Essays on Globalization, Skills and Development

by

Emiko Fukase

A dissertation submitted to the Graduate Faculty in Economics
in partial fulfillment of the requirements for the degree of
Doctor of Philosophy, The City University of New York

2011

This manuscript has been read and accepted for the
Graduate Faculty in Economics in satisfaction of the
dissertation requirement for the degree of Doctor of Philosophy.

Professor Wim Vijverberg

Date

Chair of Examining Committee

Professor Merih Uctum

Date

Executive Officer

Professor Wim Vijverberg

Professor Robert Lipsey

Professor Zadia Feliciano

Supervisory Committee

THE CITY UNIVERSITY OF NEW YORK

Abstract

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Adviser: Professor Wim Vijverberg

This dissertation examines how globalization, defined as increase in trade or Foreign Direct Investment (FDI), influences development in terms of economic growth and labor market effects. It also studies the role of human capital in affecting economic development both directly and interacting with globalization variables. The dissertation consists of four chapters: one macroeconomic study that revisits the impacts of globalization and education on economic growth (Chapter 1) and three micro-level case studies on Vietnam's labor market. One micro paper explores the impacts of FDI on wages (Chapter 2), another investigates the impacts of FDI on internal migration (Chapter 3), and the final study explores the effects of export liberalization on Vietnam's skill premium (Chapter 4).

The dissertation's findings broadly support the view that globalization can be an "engine of growth", but its mechanisms are complex. One insight from the macro study is a positive impact of trade and FDI on capital formation on average in developing countries. The micro studies for the case of Vietnam suggest that the labor market is another channel through which globalization may bring growth where it spurs employment, raises wages and brings about interregional labor migration. The macro study also reveals a strong and positive direct impact of education on economic growth, which in turn is consistent with the results of the micro studies. The dissertation provides evidence that globalization and skill variables interact in ways that vary

depending on different channels and specific episodes of trade liberalization. For instance, whereas foreign firms generally pay higher foreign wage premiums for better educated workers, they also play a role in raising wages of less skilled women relative to alternative jobs in the informal wage sector. In the aftermath of the U.S.-Vietnam Bilateral Trade Agreement, Vietnam's provinces which are more exposed to the increase in export opportunities experienced a larger wage growth for unskilled workers and a decline of the skill premium relative to the other provinces. However, as Vietnam's economy-wide skill premium increased during the period studied, the latter effect appeared to have mitigated but did not outweigh the other effects which raised the skill premium.

Acknowledgements

I am deeply grateful to my advisor Professor Wim Vijverberg for his invaluable guidance, advice and support. He read my draft papers many times and guided me with extremely useful comments and suggestions. Whenever I had questions or sought help, he always responded generously with his time and profound knowledge. I learned a great deal from him and feel truly blessed to have had Professor Vijverberg as my mentor.

I am indebted greatly to the late Professor Robert Lipsey for his academic and moral support. From the early stages of my research, he kindly helped me to develop research ideas, patiently read my drafts, and continued to support me with his insightful comments, encouragement and positive perspective. I never imagined that my dissertation defense in July 2011 would become the last time I would see him. I will always be grateful to him and remember him as a role model.

My thanks also go to Professor Zadia Feliciano for her support and for serving on my dissertation committee. I particularly benefited from her advice on my empirical model. I am also grateful to Professor Terence Agbeyegbe for his guidance and support in studying dynamic panel data models; to Professor Michael Grossman for his generous support and advice on my draft paper; participants at the Applied Economic Seminar at the Graduate Center, especially to Professors Ryan Edwards, David Jaeger, and Merih Uctum for their very useful comments and discussions. Despite all the guidance and comments I have received, any remaining errors are mine.

I thank the General Statistics Office of Vietnam for providing the micro data, including the Vietnam Household Living Standards Survey (VHLSS), the Vietnam Migration Survey (VMS), and the annual Enterprise Survey data; and to the Graduate Center Doctoral Research Grants for financial support.

I extend my thanks to Professors Thom Thurston and Merih Uctum for their guidance and helping me with administrative matters. Special thanks go to Linda Perrotta, director of the Graduate Center's Child Development and Learning Center, and her excellent teachers. My daughter's stay at Linda's school not only made my studies possible, but also provided her with a wonderful preschool education.

Finally, I thank my husband, Jonathan Nelson, for his academic, emotional and spiritual support; my daughter for bringing joyful moments in everyday life; and, for their continual support in my pursuit of the Ph.D., my parents, Tadakazu and Ayako Fukase, my aunt Reiko Takashina, my sister and brother in law, Fumiko Fukase and Michael Indergaard, and my most inspiring friend Junko Otani. In particular, my father's lifetime commitment to *sekai heiwa* ("world peace") as a constitutional scholar continues to inspire, motivate and encourage me.

September, 2011

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Abbreviations and Acronyms

ADB	Asian Development Bank
ATC	Agreement on Textiles and Clothing
BTA	Bilateral Trade Agreement
CMT	Cut-Make-Trim
EP	Export Promotion
EPZ	Export Processing Zone
ERP	Effective Rate of Protection
FDI	Foreign Direct Investment
GATT	General Agreement on Trade and Tariffs
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
GSO	General Statistics Office
HCMC	Ho Chi Minh City
H-O-S	Heckscher-Ohlin-Samuelson
HS	Harmonized System
ILO	International Labour Organization
IS	Import Substitution
ISCO	International Standard Classification of Occupations
ISIC	International Standard Industrial Classification
IV	Instrumental Variable
M&A	Merger and Acquisition
MFN	Most Favored Nation
NAFTA	North American Free Trade Area
NEZ	New Economic Zone
NICs	Newly Industrializing Countries
NT	National Treatment
NTR	Normal Trade Relations
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
SBTC	Skill-Biased Technological Change
SIDA	Swedish International Development Agency
SOE	State-Owned Enterprise
S-S	Stolper-Samuelson
SUR	Seemingly Unrelated Regression
2SLS	Two-Stage Least Square
3SLS	Three-Stage Least Square
TRIM	Trade-Related Investment Measure
TVE	Township and Village Enterprise
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
VHLSS	Vietnam Household Living Standards Survey
VIF	Variance Inflation Factors
VLSS	Vietnam Living Standard Survey
VMS	Vietnam Migration Survey

VND	Vietnamese dong
VSIC	Vietnam Standard Industrial Classification
WTO	World Trade Organization

Introduction and Summary

This dissertation consists of one macroeconomic study that revisits the impacts of globalization[1] and education on economic growth (Chapter 1) and three micro-level case studies (Chapters 2-4) that investigate the effects of globalization on different types of workers (in terms of skills and gender) in Vietnam's labor market. The latter studies explore the impacts of Foreign Direct Investment (FDI) on wages (Chapter 2) and on internal migration (Chapter 3), and the effects of exports on skill premium (Chapter 4).

For 106 countries over 1969-2004, the first study investigates the relationship between trade, FDI, education and economic growth using the System Generalized Method of Moment (GMM) approach (Arellano and Bover, 1995; Blundell and Bond, 1998). In terms of the linkages between globalization and growth, the System GMM estimator provides support for some of the earlier findings. Trade and growth are usually positively correlated and capital formation appears to be an important channel through which trade brings growth (Wacziarg, 2001; Levine and Renelt, 1992). There generally exists a positive relationship between FDI inflow and economic growth for a subset of developing countries partly because FDI has a positive impact on host-countries' capital formation (de Mello, 1997; Wang, 2003).

The System GMM model reveals a robust positive impact of education on subsequent growth. The result contrasts with previous studies that find an insignificant or even a negatively significant relationship between education and economic growth using data on within-country *changes* in or *growth* of education (e.g., Benhabib and Spiegel, 1994; Pritchett,[2] 2001). The study

[1] Throughout the dissertation, globalization is defined as increase in trade or foreign direct investment (FDI).

[2] While there is solid microeconomic evidence of a positive return of schooling on individual wages, the results based on macroeconomic studies are mixed. For instance, finding a negative relationship between education growth and per capita GDP growth, Pritchett refers it as a "micro-macro paradox of negative externality" which implies high social cost of education in some countries.

suggests that the System GMM estimator is better suited to the characteristics of the data,[3] as it incorporates information on both cross-country variation in education *levels* and within-country *changes* in educational attainment. The study also explores whether or not FDI raises growth only when the host country has a minimum threshold stock of human capital (Borensztein, de Gregorio and Lee, 1998). Based on Borensztein *et al.*'s data, my study shows that their results are sensitive to the coverage of source and host countries.[4] One of the limitations of the macro study is that it cannot explore further how globalization and skills interact depending on different channels. In addition, the macro study does not differentiate how globalization would affect different types of workers. These limitations motivated me to turn to micro studies in Vietnam.

Since Vietnam started its transition from a centrally planned to a market oriented economy under its *doi moi* ("renovation") policy in 1986, Vietnam has been among the fastest growing economies with an average annual growth rate of 7.0 percent.[5] Stimulated by the U.S.-Vietnam Bilateral Trade Agreement (BTA) in 2001 and its accession to the World Trade Organization (WTO) in 2007, the ratio of imports plus exports relative to GDP rose from 113 percent in 2000 to 170 percent in 2007 (the World Bank). During the same period, the number of workers employed by foreign firms more than quadrupled from 0.4 million in 2000 to 1.7 million in 2007 (General Statistics Office of Vietnam). These changes make the Vietnamese economy an inviting case for microeconomic studies focusing on the labor market channel.

[3] Figure 1.1 in Chapter 1 shows a positive relationship between the *levels* in educational attainment and economic growth; little systematic variation in the *changes* in education across countries; and a negative relationship between the *growth* rate of education and economic growth, given the lower initial level of educational attainment for the lowest growing economies.

[4] Once developing countries are added as FDI source countries to Borensztein *et al.*'s actual dataset (which covers only developed economies as source countries), no evidence is found to support the existence of a threshold level of schooling. A potential explanation is that FDI may influence the economy of host countries through a variety of channels and that the role of human capital in affecting the impact of FDI may vary depending on different channels.

[5] The average for the period 1986-2007 (the World Bank).

Chapter 2 turns to the first case study to investigate the differential impacts of FDI on wages for different types of workers using the *Vietnam Household Living Standards Surveys* (VHLSS) of 2002 and 2004. Whereas most of the previous studies analyzing the impact of FDI on wages used firm-level data (thus excluding the informal sector), an advantage of using the VHLSS is that the data allow wage comparison analyses to extend to the informal wage sector. The results of earnings equations reveal that foreign firms pay higher wages relative to domestic counterparts after controlling for personal characteristics;[6] longer hours of work in foreign firm jobs relative to working in the informal wage sector are an important component of the wage premium; and the foreign wage premium is on average higher for higher educated workers.

The study also highlights the differential gender impacts of FDI in Vietnam's labor market. In particular, export-oriented, female-intensive activities by foreign firms (e.g., in the clothing, footwear, and electronics industries) raised labor demand disproportionately for females. The results of earnings regressions run separately by skill and gender reveal that female workers with lower levels of schooling experience a larger foreign wage premium relative to male counterparts, reflecting lower earning opportunities for unskilled women in the informal wage sector. However, the higher female foreign wage premium disappears or even is reversed both at higher levels of education and when the sample is restricted to the formal sector.

Chapter 3 focuses on the role of FDI as a determinant of internal migration and destination choices using the *Vietnam Migration Survey* (VMS) 2004 and the VHLSS 2004. Multinominal logit and conditional logit models are estimated to study both origin- and destination-specific

[6] Controlling for observable worker characteristics, the effects of foreign ownership on hourly wages are estimated to be about 30 percent and 46 percent higher wages relative to wages paid to similar workers employed with domestically-owned private firms and those working in the informal wage sector respectively. In order to control for unobservable worker characteristics, a worker-specific fixed-effects model is also estimated. With the latter model, the magnitude of foreign premium is decreased (perhaps because part of the wage premium in the cross-section model reflects workers' unobservable characteristics) and statistical precision is reduced (perhaps due to the small sample size of those who "switched" between foreign and domestic sectors).

characteristics of migrants respectively. The study emphasizes the differential migration patterns depending on four migration types, namely, migrants who reported to work in foreign, state, and private sectors in major urban and industrial areas (categories 1-3) as well as agricultural migrants (category 4). The study finds that the migration response to FDI job opportunities is larger for female workers than male workers.[7] In terms of educational attainment, there appears to be intermediate selection. Ethnic minority workers are less likely to relocate in search of FDI or other urban jobs (relative to the Kinh majority and Hoa), but they are more likely to move in search for agricultural opportunities.

Focusing on the *origin* areas, no evidence is found that scarce FDI job opportunities are a reason to push individuals to move out. In contrast, the conditional logit regressions that study the effect of characteristics of *destination* areas reveal a robust pattern of migrating individuals seeking out locations with higher FDI employment opportunities, even after controlling for income differentials, land differentials and distances between sending and receiving areas.

Chapter 4 explores how the expansion of labor-intensive manufacturing exports resulting from the U.S.-Vietnam BTA in 2001 translated into wages of skilled and unskilled workers and modified the skill premium in Vietnam through the channel of labor demand. In order to isolate the impact of trade shock from the effects of other market-oriented reforms, I exploit the regional variation in difference in exposure to trade (e.g., Coello, 2009; Chiquiar, 2008; McCaig, 2009b; Topalova, 2005; Wei and Wu, 2001). In particular, I construct an Export Index to capture the differential impact of trade shock on labor demand at the province level, taking account of the degree of provincial industrial development as well as export- and labor-intensities of each province's industrial composition.

[7] For instance, the result of the multinational logit model implies that, *ceteris paribus*, the relative probability of migrating to work in the foreign sector is about three times higher for females relative to males.

