover, discussions and examinations of the relationship between production network, geography and firm performance should be rigorously incorporated and emphasized in the future work for the Thai case.

Despite some limitations in this dissertation, it is hoped that all the empirical results from may be treated as the new aspect for examining systematically the relationship between FDI, trade, and firm performance in Thailand for various industries and sectors. I sincerely hope that, based on this dissertation, there will be more work in this field of analysis for Thailand and other developing countries in the future.