On the basis of data from the VHLSS 2002 and 2004 panel individuals, with a correction for potential endogeneity, the results of wage growth regressions confirm the existence of a Stolper-Samuelson (S-S) type effect, i.e., those provinces that are more exposed to the increase in export opportunities experienced a larger wage growth for unskilled workers and a decline of (or smaller rate of increase in) the relative wage of skilled and unskilled workers relative to the other provinces. However, since during the same period the skill-premium in Vietnam rose at the aggregate level, the S-S effect is likely to have mitigated—but did not outweigh—the other effects that raised the skill premium.[8]

In conclusion, my dissertation broadly supports the view that trade and FDI are "engines of growth", but its mechanisms are complex. The case studies in Vietnam suggest that one of the channels through which globalization may bring growth operates through the labor market effect, where it spurs employment, raises wages and brings about interregional labor migration. The macro study also reveals a strong and positive direct impact of education on economic growth, which in turn is consistent with the results based on micro studies.[9] In terms of the question how globalization and skill variables interact, the results in Vietnam are varied. Whereas foreign firms generally reward higher levels of education, they also play a role in raising wages of less skilled women relative to alternative jobs in the informal wage sector. The study also suggests that the S-S type effect appears to be one of the *components* of—rather than a dominant force behind—wage movements that may coexist with the other impacts of globalization and market-oriented reforms.

[8] There is a long list of variables which potentially contributed to the rise in skill premium including: Skill Biased Technological Change, the rise in return to education, privatization (Ho, Dong, Bowles and MacPhail, 2002), FDI which pays higher wages for skilled workers (e.g., Lipsey and Sjöholm, 2004; Te Velde and Morrissey, 2003), defensive innovation (Thoenig and Verdier, 2003), product upgrading (Verhoogen, 2008), and firms' switch to more advanced technologies (Yeaple, 2005). These effects are not mutually exclusive.

[9] A series of Mincerian earning regressions in Chapter 2 confirms the positive impacts of education level on wage *level*. Perhaps reflecting a transition from a centrally planned to market-oriented economy, the results of wage growth regressions in Chapter 4 also find a positive impact of education level on individuals' wage *growth* rate.

Chapter 1: Revisiting Linkages Between Openness, Education and Economic Growth: System GMM Approach[10]

[10] This chapter is based on an article published in *Journal of Economic Integration*, 2010, 25(1), 193-222. I am grateful for their permission to reprint it in my dissertation.

1. Introduction

Many cross-country studies from the 1990s find a strong positive relationship between outward orientation and economic growth (e.g., Dollar, 1992; Sachs and Warner, 1995). These studies typically regress per capita growth rate on various openness level variables. There also exist a number of studies to assess the linkages between economic growth and foreign direct investment (FDI) and their results are highly heterogeneous.[11] Utilizing data on FDI flows from industrial countries to 69 developing countries, Borensztein, de Gregorio and Lee (1998) find that FDI contributes to economic growth only when the host country has a minimum threshold stock of human capital.

Rodriguez and Rodrik (2001) re-investigate critically the conclusion of previous cross-country studies that openness is associated with higher rates of growth. They argue that a variety of measures of openness used in these studies are proxies for other policy or institutional variables and that the earlier results that openness enhances growth are not strong. Using the various authors' actual data sets in undertaking tests of the robustness, they show that many openness variables lose their statistical significance when these other policy and institutional variables are included in the regressions, different data are used, or different weights are utilized. Rodriguez and Rodrik warn that a liberal trade policy cannot guarantee higher growth.

Some economists argue that an attempt to isolate the impact of trade on growth in empirical analyses is futile, and emphasize the importance of combining liberal trade policies with other good policies and institutional development (Baldwin, 2003; Winters, 2004). Their recommendations include sound macroeconomic and fiscal policies, corruption-free institutions

[11] In his extensive review of home- and host-country effects of FDI, Lipsey (2004) concludes that one cannot say that there are "universal effects" of FDI on growth from the studies who find positive effects in some periods or among some groups of countries and suggests that there are circumstances, periods, and countries where FDI appears to have little relation to growth (p.369).

and an environment that encourages physical and human capital investments. Winters (2004) points out that many of these policies and institutions respond positively to trade liberalization (e.g., through increasing incentives to develop better institutions, promoting transparency and increasing the return to investments). Among these factors, Winters suggests education as "possibly top of any *a priori* list" (F16) as education imparts transferable skills; increases productivity which may lead to higher output; promotes health; creates social and political capital; and facilitates the absorption of new technologies.

While there is solid microeconomic evidence of a positive return of schooling on individual wages, macroeconomic studies which focus on changes in education frequently find an insignificant or even a negatively significant relationship between education and economic growth (e.g., Benhabib and Spiegel, 1994; Krueger and Lindahl, 2001; Pritchett, 2001). For instance, Pritchett (2001) calls this a "micro-macro paradox of negative externalities" (p.376).[12] The linkages between openness, education and growth are not settled issues.

For 106 countries over the period 1969-2004, this paper revisits the relationship between openness,[13] education and economic growth, using a series of panel data techniques. In particular, the paper highlights how the results obtained by the System Generalized Method of Moment (GMM) approach (Arellano and Bover, 1995; Blundell and Bond, 1998), which solves difference and level equations as a system, bring new insights relative to the previous literature. Section 2 reviews summary statistics on economic growth, education and openness by growth quartiles. Section 3 presents a series of regressions with varying specifications. When it is not possible to isolate the partial effect of openness on growth from other related policy and economic variables, e.g., when openness variables lose statistical significance with the inclusion

[12] Pritchett hypothesizes that in some countries education may have created "better-educated pirates" who engage in "privately remunerative but socially wasteful or counterproductive activities" (p.387).
[13] Openness variables are measured by the volumes of trade and FDI as shares of GDP.

of control variables in my regressions, potential relationships between these variables are discussed. It is also demonstrated how the System GMM estimator may improve the estimate of the impact of education relative to the models which focus on within-country *change*s adding information on cross-country variation in education *levels*. Section 4 revisits the findings of Borensztein *et al*. (1998), using the actual dataset used in that study. Section 5 summarizes my conclusions.

2. Growth, Education, and Openness – Overview

Table 1.1 shows the average annual growth rates of real per-capita GDP for 106 countries by growth performance for the period 1969 to 2004.

The first, second, third and fourth columns present the highest, high-middle, low-middle, and the lowest quartile countries classified by their average annual growth rates during the same period. The highest quartile countries include many fast-growing East-Asian and South-East Asian economies as well as other transitional economies. Among these, one sub-Saharan African country, Botswana, was the second fastest growing country during the same period. Many OECD countries belong to the high-middle growth quartile. With an exception of Papua New Guinea, the lowest growing quartile is comprised of Sub-Saharan African, Middle-Eastern, Latin American and Caribbean countries.

Table 1.2 demonstrates summary statistics for GDP growth rate, GDP per capita, total education years, trade, and FDI inflow as the averages over the period 1969 to 2004 by growth quartiles.

There is substantial variation in annual real GDP per capita growth rates among these four groups of countries with averages over the period of 4.0 percent, 2.0 percent, 1.1 percent and -0.66 percent for the highest, high-middle, low-middle and lowest growth economies respectively.

The average real GDP per capita are recorded as $8136.7, $9449.5, $3820.6, and $3198.8 for these same groups. GDP per capita of high-middle growth countries on average is higher than that of the highest growth economies partly because the former group includes many high-income OECD economies. Within the subgroup of fast growers (the highest and high-middle quartiles combined), lower income countries appear on average to grow faster than higher income countries implying that the economies are converging even unconditionally. Unfortunately, within the sub-group of slow growers (low-middle and lowest quartiles), the lowest growing group records the lowest average GDP per capita implying that these economies are falling further behind.

During the same period, the high-middle quartile economies record the highest schooling attainment with 6.4 total years of education which is slightly higher than that of the highest quartile countries (6.1 years). The level of education attainments of low-middle and lowest-quartile economies are clearly low relative to the upper-half group, registering 4.5 years and 3.4 years respectively. In terms of openness variables, trade relative to GDP reaches levels of 91.7 percent, 62.9 percent, 67.9 percent, and 61.1 percent for the highest, high-middle, low-middle, and lowest quartile economies respectively. FDI inflow relative to GDP accounts for 2.3 percent, 1.8 percent, 1.6 percent and 1.9 percent for the same groups of countries.

The time trends of educational achievement by growth performance are shown in Figure 1.1, which plots the average years of schooling by growth category over the 1970-2000 periods. During the past three decades, the world as a whole has achieved a substantial improvement in educational attainment as the countries in all four growth categories show steady progress. The *changes* in educational attainment appear to be similar across growth categories. The only noticeable exception is that the schooling years of the countries classified into the highest growth

quartile rose slightly faster than the other groups converging towards the highest level attained by the high-middle quartile of countries. In contrast, Figure 1.1 reveals a clear positive relationship between the *levels* of educational attainment and economic growth. Throughout the period, the total education years for the highest and high-middle quartile economies are higher relative to the lower groups, those attained by low-middle growing economies are lower than the upper half growing economies, and those for the lowest growing economies lag further behind. These characteristics of the actual data are consistent with the previous studies which find no or even negative association between economic growth and education growth (e.g., Benhabib and Spiegel, 1994; Pritchett, 2001). An econometric technique which exploits information on the levels of education is clearly needed to assess properly the impacts of education on growth.

3. Impacts of Trade, FDI and Education on Economic Growth

3.1. Model Specification

In this section, I outline 5-year period growth regressions using a series of models: pooled Ordinary Least Squares (OLS), fixed effects, first-differenced GMM, and System GMM. My panel data consist of observations from 106 countries during the period 1969 to 2004 at the five year intervals.[14] I first specify a growth level equation of the type considered typically in the literature (see, for instance, Caselli, Esquivel, and Lefort, Section 5, 1996):

$$y_{it} - y_{i(t-1)} = \beta y_{i(t-1)} + \boldsymbol{x}'_{it}\boldsymbol{\gamma} + \xi_t + \eta_i + v_{it} \qquad (1)$$

where y_{it} denotes the logarithm of real per-capita GDP in country i in year t; $\boldsymbol{x}_{it}$ is a vector of explanatory variable; ξ_t is the time specific effect which captures global shocks; η_i is the country-specific effect; and v_{it} is the error term. The education variable is measured at the beginning of

[14] This time frame is chosen since the period ending at the year 2004 is the latest five year interval for which the initial education data are available and the 1970s are the oldest decade when the FDI data become available for a sufficient number of countries.

each five year period and the other variables are measured as averages from t to t-4. Since my analysis is focused on five year growth rates, ι is 5 in my regression. Equation (1) can be re-written as a dynamic model in the level of per capita GDP by adding $y_{i(t-\iota)}$ to both sides:

$$y_{it} = \alpha y_{i(t-\iota)} + \boldsymbol{x'}_{it}\boldsymbol{\gamma} + \xi_t + \eta_i + v_{it} \qquad (1')$$

where $\alpha = (1+\beta)$.

In the presence of the country specific effect η_i, it is well known that the OLS estimate of the coefficient on the lagged dependent variable α is likely to be biased upward since the lagged dependent variable is positively correlated with η_i (see for instance Blundell and Bond, 1998). One approach to address the country specific effects is the fixed effects estimator. For this model, equation (1') is transformed by taking the deviation from the time series mean of each variable for each country, and then the transformed equation is estimated by OLS. In this transformation process, the country specific effects η_i can be removed. A disadvantage of using the fixed effects model is that it uses only the variation within countries and the cross-sectional variation is discarded. In addition, equation (1') contains a lagged endogenous variable, namely the income term. Thus, with a small number of time series periods, the model provides biased and inconsistent estimates even if data from a large number of countries are considered. In contrast to the OLS estimate, the fixed effects estimate of the coefficient on the lagged dependent variable α is likely to be biased downward (Arellano and Bond, 1991).

Arellano and Bond (1991) suggest an alternative estimation technique that addresses the presence of the lagged endogenous variable and permits a certain degree of endogeneity in the other explanatory variables. Their GMM estimator first-differences Equation (1') in order to eliminate the country-specific effect, and then uses all possible lagged levels as instruments. Arellano and Bond's Difference Equation is:

$$\Delta y_{it} = \alpha \Delta y_{i(t-1)} + \Delta \boldsymbol{x}'_{it} \boldsymbol{\gamma} + \Delta \xi_t + \Delta v_{it} \quad (2)$$

Since $\Delta y_{i(t-1)}$ and Δv_{it} are correlated, the OLS estimate of Equation (2) is inconsistent. Assuming that the error terms are serially uncorrelated in Equation (1), the level of y_{it} lagged two periods or more can be used as valid instruments for Equation (2). This is because $\Delta y_{i(t-2)}$ and earlier values are correlated with $\Delta y_{i(t-1)}$, but not with Δv_{it}. Assuming that the $\boldsymbol{x}_{it}$ are predetermined in the sense that $\boldsymbol{x}_{it}$ and v_{it} are uncorrelated, but $\boldsymbol{x}_{it}$ may be correlated with $v_{i(t-1)}$ and earlier errors, $\boldsymbol{x}_{it}$ lagged one period or more are also used as valid instruments. Thus, the relevant moment conditions are:

$E[y_{i(t-s)} \Delta v_{it}] = 0 \text{ for } s \geq 2; \; t = 3, \ldots . T$

$E[\boldsymbol{x}_{i(t-s)} \Delta v_{it}] = 0 \text{ for } s \geq 1; \; t = 3 \ldots . T.$

Using Arellano and Bond (1991)'s first-differenced GMM estimator, Dollar and Kraay (2004) focus on the effects of within-country *change* in trade policy on subsequent growth. They point out that the methodology employed by the earlier literature which relates growth to cross-country differences in trade volumes is not suitable to evaluate the effects of trade *policy* since a significant share of the variation in trade across countries reflects countries' geographical characteristics. By taking the difference, they argue that their results are not driven by geography and other time-invariant country specific characteristics. Their first-differenced GMM estimators reveal a strong positive relationship between *change* in trade and growth.

Blundell and Bond (1998) point out that the first-differenced GMM estimators are likely to perform poorly when the time series are persistent and the number of time periods is small. This is because lagged levels of the series provide only weak instruments for the differenced equations. Another shortcoming of using the difference estimator is that the process of differencing to remove the country specific effect also eliminates information on the cross-country variation in levels. The System GMM estimator proposed by Arellano and Bover (1995)

and Blundell and Bond (1998) combines the standard set of moment conditions in first-differences with lagged levels as instruments, with an additional set of moment conditions derived from the equation in levels. The availability of additional moment conditions depends on assumptions made about the correlation between $\boldsymbol{x}_{it}$ and the country-specific effect η_i. Following Blundell and Bond (1998), it is assumed that the difference of $\boldsymbol{x}_{it}$ is uncorrelated with the individual effects although $\boldsymbol{x}_{it}$ and η_i are allowed to be correlated.

Thus, the additional moment conditions for the equation in levels are:

$E[\Delta y_{i(t-1)} u_{it}] = 0$ *where* $u_{it} = \eta_i + v_{it}$

$E[\Delta \boldsymbol{x}_{it} u_{it}] = 0.$

Carkovic and Levine (2005) use the System GMM estimator to re-examine the relationship between FDI and growth, but find no robust evidence supporting the claim that FDI accelerates growth. Felbermayr (2005) employs the System GMM estimator to revisit the relationship between trade and growth and finds a robust and positive relationship between these variables.

3.2. Regression Results

Table 1.3 demonstrates a series of regression results using pooled OLS, fixed effects, Arellano and Bond (1991) differenced GMM, and System GMM estimators.[15]

The coefficients on the lagged dependent variable in all the models are found to have a value of less than one and to be statistically significant at the 1 percent level, providing strong evidence of conditional convergence.[16]

[15] The Data Appendix provides details on data sources.

[16] As expected, the magnitude of the coefficient for the lagged dependent variable estimated by OLS is higher than that estimated using the fixed effects method and it is likely that the OLS estimate and fixed effects estimates give upwards- and downwards-biased estimates respectively. The differenced GMM estimate for the lagged dependent variable is found to be below the fixed effects estimate. This downward bias in the differenced GMM estimator is consistent with the finite sample bias expected in the case of highly persistent series (Blundell and Bond, 1998). The System GMM estimator of the lagged dependent variable appears to provide the most reasonable results with the magnitude of coefficient lower than the OLS and higher than the fixed effects estimates.

The coefficient on education[17] estimated by OLS is found to be positively significant confirming the positive association between the initial level of human capital and subsequent economic growth (Barro, 1991). In contrast, using fixed effects and first-differenced GMM estimators, the coefficients on education lose statistical significance perhaps because these within country models discard information on cross-country variations in education levels. When the System GMM estimator is employed, the coefficient on education reverts to become significantly positive suggesting that the additional moment conditions derived from the level equation are highly informative.

The coefficients on trade are found to be statistically significant and positive using the fixed effects and System GMM models. The coefficients on FDI turn out to be significantly positive using all methods except the System GMM model. The coefficients on inflation show a significant and negative relationship in all the models.

The validity of instruments for first-differenced and System GMM estimator can be evaluated by a set of specification test (Arellano and Bond, 1991). The application of the Hansen test of over-identifying restrictions provides no ground to reject the validity of the instruments. m1 and m2 tests show a first order serial correlation in the first- differenced equation, but detect no evidence of second order serial correlation. Overall, there are several advantages in the System

[17] The average of male and female schooling years for the population over age 15 is used as a proxy of education. An alternative model of disaggregating education by gender was also considered. However, the latter specification reproduced somewhat "puzzling" results in the previous studies. The results of OLS model, a significantly positive coefficient on male education and a negative one on female education, are consistent with the literature (Barro and Sala-i-Martin, 1995; Wacziarg, 2001). The results of fixed effects and differenced GMM estimators reveal the reversal of the signs of male and female education although they are not statistically significant or are significant only marginally. These changes of signs are also consistent with the earlier works which use the first-differenced GMM estimators (Caselli *et al*., 1996). With the System GMM estimates, the coefficients on male and female education years both show positive signs although only the coefficient on female education is significant at the five percent level. A potential explanation of these "unstable" results is that the collinearity between male and female schooling variables is inflating the standard errors. The Variance Inflation Factors (VIFs) for female and male schooling variables are 15.7 and 13.0 respectively suggesting a high degree of collinearity between two variables. Wetherill (1986) suggests that, as a rule of thumb, a VIF higher than 10 is of concern. Thus, the specification of including separate male and female education years was dropped.

GMM estimator since it controls for time-invariant country specific effects; deals with the endogeneity problem of lagged dependent variable; permits a certain degree of endogeneity in the other regressors, and optimally combines information on cross-country variation in levels with that on within-country variation in changes.

3.3. Models with Alternative Specifications

In order to test the sensitivity of the results to the conditioning variables included, Table 1.4.A gives the results of the models estimated by System GMM with a series of different specifications.[18]

The first six columns report the regression results when the openness variables are included separately. When only trade and FDI variables are included along with income terms, the coefficients on trade and FDI are positively significant at the one percent level in regression (1) and in regression (2) respectively. With the latter specifications, the coefficients on the lagged dependent variable turn out to be greater than one implying that these economies would not be converging unconditionally. This result is consistent with Barro's seminal paper (1991) which finds that countries' incomes converge only when controlling for initial human capital and some other variables. The next two regressions introduce education and inflation as control variables: the coefficients of trade and FDI remain positively significant in regression (3) and in regression (4) at the one percent level. The next two regressions include gross capital formation as a control variable. As expected, the coefficients on capital are found to be highly significant at the one percent level. However, adding the capital variable, the coefficients on trade and FDI lose statistical significance in regression (5) and regression (6) respectively.

[18] Although the results of System GMM models are highlighted in this paper, the outcomes of the pooled OLS and fixed effect models are reported in Appendix Table 1.A.1 for the purpose of comparison.

The final three columns show the results when trade and FDI variables are simultaneously included in the regressions. The results of regression (7)[19] reveal that, including both openness variables, only the coefficient on trade demonstrates a statistically significant positive relationship. Controlling for government consumption expenditure as percent of GDP in regression (8), the results of other variables remain essentially unchanged. Finally, adjusting for capital in regression (9), the FDI variable turns out to be significant whereas the trade variable loses its statistical significance.

Several findings emerge as the results of these regressions. First, without gross capital formation as a control variable, the coefficients on trade are positively significant in all the System GMM models. In contrast, when the regressions include capital formation, the coefficients on trade lose their explanatory power. These results are consistent with the view that trade might be contributing to economic growth largely through investment, (for instance, in the form of increase in imports of capital goods or investment related to the expansion in exports). Wacziarg (2001) employs a three-stage least squares (3SLS) model in order to evaluate simultaneously the mechanism through which trade would bring growth. He considers six channel variables, namely improved macroeconomic policies, reduced distortions, government consumption, technological transmissions (proxied by manufactured exports), investment rate and FDI, through which trade affects growth. Wacziarg (2001)'s model confirms that trade has a strong positive impact on economic growth, and that the accelerated accumulation of physical capital accounts for more than half of the total effect of trade policy on growth. Levine and Renelt (1992) also identify a positive, robust correlation between growth and the share of investment in GDP and between the investment share and the ratio of trade to GDP.

[19] This model is the same as that in Column 4 in Table 1.3.

In order to investigate how trade and capital formation are correlated in my sample, Figure 1.2.A plots the relationship between these variables for the observations in my dataset.

Overall, trade is shown to be positively associated with capital formation. Evaluating the data by the subsets of OECD[20] and non-OECD economies, it is revealed that there is a positive robust link between trade and capital in non-OECD countries, but that the correlation is close to zero for OECD countries.

Second, when both trade and FDI variables are included in the regressions, one of these variables tends to lose statistical significance. Trade and FDI are linked in many different ways. First, both variables might reflect the general openness of a country (e.g., if a country "opens up" and liberalizes trade and investment regimes simultaneously). Second, increases in trade may be directly caused by increases in FDI, due to a much greater propensity to trade of foreign firms relative to domestic firms.[21] Third, the association might reflect features of FDI, e.g., so-called "horizontal" FDI to serve a protected host-country market vs. "vertical" FDI that is integrated into the global production network of the parent multinationals. With "horizontal" FDI, as FDI may occur to save trade costs, FDI acts mainly as a substitute for trade. In contrast, in the context of "vertical" integration strategies in which multinationals locate their production activities across different countries taking advantage of international factor price differences, trade and FDI tend to be complements. Figure 1.2.B reveals a positive correlation between trade and FDI for both OECD and non-OECD economies.

[20] The OECD countries are defined as the current member countries for which the data are available, namely, Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and the United States. Czech Republic, Luxembourg, and Slovak Republic are not included due to the unavailability of the data.

[21] According to the *Enterprise Surveys* of 96 countries conducted by World Bank/IFC (www.enterprisesurveys.org), foreign firms are engaged in trade much more than domestic firms. The shares of foreign firms (domestic firms) who directly import and export are 68.0 percent (43.3 percent) and 43.3 percent (18.1 percent) respectively (author's calculation based on *Enterprise Surveys*).

Third, the coefficients on FDI are sensitive to the inclusion of the capital variable. The effects of FDI on capital formation can be either positive or negative. On the positive side, foreign firms, especially FDI in the form of greenfield investments,[22] may contribute directly to domestic capital formation. As foreign firms are more involved in trade relative to domestic firms, FDI might promote trade-induced investments. They might also indirectly stimulate domestic investment through backward and forward linkages. On the other hand, FDI might be harmful to domestic capital formation by crowding out domestic investments and forcing inefficient firms out of business. Policies offering preferential tax treatment and other incentives to attract FDI may result in forgone public revenues and introduce distortions affecting domestic investments.

Figure 1.2.C plots the relationship between FDI inflow and gross capital formation. Overall, there exists a positive correlation between these variables. Whereas the link is found to be positive for non-OECD economies, the association appears to be negative for OECD economies. Some studies suggest that FDI may play a greater role in the capital formation in developing countries since the latter countries rely more on foreign capital as sources of funds and more FDI takes the form of greenfield investments. In contrast, developed countries have access to their own capital markets and most FDI in these countries represents the purchase of existing assets and companies. De Mello (1997) argues that the extent to which FDI is growth-enhancing is influenced by the degree of complementarity and substitution between FDI and domestic investment in the short run. In developing countries (technological followers), according to de Mello, FDI may be promoted as a means to foster capital accumulation as complementarity of technology would lead to a more diversified production base. In contrast, in more

[22]In the short-run, greenfield FDI, or investment in new projects, usually contributes directly to the stock of productive capital in the host country (by setting up a new production base for instance). In contrast, a merger or acquisition (M&A) generally adds to "foreign-owned" capital stock, but does not represent an immediate addition to the capital stock of countries. In the long-run, the impacts of FDI on capital formation are difficult to distinguish by mode of entry (UNCTAD, 2006).

technologically advanced economies, a "Shumpeterian view of FDI-related innovative investment" which implies creative destruction through substitution (de Mello, p.20), might be more relevant since more efficient technologies embodied in FDI may lead to faster technological obsolescence. Based on data for 50 countries, Wang (2003) finds a negative contemporaneous effect of FDI inflows on domestic investment in OECD countries. She also demonstrates that the cumulative long-run effect of FDI inflows on a host country's domestic investment tends to be positive in non-OECD countries and neutral in OECD countries. Table 1.4.B demonstrates the regression results for a subset of non-OECD economies.[23] The results demonstrate a robust positive relationship between FDI inflow and growth with the coefficients on FDI of all the models becoming positively significant.[24]

Finally, the positive association between education and growth in System GMM models is robust to the inclusion of various control variables with the coefficients on education of all the models revealing a significantly positive relationship. The magnitudes of the effect of schooling on growth vary depending on the control variables. For instance, controlling for physical capital and other variables in regression (9), an increase by one year in the average education years of the population over age 15 is associated with about .67 percent faster annual growth in per capita GDP. These findings contrast with the results obtained from the *within*-country fixed effects models where none of the coefficients on education reveals any statistically significant relationship (see Appendix Table 1.A.1). This exercise suggests that the results of the coefficients on education obtained from within-country panel data models need to be interpreted

[23] System GMM estimator is designed for situations with "Small T, large N" panels meaning few time periods and many individuals (Roodman, 2006). For the subset of OECD countries, it became impossible to run the System GMM regressions due to the reduced sample size. See Appendix Table 1.A.1 for the results of OLS and fixed effect models.

[24] However, further robustness analyses reveal that the coefficients of FDI become insignificant when inflation is not included in the regressions. Thus, it should not be assumed that FDI is always growth enhancing in developing countries.

with caution since the latter models wipe out the information on cross-country variation in the levels of educational attainment.

A similar insight would be relevant for the models derived from growth accounting exercises since the growth rates of human capital also fail to incorporate cross country variation in education levels. For instance, Benhabib and Spiegel (1994) estimate growth accounting regressions relating the growth rate of GDP to the log change in years of schooling and find insignificant and usually negative coefficients on human capital growth rates. However, specifying an alternative model in which the growth rate of technological progress depends on a country's human capital stock level, Benhabib and Spiegel find a positive relationship between human capital and economic growth. They in turn conclude that education is not directly important as a factor of production and that human capital affects growth by promoting technological innovation and facilitating adoption of technology from abroad. However, I cast some doubt on Benhabib and Spiegel's conclusion that human capital is not a productive input in the production function since, when the log level of GDP is regressed on the log level of education, the coefficient on education turns out to be positive and highly significant.[25]

4. Revisiting Borensztein, de Gregorio and Lee (1998)

Borensztein *et al*. (1998) test the impact of FDI on economic growth via transfer of technology dealing with data on FDI flows from industrial countries to 69 developing countries. They find a

[25] Assuming a simplified version of the production function in which per capita income (Y_t) is a function of physical capital (K_t) and human capital (H_t), $Y_t=g(K_t, H_t)$, and taking log differences, I estimate the following relationship for my sample:

$\Delta log\ Y_t = 0.087^{***} + 0.22^{***}\Delta log\ K_t - 0.16^{***}\Delta log\ H_t$

$\quad\quad (0.0095) \quad (0.031) \quad\quad (0.044)$

(R^2= 0.12; number of observations=560; robust standard errors are in parentheses)

Similar to the findings of Benhabib and Spiegel and others, the coefficient on log difference in human capital is found to be significantly negative.

However, when the log level of income per capita is regressed on the log level of human capital, the coefficient on the log level of education turns out to be highly positively significant as shown below.

$log\ Y_t = 3.70^{***} + 0.48^{*} log\ K_t + 1.71^{***} log\ H_t$

$\quad\quad (0.79) \quad (0.27) \quad\quad (0.13)$

(R^2= 0.54; number of observations=667; robust standard errors are in parentheses)

positively significant coefficient for the interaction term between FDI and schooling and suggest that the beneficial effects of FDI in terms of growth hold only when the host country has a minimum threshold stock of human capital. However, a recent study by Carkovic and Levine (2005) finds little evidence that FDI would affect economic growth even allowing for the interaction between FDI and human capital.

Borensztein *et al*.'s findings lead to a question whether some minimum level of human capital is a prerequisite for a country to reap any benefit from FDI. Based on case study evidence involving poorer developing countries, Moran (2005) suggests that allowing foreign firms to invest in economic sectors which employ the low-skilled workers in the early stages of export-led growth[26] might provide positive impacts to the least developed countries in terms of generating employment opportunities and export revenues. As foreign firms have an incentive to locate labor-intensive activities in low-wage countries either in the context of vertical integration strategy[27] or "export platform" operations, FDI may play a key role in utilizing efficiently low-skilled labor in which the least developed economies possess a comparative advantage. Applying the Smith-Myint model of "vent for surplus" to China, Fu and Balasubramanyam (2005) find that the expansion of exports from labor-intensive manufacturing, assisted by FDI, has promoted the growth of industrial output and accelerated the transfer of surplus labor from the agricultural to the export sector.

Slaughter (2002) suggests that FDI might contribute to a host country's good macro environment in which fiscal policy drives productive investments, through for instance

[26] Balasubramanyam, Salisu, and Sapsford (1996) find that the beneficial effect of FDI on economic growth is stronger when developing countries pursue the export promoting (EP) strategy rather than the import substituting (IS) strategy.

[27] Using firm-level data on U.S. multinationals, Hanson, Mataloni and Slaughter (2005) examine the behavior of multinational firms locating input processing in their foreign affiliates. They find that the demand for imported inputs by U.S. multinationals is higher when affiliates face lower wages for less-skilled labor.

contributing to host-country revenues. Botswana's FDI experience can be cited as an example that even a least developed country with a minimal initial stock of human capital might reap such benefits if a country has strong institutions. Botswana is among the fastest growing economies (the second fastest after China in my sample) with an average annual real per capita GDP growth rate of 6.8 percent for the past 35 years. Starting as a very poor nation at independence in 1966 with per capita income of merely $312,[28] Botswana now belongs to the upper-middle income countries with real per capita GDP of $3,683.9 in 2004 (The World Bank). Several studies document the presence of good institutions among the causes of its high economic growth (Acemoglu, Johnson, and Robinson, 2001; Mehlum, Moene, and Torvik, 2006; Olsson, 2006). Soon after the Kimberlite diamond pipes were found in the early 1970s**,** the Botswanan government formed a joint venture with the South African firm De Beers, which has a dominant position in the global diamond market.[29] Botswana in turn invested its revenues from diamonds in a socially efficient way in public goods such as infrastructure, health and education (Acemoglu *et al.*, 2001). For instance, Botswana accumulated human capital at a much faster rate than the world average with the average education years of its population increasing from 2.0 years in 1970 to 6.3 years in 2000 (Barro and Lee, 2000).

Blonigen and Wang (2005) argue that it is inappropriate to pool developing and developed countries in empirical analyses since there is a systematic difference in the determinants and effects of FDI between these two groups of countries. They test a hypothesis that the contrasting results between Borensztein *et al*. (1998) and Carkovic and Levine (2005) might be attributed to

[28] 2000 constant price.
[29] See Olsson (2006) for the crucial role of Botswana's joint venture with De Beers in securing revenue from diamond production.

the different coverage of host countries included in their samples.[30] Extending Borensztein *et al.*'s dataset adding developed countries as *host* countries, and observing that the interaction term loses its significance, Blonigen and Wang argue that Borensztein *et al.*'s conclusions are supported only for developing host countries. In the next subsection, I extend Borenstzein *et al.*/Blonigen and Wang's analyses and investigate what happens if the *source* countries are extended to both OECD and non-OECD countries using their actual dataset.

Column 1 on Table 1.5 reproduces Borenstzein *et al.*'s results of the impact of FDI from OECD to developing countries (Regression 1.3 in Table 1, p.124) using the Seemingly Unrelated Regression (SUR) techniques for the periods 1970s and 1980s.

The results demonstrate that whereas the coefficient on FDI is negative but insignificant, the interaction term is positively significant at the one percent level. The values of these coefficients imply that the countries with male secondary school attainment above .52 will benefit from FDI, which is the identical result with Borenstzein *et al.*'s (p.125). Column 2 of Table 1.5 provides the results of the effects of FDI from OECD to both developed and developing economies as *host* countries using Blonigen and Wang's (2005) extended dataset. The results show much reduced and statistically insignificant coefficient estimates on FDI measures supporting Blonigen and Wang (2005)'s conclusion that FDI from developed countries affects growth conditioned on a sufficient level of human capital only in developing host countries.

Finally, Column 3 of Table 1.5 reports the results replacing the FDI variable with those from all the *source* countries to developing *host* countries. Whereas the coefficient on FDI is found to be positively significant at the five percent level, the coefficient on the interaction term becomes insignificant. These results imply that, once all the source countries are taken into consideration,

[30]Carkovic and Levine (2005) deal with both developing and developed countries as source and destination of FDI. Borensztein *et al.* investigate only the FDI originated in OECD countries to developing countries assuming that FDI flows from industrialized to developing countries to "close the technological gap" (Borensztein *et al.* , 1998, p.122).

the growth of developing countries is generally associated positively with FDI and that no evidence is found to support the existence of threshold level of schooling below which developing host countries cease to benefit.

It is not the purpose of this exercise to argue that human capital is not important interactively with FDI. Perhaps, *Borenstzein et al.*'s conclusions may be valid for the technology transfer channel from developed countries but developing source countries may contribute to growth in other developing countries probably due to the use of technology that is more compatible with host-country educational levels. In other words, this paper suggests that there appears to be a variety of channels through which FDI can affect growth and that the role of human capital are likely to differ depending on different channels, industries, and host country policies and institutional capabilities.

Table 1.6 demonstrates the results of System GMM models re-estimating the regressions in Table 1.4.A including the interaction term between schooling and FDI.

Surprisingly, the coefficients on interaction terms turn out to be negatively significant in four out of the six models implying that the growth effect of FDI is greater for countries with lower human capital.[31] These findings may appear puzzling, but are consistent with Carkovic and Levine's (2005).[32] A potential explanation is that the interaction term may have captured an overall tendency for the impacts of FDI to be greater in developing countries (with less human capital) than in developed countries (with more human capital). The results of the impacts of FDI vary depending on the periods included. Excluding the most recent three periods, namely 1989-2004, the coefficients on the interaction term turn out to be insignificant (not reported). Perhaps, a variety of changing characteristics of FDI – including a greater level of cross-border mergers

[31] The qualitative results are similar when I use OLS, SUR and fixed effects models.
[32] Investigating 70 countries over the periods 1960 to 1995, Carkovic and Levine (2005) find that the coefficients on FDI*education are either insignificant or negatively significant in their System GMM models.

and acquisitions (M&As) relative to the earlier periods, and increasing participation of developing economies as sources of FDI[33] (UNCTAD, 2006) – may have been altering the impacts of FDI in host countries over time.

5. Conclusions

This paper revisits the relationship between openness, education and economic growth for 106 countries over the periods 1969-2004 using the System GMM approach.

In terms of the linkages between openness and growth, the system GMM estimators provide support for some of the earlier findings. Whereas there are usually positive ties between trade and growth, the coefficient on trade loses statistical significance when the regressions include capital formation. The latter result is consistent with the earlier research findings that trade is largely linked to higher growth via investment (Wacziarg, 2001; Levine and Renelt, 1992).

There generally exists a positive relationship between FDI inflow and economic growth for a subset of non-OECD countries. This may be partly because FDI has on average positive impacts on host-countries' capital formation in developing countries (de Mello 1997; Wang, 2003). However, the paper does not reveal clear insights on how FDI and education interact to affect economic growth. In my regressions, the coefficients for the interaction term between FDI and education are found to be sensitive to the coverage of source and host countries and the periods included. The paper suggests that there appears to be a variety of channels through which FDI can affect growth and that the role of human capital are likely to differ depending on different channels, industries, and host country policies and institutional capabilities.

[33] For low-income developing countries, FDI from developing countries accounts for a large share of total FDI flows. FDI by developing countries might have a greater employment–generating potential relative to those by developed countries since they may be oriented more towards labor-intensive industries and may use simpler technologies. The example of such FDI is the emergence of East Asian developing countries as foreign investors in labor-intensive sectors in Asia (UNCTAD, 2006).

Finally, the System GMM approach is found to improve substantially the estimate of the impacts of education on growth relative to the models which focus on the changes in educational attainment. The effect of education on economic growth has been debated in the literature. Whereas earlier studies identified the positive impacts of the initial level of education on economic growth (e.g., Barro, 1991), some influential papers which relate economic growth and education growth find insignificant and even negative coefficients on education (e.g., Benhabib and Spiegel, 1994; Pritchett, 2001). This paper hypothesizes that these mixed results are attributed to the characteristics of the data, i.e., whereas there exists a positive relationship between the *levels* in educational attainment and economic growth, there is little systematic variation in the *changes* in education across countries (see Figure 1.1). The System GMM approach is shown to be better suited to the actual data: once information on cross country variation in education levels is added to data on within-country changes in education, the System GMM estimator reveals a strong positive relationship between education and subsequent growth. These exercises have important policy implications. Given fiscal budget constraints, there exists a potential danger that a belief that education has little or even a negative effect upon economic growth may discourage public investment in education. This paper emphasizes that there indeed exists a robust positive association between education and subsequent growth and suggests that investment in schooling should be among the top priorities in countries' development strategies.

Data Appendix

The following data are extracted from *the World Development Indicators* (the World Bank) from 1969 to 2004: real per capita GDP in constant 2000 prices; inflation rate in consumer prices, trade (imports plus exports) as percent of GDP; government consumption as percent of GDP; and gross capital formation as percent of GDP. The data for FDI inflow as percent of GDP are taken

from *Foreign Direct Investment (FDI) Database* of UNCTAD. The averages of male and female schooling years for the population over age 15 are computed from Barro and Lee's dataset (2000). The FDI data used for Borensztein *et al*. (1998) and Blonigen and Wang (2005)'s studies were provided by Miao Wang.

Table 1.1. Average Annual Real Per Capita Growth Rates for the Periods 1969-2004

Highest Quartile		High-middle Quartile		Low-middle Quartile		Lowest Quartile	
Country	Growth Rate (%)	Country	Growth Rate (%)	Country	Growth Rate (%)	Country	Growth Rate (%)
China	7.40	Hungary	2.46	Mexico	1.64	Bahrain[12]	.59
Botswana	6.80	Spain	2.45	Denmark	1.60	Argentina	.57
Korea	5.80	Uganda[4]	2.29	Nepal	1.55	Senegal	.45
Singapore	5.31	Belgium	2.27	Panama	1.53	Jamaica	.44
Malta	5.28	Brazil	2.27	Paraguay	1.51	Peru	.41
Cyprus[1]	5.21	Pakistan	2.26	Barbados[9]	1.51	Papua New Guinea	.41
Hong Kong	4.82	Greece	2.23	Tanzania[10]	1.47	El Salvador	.34
Thailand	4.68	Syrian Arab Republic	2.20	Ecuador	1.44	Iran[13]	.31
Mauritius[2]	4.31	Italy	2.19	Yemen[11]	1.31	Burundi	.31
Ireland	4.23	United Kingdom	2.14	Algeria	1.31	South Africa	.29
Indonesia	4.17	Mozambique[5]	2.10	Uruguay	1.30	Bolivia	.27
Malaysia	4.08	Turkey	2.10	Cameroon	1.29	Ghana	.20
Lesotho	3.94	Jordan[6]	2.09	Bangladesh	1.27	Zimbabwe[14]	.18
Poland[3]	3.47	Israel	2.04	New Zealand	1.22	Togo	-.05
Tunisia	3.12	United States	2.03	Philippines	1.20	Sierra Leone	-.37
Dominican Republic	3.10	France	2.01	Republic of Congo	1.19	Guinea-Bissau[15]	-.42
Sri Lanka	3.06	Canada	1.97	Mali	1.17	Venezuela, RB	-.65
Portugal	3.05	Swaziland[7]	1.95	Switzerland	1.08	Central African. Rep.	-1.06
Egypt	3.04	Germany[8]	1.94	Malawi	.98	Zambia	-1.12
Norway	2.95	Costa Rica	1.87	Kenya	.94	Haiti	-1.21
India	2.89	Netherlands	1.85	Guatemala	.89	Niger	-1.55
Iceland	2.88	Sweden	1.84	Guyana	.84	Nicaragua	-1.63
Chile	2.76	Australia	1.82	Rwanda	.83	Liberia	-2.80
Japan	2.66	Sudan	1.74	Benin	.81	United Arab Emirates[16]	-3.09
Finland	2.61	Trinidad and Tobago	1.74	Gambia	.72	Dem. Rep. of Congo	-3.60
Austria	2.47	Colombia	1.73	Mauritania	.68	Kuwait[17]	-3.83
		Fiji	1.72	Honduras	.67		

Source: *The World Development Indicators*, the World Bank

Notes: [1]1976-2004; [2]1981-2004; [3]1991-2004; [4]1983-2004; [5]1981-2004; [6]1976-2004; [7]1971-2004; [8]1972-2004; [9]1969-2003; [10]1989-2004; [11]1991-2004; [12]1981-2003; [13]1975-2004; [14]1969-2002; [15]1971-2004; [16]1974-2002; [17]1963-1989 and 1996-2003.

Table 1.2. Summary Statistics by Growth Quartiles for the Period 1969-2004

	Highest		High-middle		Low-middle		Lowest	
	Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean
GDP Growth (%)	175	4.0 (2.6)	184	2.0 (2.1)	182	1.1 (2.4)	178	-.66 (4.6)
GDP per capita ($)	198	8136.7 (9606.9)	206	9449.5 (8592.2)	206	3820.6 (7371.4)	197	3198.8 (7418.8)
Total Education Years[1]	173	6.1 (2.2)	189	6.4 (3.0)	176	4.5 (3.0)	168	3.4 (1.9)
Trade (% of GDP)[2]	175	91.7 (64.6)	185	62.9 (37.8)	179	67.9 (37.5)	170	61.1 (32.2)
FDI Inflow (% of GDP)	179	2.3 (2.9)	181	1.8 (2.1)	187	1.6 (2.4)	181	1.9 (3.6)

Sources: Author's calculation based on *the World Development Indicators*; Barro and Lee (2000); UNCTAD.
Notes: The standard deviations are between parentheses. [1]"Total Education Years" reflect average schooling years for the population over age 15 (Barro and Lee, 2000). [2]Trade is measured by adding imports and exports and comparing the sum to the GDP.

Table 1.3. Regression Results

Variables	Pooled OLS	Fixed effects	Differenced GMM	System GMM
Log of Lagged GDP	.98***	.77***	.69***	.94***
	(.013)	(.036)	(.050)	(.025)
Total Education Years	1.85**	.30	-3.07	5.49***
	(.73)	(1.15)	(2.32)	(1.41)
Inflation	-.0096***	-.0069***	-.0038***	-.0081***
	(.00080)	(.00072)	(.00080)	(.0013)
Trade as % of GDP	.018	.15***	.031	.13***
	(.020)	(.043)	(.098)	(.043)
FDI as % of GDP	1.08***	1.25***	.92**	.70
	(.38)	(.33)	(.43)	(.58)
m2			.876	.930
Hansen Test			.357	.141
Number of Observations	607	607	504	607
Number of Countries	102	102	99	102
Number of Instruments			96	92

Notes: The dependent variable is the log of GDP. Robust standard errors are in parentheses. For the specification tests, *p*-values are reported. Time dummies are included in all the regressions (not reported).

*, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level, respectively.

Column 3 reports the results of two-step Arellano-Bond (1991) difference GMM.

Column 4 shows the results of two-step Blundell and Bond (1998) system-GMM estimator with Windmeijer finite-sample correction.

Table 1.4.A. Regression Results with Alternative Specifications - Full Sample

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged log of GDP	1.033***	1.033***	.94***	.97***	.95***	.95***	.94***	.94***	.94***
	(.022)	(.017)	(.025)	(.027)	(.021)	(.018)	(.025)	(.028)	(.018)
Average Education Years			5.70***	3.64**	4.03***	3.46***	5.49***	5.56***	3.42***
			(1.46)	(1.57)	(1.26)	(1.04)	(1.41)	(1.73)	(1.10)
Inflation			-.0079***	-.0090***	-.0070***	-.0071***	-.0081***	-.0074***	-.073***
			(.0012)	(.00084)	(.00096)	(.0010)	(.0013)	(.0017)	(.0013)
Trade as % of GDP	.17***		.14***		-.0080		.13***	.13***	-.040
	(.044)		(.036)		(.027)		(.043)	(.047)	(.029)
FDI Inflow as % of GDP		1.29***		1.52***		.55	.70	.87	1.21***
		(.35)		(.44)		(.40)	(.58)	(.97)	(.46)
Government Consumption as % of GDP								-.65*	
								(.38)	
Gross Capital Formation as % of GDP					1.25***	1.21***			1.43***
					(.17)	(.18)			(.18)
m2	.800	.333	.930	.802	.864	.693	.930	.888	.830
Hansen Test	.031	.175	.187	.247	.270	.205	.141	.141	.185
Number of Observations	686	687	618	613	618	606	607	605	605
Number of Countries	105	106	102	102	102	102	102	102	102
Number of Instruments	61	61	91	91	92	92	92	79	79

Notes: The dependent variable is the log of GDP. Robust standard errors are in parentheses. Time dummies are included in all the regressions (not reported.). *, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level, respectively. All columns report two-step Blundell and Bond (1998)'s system-GMM estimator with Windmeijer finite-sample correction. For the specification tests, *p*-values are reported. In order to overcome a problem resulting from using too many instruments (Roodman, 2006), I reduced the number of instruments by dropping deeper lags as instruments if the instruments count exceeds the number of countries. Note that regression (1) fails to pass the specification test.

Table 1.4.B. Regression Results with Alternative Specifications – Non-OECD Countries

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Lagged log of GDP	.98***	1.01***	.88***	.88***	.89***	.92***	.89***	.90***	.92***
	(.036)	(.023)	(.034)	(.043)	(.029)	(.027)	(.027)	(.022)	(.028)
Average Education Years			8.56***	7.84***	5.57***	3.07**	7.27***	6.96***	4.24***
			(2.01)	(2.47)	(1.63)	(1.32)	(1.82)	(1.33)	(1.55)
Inflation			-.0083***	-.0090***	-.0071***	-.0073***	-.0086***	-.0078***	-.0074***
			(.0016)	(.0014)	(.0013)	(.0012)	(.0014)	(.0017)	(.0011)
Trade as % of GDP	.22***		.18***		.0077		.11**	.12**	-.039
	(.048)		(.056)		(.030)		(.051)	(.047)	(.030)
FDI Inflow as % of GDP		1.71***		3.23***		1.42***	2.00**	1.63*	1.49***
		(.29)		(.72)		(.54)	(.96)	(.91)	(.43)
Government Consumption as % of GDP								-.29	
								(.34)	
Gross Capital Formation as % of GDP					1.38***	1.34***			1.30***
					(.21)	(.24)			(.19)
	.877	.341	.694	.680	.997	.706	.696	.793	.974
Hansen Test	.137	.248	.538	.548	.440	.230	.574	.576	.382
Number of Observations	503	514	438	443	436	436	437	435	435
Number of Countries	78	79	75	75	75	75	75	75	75
Number of Instruments	49	49	55	55	67	67	67	79	79

Notes: See Table 1.4.A.

Table 1.5. Replication and Extension of Borensztein *et al.* (1998)

	(1)	(2)	(3)
Log of initial GDP	-.12***	-.0099***	-.014***
	(.0038)	(.0032)	(.0040)
Schooling[1]	.012***	.0077**	.021***
	(.0045)	(.0034)	(.0058)
Government Consumption	-.080**	-.10***	-.11***
	(.033)	(.031)	(.034)
Log(1+black market premium)	-.018***	-.019***	-.016***
	(.0054)	(.0051)	(.0055)
FDI from OECD to 69 Developing Countries			
FDI	-.83		
	(.72)		
FDI*Schooling	1.61***		
	(.61)		
FDI from OECD to both OECD and non-OECD Countries			
FDI		.21	
		(.59)	
FDI*Schooling		.14	
		(.36)	
FDI from both OECD and non-OECD to 69 Developing Countries			
FDI			.55**
			(.26)
FDI*Schooling			-.23
			(.22)
Number of Countries	69	88	69
R^2 - 1970-79	.39	.28	.36
R^2 - 1980-89	.16	.12	.17
Goodness of Fit – chi2(*p*-value)	50.13 (.000)	42.00 (.000)	45.55 (.000)

Notes: The dependent variable is the per capita GDP growth rate. Standard errors are in parentheses.

[1] Schooling represents average years of the male secondary schooling aged over 25.

Seemingly Unrelated Regression (SUR) estimation was done constraining all the coefficients (except the constant) to be the same across the two decades.

Table 1.6. Regression Results with the Interaction Term

	(2')	(4')	(6')	(7')	(8')	(9')
Lagged log of GDP	1.05***	1.01***	.96***	.97***	.98***	.95***
	(.012)	(.027)	(.023)	(.028)	(.030)	(.019)
Average Education Years		2.60*	2.36*	4.64***	4.34***	2.81***
		(1.50)	(1.38)	(1.56)	(1.58)	(1.07)
Inflation		-.0082***	-.0067***	-.0073***	-.0068***	-.0069***
		(.00077)	(.0014)	(.0014)	(.0015)	(.0013)
Trade as % of GDP				.11**	.13**	-.024
				(.049)	(.057)	(.026)
FDI Measures						
FDI	2.24*	5.64***	1.28	5.70***	5.46***	1.39
	(1.16)	(1.11)	(.95)	(1.31)	(1.10)	(.87)
FDI*Schooling	-.29*	-.67***	-.10	-.81***	-.76***	-.082
	(.16)	(.15)	(.12)	(.18)	(.15)	(.11)
Government Consumption					-.75**	
					(.32)	
Gross Capital Formation			1.46***			1.42***
			(.19)			(.18)
M2	.372	.920	.676	.744	.882	.816
Hansen	.352	.260	.226	.156	.421	.338
Number of Observation	656	613	606	607	605	605
Number of Countries	104	102	102	102	102	102
Number of Instruments	88	92	79	79	91	91

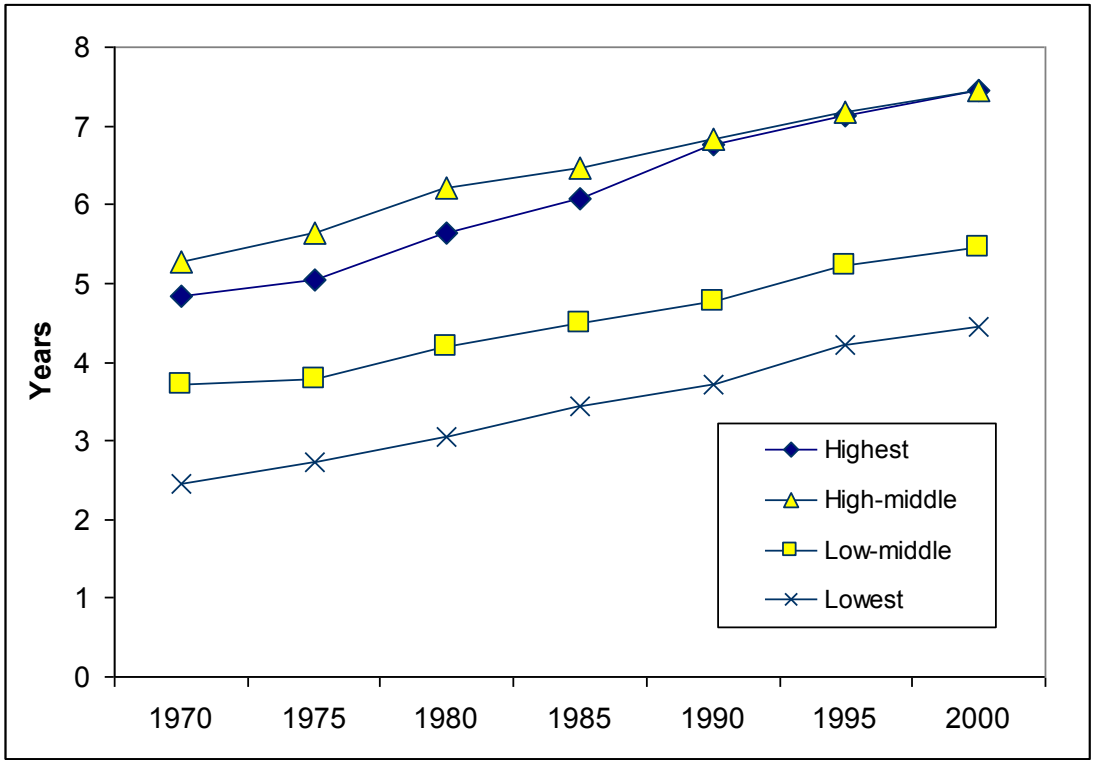
Notes: The models in Table 1.4.A were re-estimated including the interaction term between schooling and FDI.

Appendix Table 1.A.1. *Results of Education and Openness Variables Estimated by OLS and Fixed effects Models*

	Variables Included							Pooled OLS			Fixed effects		
Model	Lagged GDP	Education	Trade	FDI	Infl.	Capital	Gov.	Education	FDI	Trade	Education	FDI	Trade
Full Sample													
(1)	x		x							.059***			.19***
										(.015)			(.039)
(2)	x			x					.66			2.17***	
									(.52)			(.64)	
(3)	x	x	x		x			1.95***		.050***	.40		.17***
								(.74)		(.016)	(1.09)		(.046)
(4)	x	x		x	x			1.84**	1.26***		.31	1.50***	
								(.73)	(.28)		(1.10)	(.32)	
(5)	x	x	x		x	x		1.72***		.0087	.76		.12***
								(.57)		(.014)	(1.06)		(.044)
(6)	x	x		x	x	x		1.66***	.71***		.65	1.23***	
								(.58)	(.23)		(1.03)	(.31)	
(7)	x	x	x	x	x			1.85**	1.08***	.017	.30	1.25***	.15***
								(.73)	(.38)	(.019)	(1.15)	(.33)	(.043)
(8)	x	x	x	x	x		x	1.89**	1.02**	.022	.33	1.23***	.15***
								(.74)	(.40)	(.019)	(1.16)	(.33)	(.043)
(9)	x	x	x	x	x	x		1.64***	.98***	-.023	.68	1.07***	.10**
								(.56)	(.30)	(.016)	(1.07)	(.29)	(.040)
Non-OECD Countries													
(1)	x		x							.087***			.19***
										(.019)			(.040)
(2)	x			x					.87			2.41***	
									(.69)			(.70)	
(3)	x	x	x		x			2.83***		.064***	-.86		.16***
								(.90)		(.020)	(1.06)		(.047)
(4)	x	x		x	x			2.82***	1.85***		-.64	1.70***	
								(.78)	(.34)		(1.19)	(.38)	
(5)	x	x	x		x	x		2.57***		.015	-.088		.093**
								(.67)		(.018)	(1.16)		(.039)
(6)	x	x		x	x	x		2.47***	1.15***		-.22	1.33***	
								(.61)	(.30)		(1.13)	(.38)	
(7)	x	x	x	x	x			2.80***	1.75***	.013	-.80	1.58***	.14***
								(.81)	(.45)	(.022)	(1.15)	(.42)	(.047)
(8)	x	x	x	x	x		x	2.81***	1.69***	.019	-.79	1.55***	.14***
								(.82)	(.47)	(.022)	(1.15)	(.42)	(.047)
(9)	x	x	x	x	x	x		2.51***	1.45***	-.027	-.20	1.24***	.083**
								(.60)	(.35)	(.018)	(1.17)	(.38)	(.041)
OECD Countries													
(1)	x		x							.056			.23**
										(.033)			(.093)
(2)	x			x					.17			.64	
									(.73)			(.72)	
(3)	x	x	x		x			-.20		.046	1.49		.25**
								(.57)		(.034)	(1.45)		(.095)
(4)	x	x		x	x			-.23	.16		1.05	.78	
								(.67)	(.76)		(1.31)	(.69)	
(5)	x	x	x		x	x		-.33		.042	1.04		.18
								(.54)		(.034)	(1.48)		(.11)
(6)	x	x		x	x	x		-.34	.33		.91	.73	
								(.57)	(.63)		(1.39)	(.52)	
(7)	x	x	x	x	x			-.14	-.50	.079**	.85	-.0043	.27***
								(.62)	(.71)	(.037)	(1.47)	(.38)	(.094)
(8)	x	x	x	x	x		x	-.16	-.51	.091**	1.41	-.15	.23**
								(.59)	(.63)	(.036)	(1.40)	(.37)	(.087)
(9)	x	x	x	x	x	x		-.26	-.19	.062*	.81	.25	.17
								(.55)	(.50)	(.034)	(1.59)	(.34)	(.12)

Notes: The dependent variable is the log of GDP. Robust standard errors are in parentheses. The model numbers (1) through (9) correspond to those in Table 1.4.A.B. *, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level respectively.

Figure 1.1. Time Trends of Average Years of Schooling by Four Growth Categories



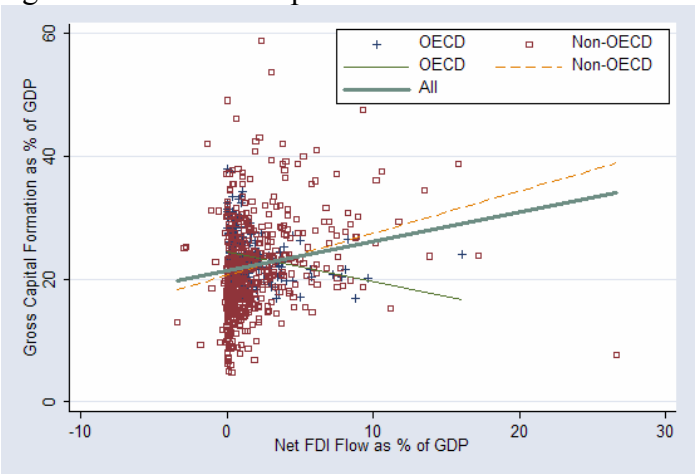
Source: Author's calculation based on Barro and Lee (2000)'s dataset.
Note: The data for 2000 are projections in Barro and Lee's dataset.

Figure 1.2. Relationship between Trade,
FDI Inflow and Gross Capital Formation

Figure 1.2.A. Trade and Gross Capital Formation

Figure 1.2.B. Trade and FDI Inflow

Figure 1.2.C. Gross Capital Formation and FDI Inflow



Chapter 2: Differential Impacts of Foreign Direct Investment on Wages: the Case of Vietnam

1. Introduction

Since Vietnam started its transition from a centrally-planned economy towards a market-oriented economy with its *doi moi* ("renovation") policy in 1986, Vietnam has been among the fastest growing economies with an average annual growth rate of 7.0 percent.[34] Vietnam has also made substantial progress in liberalizing its trade and Foreign Direct Investment (FDI) policy. Since the first Law on Foreign Direct Investment took effect in 1987, Vietnam has received a considerable inflow of FDI with a cumulative FDI stock of $40.2 billion in 2007 (UNCTAD). This FDI contributed greatly to Vietnam's economy. For the year 2007, foreign owned firms accounted for 18.0% of Vietnam's Gross Domestic Product (GDP) and 44.6 percent of industrial output (GSO, 2008). Stimulated by the United States-Vietnam Bilateral Trade Agreement (BTA) in 2001 and Vietnam's accession to the World Trade Organization (WTO) in 2007, employment in foreign affiliates increased from 0.4 million workers in 2000 to 1.7 million in 2007 (GSO). However, not much research has been done in terms of the employment and wage effects of foreign-owned establishments.[35]

This paper investigates the impacts of FDI on wages for different types of workers in Vietnam (in terms of educational attainment and gender) using the *Vietnam Household Living Standards Surveys* (VHLSS) for the years 2002 and 2004. Previous studies have found that foreign firms usually pay higher wages both in developed and developing countries.[36] Most of these studies have used *firm*- or *plant*-level data and demonstrated that foreign firms pay wage premiums, even controlling for a variety of firm and industry characteristics (e.g., industry, firm size, capital intensity, and inputs). A small number of studies adjusted for workers' educational attainments for developing countries. For instance, using Indonesian manufacturing plant data which include

[34] The average for the period 1986-2007 (the World Bank).
[35] See Nguyen Ngoc Anh and Nguyen Thang (2007) for a review of the literature on FDI in Vietnam.
[36] See Lipsey (2004) for a review.

information on the distribution of workers by level of education completed, Lipsey and Sjöholm (2004) find that foreign-owned plants hire more educated workers than domestically-owned ones and pay higher wages given the educational level of workers.

For Vietnam, using firm-level data from annual enterprise surveys for the period 2000-2004, Ramstetter and Phan (2007a) find results in accordance with previous studies: Multinational Corporations (MNCs) are found to pay the highest compensation followed by state-owned enterprises (SOE)s and then by private firms; but the MNCs-private compensation differential is reduced after controlling for a series of firm- and industry-level characteristics and, as a proxy for worker quality, for the proportion of science and technology workers in total employment. However, little is known about how foreign firms reward different types of workers. One advantage in using the VHLSS is that the detailed individual level data permit the researcher to analyze the differential impacts of FDI on wages by running Mincerian earnings regressions separately by skill levels and by gender.

The existence of a foreign wage premium after adjusting for observable personal characteristics does not necessarily imply that workers' wages increase by working for foreign firms. For instance if individuals with some *unobservable* attributes (e.g., higher ability) self-select into (or are picked up by) foreign firms, the estimated coefficient for foreign ownership in cross sectional data would be biased. In order to address selectivity bias, several recent studies trace the change in wages of *identical* individuals over time using matched employer-employee panel data (e.g., Andrews, Bellmann, Schank and Upward, 2009; Martins, 2004, 2008; Heyman, Sjöholm and Tingvall, 2007) and many of them find much reduced foreign wage premiums. However, few studies trace the same individuals in developing countries, perhaps due to data constraints. Exploiting the panel component of the VHLSS 2002 and 2004, this study

investigates how the wage levels of identical individuals changed if they "switched" between domestic and foreign sectors.

While Vietnam's "formal" enterprise employment has been growing rapidly (Ramstetter and Phan, 2007b), Vietnam's "formal"[37] sector in terms of employment represents still only a fraction of its economy (e.g., about 17 percent of total employment in 2004 (VHLSS, 2004)) and the remaining workers belong to large agricultural and other informal sectors. One of the roles of foreign firms in Vietnam is to create "formal" job opportunities, drawing workers from the informal sectors. Such an employment effect of FDI has been documented in other developing countries, especially in the context of the expansion of export-oriented manufacturing production.[38] However, previous studies based on firm-level data ignore the wage effects on workers who are moving from informal sectors. Another advantage in using the VHLSS is that the data enable to extend the wage comparison analyses to the informal sector, filling the gap in the literature.[39]

Section 2 reviews the recent trends of FDI in Vietnam with a particular focus on the evolution of foreign employment compared to private and state enterprises. Section 3 estimates a series of Mincerian earnings equations by different types of workers accounting for personal and other observable characteristics. Section 4 implements a worker-specific fixed-effects model to control for unobservable individual specific characteristics. Section 5 presents my conclusions.

[37] Throughout the paper, jobs in foreign, private and state enterprises as well as those in government are referred to as "formal" employment. "Informal" employment is defined to include "informal wage" workers and "self-employed". The impacts of FDI on income for self-employed are not considered in this paper due to the lack of wage data.

[38] See Anderson and Dimon (1999) for Mexico, Fu and Balasubramanyam (2005) for China, Glick and Roubaud (2006) for Madagascar. For instance, applying the Smith-Myint model of "vent for surplus" to China, Fu and Balasubramanyam (2005) find that the expansion of exports from labor-intensive manufacturing, assisted by FDI, accelerated the transfer of surplus labor from the agricultural to the export sector. For Mexico, Anderson and Dimon (1999) report evidence that export oriented production in *maquiladoras* (across-border export processing plants) created formal sector job opportunities for single women.

[39] The VHLSSs include data for a category of workers who reported as "work for other households," which are used as a proxy for the "informal" wage workers.

2. Employment Effects of FDI in Vietnam

Although Vietnam received substantial FDI inflow in the 1990s, the contribution of FDI to employment was limited (Jenkins, 2006). Some economists attribute the slow growth of foreign jobs in the 1990s to the capital-intensive and domestic-market-oriented nature of production under protectionist trade and investment regimes (Athukorala and Tien, 2009). In contrast, partly stimulated by the U.S.-Vietnam BTA (2001) and Vietnam's accession to the WTO (2007), the re-orientation of foreign firm activities toward export-oriented production in the 2000s appears to have had positive impacts on foreign employment growth. In 2001, the U.S.-Vietnam BTA came into effect with the United States extending Most-Favored-Nation (MFN) status to Vietnam. As a result, Vietnam's exports to the United States, in particular, those of labor-intensive manufacturing, expanded dramatically, inducing a large FDI inflow into such sectors as clothing, footwear and furniture (Parker, Riedel, and Phan, 2007).[40] In addition, a number of provisions specified in the BTA[41] and commitments made in the negotiation process of Vietnam's accession to the WTO played a catalytic role in accelerating Vietnam's legal, regulatory and administrative reforms contributing to an improvement of Vietnam's investment climate (Parker *et al*., 2007).

Table 2.1 and Figure 2.1.A-C compare the structure of formal "enterprise"[42] employment by ownership and by gender for the period 2000-2007. The percentages of female workers included

[40] FDI in these three sectors tripled from 6.2 percent (average 1996-2000) of total registered FDI to 18.6 percent (average 2001-2005). Although increasing in absolute terms, the share of these sectors in total FDI inflow decreased to around 12 percent in 2006, as FDI into more capital/skill intensive sectors expanded (Parker et al., 2007, Figure 13, p.233).

[41] The BTA provisions included requirements to encourage U.S. investment in Vietnam including: providing MFN or National Treatment (NT)-whichever was better for U.S. investors; improving investment licensing procedures and corporate governance regulations; non-discriminatory pricing; a series of safeguards for foreign investors including protection against expropriation and nationalization processes and the right to repatriate earnings; allowing access to international arbitration to resolve disputes and the elimination over time of trade-related investment measures (TRIMs) involving trade balancing, local content, and foreign exchange requirements, and market access provisions in key service sectors such as financial services, trading and distribution, telecommunications, and legal, consulting and engineering services (Parker et al., 2007).

[42] The term "enterprise" is defined as "an economic unit that independently keeps business account and acquires its own legal status…" (GSO). The "enterprises" do not include *household* enterprises.

in grid section in Table 2.1 are reported in parentheses. Since the implementation of the Enterprise Law (2000),[43] the number of workers employed by "enterprises" expanded substantially from 3.5 million in 2000 to 7.4 million in 2007. The domestic private sector has become the largest source of enterprise employment with its employment rising from 1.0 million in 2000 to 3.9 million in 2007. Job creation in the foreign sector has been also strong, rising from 0.4 million in 2000 to 1.7 million in 2007. The pattern of foreign employment is characterized by its high female intensity and faster employment growth for female workers relative to male workers: the female intensity in foreign firm employment increased from 60.4 percent in 2000 to 67.5 percent in 2007. Perhaps reflecting trends of privatization and rationalization, the number of workers employed by SOEs, which was the largest source of enterprise employment up to the early 2000s, has declined in recent years.

Panels B-D in Table 2.1 and Figure 2.2.A-C disaggregate the enterprise employment numbers by ownership and by economic sector.[44] Panel B of Table 2.1 and Figure 2.2.A show that foreign firm employment is mainly concentrated in the manufacturing sector, accounting for about 93.2 percent of total foreign employment in 2004.[45] In particular, Figure 2.2.A highlights the predominance of labor-intensive manufacturing in foreign employment and its rapid growth from 0.24 million in 2000 to 1.1 million in 2007. As foreign-owned enterprises are more likely to be

[43] The implementation of the Enterprise Law (2000) was a major step toward reducing numerous barriers to private business and has greatly encouraged the establishment of new enterprises (Ramstetter and Phan, 2007b). Since the Enterprise Law came into effect, the number of firms has increased from 42,288 in 2000 to 155,771 in 2007 (the *Enterprise Survey* data).

[44] The manufacturing sector is further disaggregated into labor-, capital-, and skill-intensive sectors. The labor-intensive sector includes textiles, apparel, footwear/leather products, wood products, furniture/miscellaneous manufacturing, metal products, and non-metallic mineral products. The capital-intensive sector is defined as comprising the mining, food products, basic manufacturing, and chemical, rubber, plastic products industries. The skill-intensive sector consists of electronics/machinery and transport equipment. See footnote 56 for the corresponding Vietnam Standards Industrial Classifications (VSICs).

[45] The statistics for the year 2004 is reported since it is the year of my empirical analyses.

engaged in international trade than domestic enterprises,[46] the concentration of employment generated by them in labor-intensive manufacturing may reflect Vietnam's comparative advantage in labor-intensive manufacturing. Further disaggregation reveals that a large percentage of Vietnam's foreign sector employment was concentrated in the clothing and footwear industries (47.1 percent in 2004), and that these industries have an exceptionally high proportion of female workers (84.8 pernent in 2004). The great female-intensity in these industries undoubtedly skews the overall gender distribution for foreign employment in Vietnam.

Perhaps reflecting the growing importance of assembly activities by foreign firms in electronics and other high-tech industries (Athukorala and Tien, 2009), employment generated by foreign fimrs in the skill-intensive sector rose rapidly albeit from its small initial level, more than quadrupling from 0.054 million in 2000 to 0.25 million in 2007. As employment by foreign firms in the skill-intensive sector expanded at faster rates than corresponding employment by domestic employers, the share of foreign sector employment in total skill-intensive employment accordingly rose from 35.3 percent in 2000 to 55.7 percent in 2007 suggesting the importance of foreign firms for upgrading Vietnam's industrial structure. It is also noted that, unlike domestic private and state enterprises, foreign-owned skill-intensive enterprises tend to employ more females than males, becoming another factor contributing to a rise in female intensity in foreign sector employment.[47] Overall, high export-orientation and high female intensity in foreign firms in Vietnam are consistent with the view that expansion of exports has boosted the demand for

[46] In their responses to the annual *Enterprise Survey*, 73.1 percent of foreign enterprises in manufacturing indicated that they had some direct exports in 2004 whereas the corresponding figures are 28.1 percent and 11.7 percent for state and for private enterprises respectively. 76.5 percent, 26.2 percent and 9.3 percent of foreign, state and private enterprises, respectively, had some direct imports in 2004.

[47] This trend appears to reflect largely the recent employment expansion in certain export-oriented and female-intensive sectors such as electronics. For instance, in terms of the electrical machinery (VSIC 31), the female intensity among foreign firms registered at 80.5 percent in 2004 as opposed to 23.4 percent and 31.4 percent for private and state enterprises respectively.

female labor in manufacturing in developing countries (e.g., Ozler, 2000; Rama, 2003; Wood, 1991).[48]

3. Impacts of Foreign Ownership on Wages

3.1. Data and Summary Statistics

The *Vietnam Household Living Standard Survey* 2004 (VHLSS 2004) is the fourth of the Living Standard Measurement Surveys conducted by the General Statistics Office (GSO) of Vietnam, under the technical support of the World Bank and with funding from the United Nations Development Program (UNDP) and the Swedish International Development Agency (SIDA). The data are generally recognized to be of high quality and representative of all of Vietnam. The VHLSS 2004 consists of 9,188 households of which about half were also represented in the sample for VHLSS 2002. Table 2.2 shows the summary statistics of individuals from 15 to 59 years of age who responded to the surveys' ownership question. The ownership information is based on an individual's "most time-consuming job in the last 12 months". The ownership categories consist of "foreign", "state", "private", "informal wage", and "self-employment" sectors.[49] Table 2.2 reveals that the "formal" sector accounts for only a fraction of Vietnam's economy: the combined employment by "enterprises" and government absorbed about 17 percent of Vietnam's workers in 2004.

Table 2.2 shows that there is a substantial variation in terms of average worker age, gender, education, hourly wage and working hours according to ownership. Overall, Vietnam's workers

[48] Measuring the impact of North-South trade on the female intensity of manufacturing, Wood (1991) finds that developing countries which exported a rising proportion of their manufactured output tended to experience rising female intensity in their manufacturing sectors.

[49] The classification of ownership is based on the response to a question "for whom has [name] worked?" in the VHLSS 2004: "foreign" is referred to "foreign-invested sector"; "state" sector includes government and SOEs; "private" sector consists of "collective economic sector" and "private economic sector"; "informal wage" workers are assumed to be represented by those who responded to "work for other households"; "self-employed" includes those who answered "self-employment" and "working in his family owned company". There is no wage information in the latter sector.

of this sample are on average 34.8 years of age, attained 7.7 years of education, earned Vietnamese Dong (VND) 5,304 per hour,[50] and worked 34.8 hours per week.

On average, workers in the state sector are the most educated (with total education of 11.9 years) followed by foreign (10.4 years) and private (9.2 years) sector workers. The total education years for those who work in the informal sectors are lower, averaging 6.6 years and 7.1 years for the informal wage sector and self-employed workers respectively. Those who work for foreign-owned firms tend to be the youngest (27.5 years old on average), and 62 percent of them are female. In contrast, state workers are the oldest with an average age of 37.7 years.

The calculation of the average hours worked per week[51] reveals that those who work for the formal sector work clearly longer hours (45.1 hours, 42.2 hours, and 41.2 hours for foreign, private and state sectors respectively) relative to those in the informal sectors (35.1 hours for the informal wage sector and 33.0 hours for self-employment). The latter figures suggest that workers may tend to be underemployed in Vietnam's informal sectors.

Among Vietnam's wage workers,[52] the "informal wage" employers comprised the largest wage employment sector hiring about 6.8 million people in 2004.[53] Workers who worked for the state sector earned the highest hourly wage on average (VND 7,106) followed by workers working for the foreign (VND 6,783), private (VND 5,112) and informal wage sectors (VND 3,902).

[50] If the wages are converted into U.S. dollars using the average exchange rate in 2004 (U.S.$1.00=VND 15,630), Vietnamese workers earned $0.34 per hour on average. The average wage levels of workers who worked for state, foreign, private, and informal wage sectors were $0.45, $0.43, $0.33 and $0.25 respectively.

[51] "Hours worked per week" are computed by combining the hours worked for the first and second jobs.

[52] About 31 percent of Vietnam's workers held a wage job as the first job in 2004. The remaining 69 percent were self-employed of which about 73 percent worked in agriculture/fishery/forestry activities.

[53] The figure is computed using the household weights available in the VHLSS 2004. The corresponding figures are 0.7 million for "foreign", 4.8 million for "state" (including government and SOEs), and 2.4 million people for "private" sector employers. The number of workers employed by foreign firms computed from the VHLSS 2004 is smaller than that taken from the *Enterprise Survey* data, most likely because the VHLSS data exclude migrants who hold a temporary or no registration status.

Columns 2 and 3 of Table 2.2 report summary statistics by gender. The wage differential between men and women, known as the "gender gap", is relatively low as women earn on average an 11.4 percent lower wage relative to men for the whole sample. At first glance, women working in foreign firms appear to be experiencing the greatest degree of gender wage inequality as women are found to be paid about 40.4 percent lower wages relative to male counterparts whereas the gap is narrowest in the state sector (7.9 percent).[54]

Columns 4 and 5 of Table 2.2 disaggregate statistics by skill levels which are measured by whether or not the workers have upper-secondary educational attainment (12 grades completed with upper-secondary education diploma). The wage premium for skilled workers, defined as the relative wage of skilled to unskilled workers, is 176.2 percent for the whole sample. The skill premium is largest in the foreign sector (where skilled wages are 183.6 percent of unskilled wages) and lowest for those who work for the informal wage sector (131.1 percent).

3.2. Model Specification

The wage comparison analysis based on simple average wages is potentially misleading since the wage rates are greatly influenced by individual characteristics, industries, and locations. Thus, I turn to Mincerian wage regression analyses in the form:

$$Ln\ W_i = \boldsymbol{\alpha}\ \boldsymbol{Ownership}_i + \boldsymbol{\beta}\ \boldsymbol{X}_i + \boldsymbol{\gamma}\ \boldsymbol{ES}_i + \boldsymbol{\delta}\ \boldsymbol{Location}_i + \varepsilon_i \qquad (1)$$

where W_i is an individual's hourly wage, $\boldsymbol{Ownership_i}$ is a series of dummy variables for the ownership categories defined above; $\boldsymbol{X_i}$ is a vector of individual specific characteristics including gender, ethnicity, years of schooling, potential experience,[55] and marital status; $\boldsymbol{ES_i}$ is a series of

[54] The large gender gap in the foreign sector partly reflects the younger average age of female workers relative to male in this sector and the low-wage industries for which women work. Controlling for personal and other characteristics, the gender gap is found to be largest in the informal wage sector followed by foreign and domestic private sectors (see Sub-section 3.3 below).

[55] Potential experience is calculated as age minus six minus education years.

dummy variables for the Vietnam Standard Industrial Classification (VSIC) sub-sector;[56] and ***Location***$_i$ consists of two city and eight regional dummy variables[57] and a dummy variable for whether or not the worker lives in an urban area; and ε_i is the error term.

3.3. Regression Results

In this sub-section, I demonstrate the results of two sets of Mincerian earnings regressions. The first set of regressions includes all the wage workers in the sample, and estimates the wage differentials between the foreign and informal wage sectors. The second set of regressions repeats the same models for the subset of workers in the formal sector and evaluates the wage differentials between foreign and domestic (formal) private sectors. The latter results are reported for the purpose of comparison, since most of the previous studies compared wage differentials within formal establishments.

Columns 1-3 in Table 2.3 show the results of a series of regressions to evaluate the impacts of foreign ownership on wages for the full sample. The "informal wage" sector is the omitted ownership category. The first column in Table 2.3 demonstrates the results controlling for a series of individual characteristics. The results exhibit the expected properties: the education years are positively associated with wage; the impact of potential experience is positive but faces a diminishing return; and female workers and ethnic minority people are paid less even controlling for other personal characteristics. The coefficient for the foreign dummy is found to be positive and statistically significant at the one percent level.

[56] The VSIC sub-sector dummies consist of: agriculture/forestry/fishery (1, 2, 5), mining (10, 11, 13, 14), food products (15, 16), textiles (17), apparel (18), footwear and leather products (19), wood products (20), non-metallic mineral products (26), metal products (28), basic manufacturing (21, 22, 23, 27, 40, 41), chemical, rubber, plastic products (24, 25), electronics and machinery (29, 30, 31, 32, 33), transport equipment (34, 35), furniture and miscellaneous manufacturing (36, 37), construction (45), sales (50, 51, 52), hotel and restaurant (55), transportation (60, 61, 62, 63, 64), finance and consulting (65, 66, 67, 70, 71, 72, 73, 74, 90, 99), public (75, 80, 85, 91), and other services (92, 93, 95). Between parentheses are the VSIC codes at the two digit level.

[57] The dummies consist of: Hanoi, Ho Chi Minh City (HCMC), Red River Delta other than Hanoi, North East, North West, North Central Coast, South Central Coast, Central Highlands, South East other than HCMC and Mekong River Delta.

If foreign firms are associated with relatively high (low) wage industries, omitting industry variables would lead to the upward (downward) bias of the coefficients estimate of foreign ownership. Column 2 in Table 2.3 introduces industry dummies as explanatory variables following Krueger and Summers (1988).[58] The results show that the magnitude of the coefficient for the foreign dummy increased with the inclusion of industry variables. A potential explanation is that the jobs generated by foreign firms during the period reflected by the VHLSS 2004 are disproportionately represented by low-wage industries. Thus, controlling for industry affiliation, the estimated effect of foreign ownership may well increase as a negative omitted variable bias is removed.

Column 3 in Table 2.3 shows the results introducing the impact of locations on wages. With the inclusion of urban and regional dummies, the effect of foreign ownership is reduced. The latter result is consistent with the view that higher wages by foreign firms are partly attributed to the relatively high-wage areas where foreign enterprises are typically located. Therefore, attributing higher wages to locations rather than foreign ownership, the coefficient for foreign dummy might be reduced. Using regression (3) as a basic model, foreign firms are found to pay about 46 percent[59] higher wages relative to similar workers in the informal wage sector. The wage premiums are highest for foreign firms followed by state and private organizations.

Columns 4-6 in Table 2.3 report the regression results for a subset of workers employed in the formal sector so that the sample is roughly comparable to the firm-level analysis (e.g., Ramstetter and Phan, 2007a). The domestic private sector is the omitted ownership category. Restricting the sample to workers in the formal sector, the foreign wage premium relative to the domestic "private" sector is estimated to be 30 percent.

[58] Krueger and Summers (1988) use cross-sectional and longitudinal data and demonstrate that industry wage differentials are substantial after controlling for detailed individual characteristics.
[59] 0.38 in log terms.

Columns 1-5 in Table 2.4 report the regression results by subsets of workers with different educational attainments, namely, college/university graduates, workers who have diplomas for upper-secondary, lower-secondary and primary education, and those without any school degree. These results show that the higher the individual workers' levels of education, the larger the wage premiums are for those who work for foreign firms: the effect of foreign ownership is about 108 percent higher wages relative to the informal wage sector for college/university graduates, 45 percent for those with upper-secondary education, 43 percent and 40 percent for those with lower-secondary and primary educations respectively, and around 31 percent for workers without primary education. The qualitative results are similar for the subset of workers in the formal sector (column 6-10 in Table 2.4).

Higher rewards for workers with higher educational achievement in foreign firms are broadly consistent with the previous literature which finds that the foreign wage premium rises with skill (e.g., Feenstra and Hanson (1997) for Mexico, Lipsey and Sjöholm (2004) for Indonesia, Te Velde and Morrissey (2003) for five African countries,[60] and Zhao (2002) for China). A potential explanation for higher wages for workers with higher educational attainment is that, as foreign firms tend to employ more advanced and/or capital-intensive technologies relative to domestic counterparts, this in turn may lead to an increase in demand for skills associated with higher educated workers through technology-skill and/or capital-skill complementarity. Another potential explanation is that, since foreign firms have limited understanding of local labor, they may be more likely to reward observable skills such as educational attainment (Te Velde and

[60] Using data on individual wages in manufacturing industries for five African countries (Cameroon, Ghana, Kenya, Zambia, and Zimbabwe), Te Velde and Morrissey (2003) find that workers who have completed secondary education benefit significantly from foreign ownership and that those who have not completed primary education do not enjoy a wage premium. However, no statistically significant effect of foreign ownership on wages is found among university educated individuals for these countries, perhaps due to relatively few observations of the latter individuals (Te Velde and Morrissey, 2003).

Morrissey, 2003). However, pooling the sample across genders may mask differential impacts of foreign ownership and education on wages by gender. Thus, I turn to the analyses by gender and by skill levels below.

Whereas it is generally observed that export-oriented production tends to create jobs disproportionately for women in developing countries (see Section 2 above), the wage effect of FDI on women is controversial. Some observers view that foreign firms segregate women into inferior jobs which demand little skill, pay low wages and require long working hours. Others hold that export processing activities (most likely to include those by foreign firms) may provide women with higher earning opportunities relative to an alternative job in the informal sector (e.g., Glick and Roubaud, 2006; Madani, 1999). However, the previous studies usually did not differentiate the impacts of foreign ownership on wages by gender.[61]

Columns 1-2 in Table 2.5 show the regression results run separately by gender comparing the foreign wage levels to that in the informal wage sector. Foreign firms appear to pay higher wages for both male and female workers, as the coefficients for the foreign dummy turn out to be positively significant at the one percent level. The wage differentials between foreign sector and informal wage sector are found to be larger for females at around 58 percent than for males at 43 percent. In fact, women seem to experience a generally higher "formal wage premium" as all the coefficients for foreign, state and private dummies turn out to be larger for woman than men. This suggests that the lower wages in the informal sector for women are likely to be the source of larger foreign-wage premiums for women relative to men.

[61] One exception is a study by Braunstein and Brenner (2007) which compares the foreign wage premiums by gender in urban China in 1995 and 2002. Using province-level macro data and household survey data for 1995 and 2002, Braunstein and Brenner find that women received a higher foreign wage premium than men did in 1995, perhaps because FDI in export-oriented and female-dominated industries raised labor demand for women. However, after China committed to opening domestic markets in preparation for WTO accession in 2001, gender-based advantages reversed, as foreign investment in more capital- or technology-intensive sectors grew by 2002 to more greatly advantage workers in male-dominated than in female-dominated industries (Braunstein and Brenner, 2007).

In order to investigate further the source of wage differentials, columns 3-4 and columns 5-6 in Table 2.5 report the results of gender-specific regressions run by the subsets of skilled workers (with at least an upper-secondary education diploma) and unskilled workers (without upper-secondary education) respectively. The gender difference in foreign wage premium is particularly large for the subset of unskilled workers (57 percent for women vs. 31 percent for men), suggesting that foreign employment provides higher earnings opportunities for unskilled women relative to unskilled men. The results of the Wald Tests in Table 2.5 indicate that the equality of the coefficients between men and women is rejected only for the subset of unskilled workers, confirming the higher foreign wage premium for unskilled women relative to unskilled men.

The second panel in Table 2.5 reports the results of the gender-specific regressions restricting the samples to the formal sectors for both skilled and unskilled workers (columns 7-8), for the subset of skilled workers (columns 9-10) and for the subset of unskilled workers (Columns 11-12). It is found that the foreign wage premiums in the formal sectors are similar for men and women for all the samples (the results of the Wald tests do not reject the equality of foreign wage premium between male and female); and that the premiums are larger for skilled workers than unskilled workers for both genders.

Appendix Table 2.A.1 reports the foreign wage differentials by gender and by five educational attainments and the qualitative results turn out to be similar to the results in Table 2.5.[62] In summary, the wage gains resulting from working in the foreign sector is larger for women at low

[62] The results for the subset of male workers in Appendix Table 2.A.1 reveal that foreign wage premiums relative to informal wage sector increase markedly with the level of educational attainment (columns 1-5 in Panel A). In contrast, among female workers, no clear relationship is observed between the level of educational attainment and foreign wage premium relative to informal wage sector (columns 1-5 in Panel B). Restricting the samples to the formal sector (columns 6-10 in Panel A and Panel B), the positive association between educational attainment and foreign wage premium are broadly observed for both men and women.

skill levels, but the higher female foreign wage premium disappears or even is reversed both at higher levels of education and when the sample is restricted to the formal sector. These results are consistent with Glick and Roubaud (2006)'s finding that Zone Franche (the Export Processing Zones (EPZs)) employment in Madagascar represents a significant step-up in pay for women (especially for those with low but not zero levels of schooling) who would otherwise be engaged in low-wage informal sector work.[63]

A question arises why women are poorly remunerated especially in the informal wage sector. A potential explanation is that jobs in the latter sector tends to involve work of a low-skilled or elementary nature,[64] and physical strength may matter more in such jobs than in mental-labor intensive jobs (e.g., Fan and Lui, 2003; Galor and Weil, 1996; Goldin and Sokoloff, 1982).[65] For instance, using agricultural wage data available in the *Vietnam Living Standard Survey* (VLSS)

[63] Whereas foreign sector and EPZ sector are not the same, insights from Glick and Roubaud (2006) are relevant here in terms of earning opportunities for women in export-oriented production relative to informal wage sector jobs. Glick and Roubaud (2006) suggest that the EPZ may possibly have a significant impact on poverty as it provides relatively high wage opportunities for women with relatively low levels of schooling. Further, by disproportionately drawing women from the low-wage informal sector (where the gender gap is very large) to a higher wage sector, the EPZ has the potential to contribute to narrowing the gender gap (Glick and Roubaud, 2006).

[64] The largest sources of informal wage employment for males were construction (36 percent), agriculture/forestry/fishery (27 percent) and transportation (7 percent) whereas those for females were agriculture/forestry/fishery (37 percent), other services (10 percent) and sales (9 percent) in 2004.

[65] Some economists relate the evolution of relative wages of females to women's changing comparative advantage as economies develop (Fan and Lui, 2003; Galor and Weil, 1996; Goldin and Sokoloff, 1982). They argue that when economic structure changes, rewarding the attributes in which women have a comparative advantage, this in turn leads to a narrowing gender gap in wages. The common assumption in the literature is that men are relatively better endowed for their performance of physical labor whereas men and women are equally endowed for mental labor. Thus, females have a comparative advantage in sectors which require less physical labor. A historical illustration which supports this view may be found in the early stages of industrialization in the U.S.. Goldin and Sokoloff (1982) argue that rising demand for unskilled labor in manufacturing during the first half of the nineteenth century in the U.S., in particular in female-intensive manufacturing such as was found in the cotton and wool textile industries, drew female workers from agriculture (where women had less comparative advantage), and that both the relative wage of females and labor force participation rates for females increased during the same period. Fan and Lui (2003) develop a model focusing on different endowments in physical labor and mental labor in determining occupational choices and show that the gender gap is smaller in occupations and industries in which physical labor is less intensively used. Using the 1981 and 1991 Hong Kong population censuses, Fan and Lui (2003) suggest that the reduction in the gender gap in Hong Kong during this period is attributable to its structural change from a manufacturing- to a service-oriented economy in favor of women's comparative advantage. Running Mincerian earnings equations separately on the subsets of industrial sectors, they show that gender gaps were much larger in primary and manufacturing sectors (where physical labor is more intensively used) than in service sectors, which are more mental labor intensive.

1998, Brassard (2004) finds that the wage gap between genders is particularly high for physically demanding work, such as land preparation and crop harvesting. Following Fan and Lui (2003), I ran four separate Mincerian regressions by ownership categories for Vietnam assuming that the coefficient estimates of the female dummy captures the unexplained part of the gender gap. The results reveal that, controlling for personal and other characteristics, the gender gap is largest in the informal wage sector as the average female worker earns about 23.6 percent lower wages relative to her male counterpart. The gender gaps are found to be about 15.0 percent for foreign and domestic private sectors. Other things equal, female workers in state sector jobs received 7.9 percent higher wages relative to their male counterparts (regressions are not reported). Vietnam's gender gap pattern is consistent with the view that the gender gap tends to be large in physical-labor-intensive and elementary jobs but may decrease in jobs which require higher levels of schooling.

3.4. Alternative Specifications

This sub-section runs a series of additional regressions to test the robustness of the results and other related issues. Column (1) in Table 2.6 reports the results of the basic model (regression (3) in Table 2.3) for the purpose of comparison. The informal wage sector is the omitted ownership category.

Column (2) investigates the impacts of foreign ownership on *weekly* wages which in turn reflect both the compensation per unit of time and the hours worked per week. The foreign wage premium increases from 46 percent in the basic model to 80 percent, suggesting that the increased hours of work relative to working in the informal sector are an important source of income gains.

Column (3) reports the result of a regression addressing a potential sample selection problem into wage sector using Heckman's two-step procedure (Heckman, 1979).[66] The coefficient for the selection term turns out to be positively significant implying that individuals selected into wage employment earn higher wages than those with similar observable characteristics randomly drawn from the population. However, the coefficient for the foreign dummy remains essentially unchanged.

Column (4) introduces the interaction terms between education and ownership allowing for an analysis of ownership-specific returns to education. The estimated impacts of additional schooling seem to be largest in the state sector and lowest in the informal wage sector. The positive slope of the interaction term between foreign ownership and education confirms that the impact of foreign ownership on wage rises with educational attainment. The implied wage premium relative to informal wage sector turns out to be largest for the foreign sector at around 58 percent[67] followed by state (52 percent) and private sectors (13 percent).

The last three columns of Table 2.6 show the regression results for the subsets of capital-, labor- and skill- intensive manufacturing sectors[68] in which workers are employed. The results show a large difference in wage premiums according to the subsets: the wage premiums associated with foreign ownership for capital- and skill-intensive industries are found to be substantially higher, at 68 percent and 110 percent respectively, relative to that for labor-intensive manufacturing (43 percent). This is perhaps because foreign firms in capital- and skill-

[66] In the first stage, a probit model is used to determine the selection process from self-employment into wage employment. For the purpose of identification, the variables which are likely to influence the selection process but not wages, namely the non-labor household income and agricultural/forestry land and water surface for aquaculture, are included. In the second stage, the selection correction term for the wage earners is calculated from the probit model and is included in the wage equation.

[67] The effect of foreign ownership in the log term is calculated at the sample mean of education level: $0.46 \approx -0.029 + 10.4*0.047$.

[68] See footnote 44 for the definition of capital-, labor- and skill-intensive manufacturing.

intensive sectors tend to be more profitable[69] and the rents may be shared by firms and workers (e.g., Blanchflower, Oswald and Sanfey, 1996; Egger and Kreickemeier, 2010). Another explanation may be that as export-oriented labor-intensive foreign investments may threaten to move when labor costs increase, the government and workers in foreign firms have less bargaining power to raise wages given the threat of plant relocation.

4. Panel Data Analyses

4.1. Model Specification

A series of cross-section regressions in Section 3 compared the wage levels of individuals working in different employer ownership categories, controlling for observable personal and other characteristics. One of the limitations of this approach is that the coefficient for the foreign dummy is biased if some unobservable characteristics (e.g., ability, willingness to work harder) are correlated with foreign ownership.

In order to address selectivity bias, several recent studies use matched employer-employee panel data and trace the change in wages of *identical* individuals over time. Some studies compare the wage growth of workers whose employers experience foreign takeover with that of workers whose employers do not. For instance, Andrews *et al.* (2009) find that the takeover effect is small in Germany; and Martins (2004) and Heyman *et al.* (2007) show that the wage consequences of the acquisition of domestic firms may even be negative in Portugal and in Sweden respectively. Other studies focus on worker mobility between foreign and domestic firms to identify the wage effect. For instance, using matched employer-employee panel data for Portugal, Martins (2008) finds that workers who move from a domestic to a foreign firm receive

[69] Ramstetter and Phan (2007a) report that foreign firms tend to be generally more profitable, but there exists a large variation in profitability according to industrial sectors. Whereas foreign firms in capital- and skill-intensive sectors tend to be much more profitable relative to private firms, foreign firms in labor-intensive sectors are not (Ramstetter and Phan, 2007a, p.53-64).

a considerable pay increase. However, few studies trace the same individuals in developing countries,[70] perhaps due to data constraints.

This section examines how wages of *identical* individuals would have changed as they "switch" between domestic and foreign sectors by exploiting a panel of individuals in the VHLSS 2002 and 2004.[71]

I estimate a worker-specific fixed-effects model of the type used by Korenman and Neumark (1991) and Lemieux, MacLeod and Parent (2007). I start with equation (1) and introduce the time invariant individual specific characteristics η_i which may be correlated with independent variables.

$$Ln\ W_{it} = \boldsymbol{\alpha}\ \boldsymbol{Ownership}_{it} + \boldsymbol{\beta}\ \boldsymbol{X}_{it} + \boldsymbol{\gamma}\ \boldsymbol{ES}_{it} + \boldsymbol{\delta}\ \boldsymbol{Location}_i + \eta_i + \varepsilon_{it} \quad (2)$$

where i and t index individuals and years (2002 and 2004) respectively. W_{it} is an individual's wage; $\boldsymbol{Ownership}_{it}$ are a series of dummy variables reflecting ownerships (foreign, state, private, and informal wage); $\boldsymbol{X}_{it}$ is a vector of individual characteristics; $\boldsymbol{ES}_{it}$ and $\boldsymbol{Location}_i$ are a set of industry and location dummy variables defined in equation (1) and η_i is an unobservable time-invariant individual characteristic of individual i.

In order to remove the individual-specific effect η_i, a first-difference is taken between the years 2002 and 2004, and then the parameters will be estimated via Ordinary Least Squares (OLS).

$$\Delta Ln\ W_i = \boldsymbol{\alpha}\ \Delta\boldsymbol{Ownership}_i + \boldsymbol{\beta}\ \Delta\boldsymbol{X}_i + \boldsymbol{\gamma}\ \Delta\boldsymbol{ES}_i + \Delta\varepsilon_i \quad (3)$$

[70] The results of some studies based on *firm-level* panel data suggest that impacts of foreign ownership in labor markets may differ between developed and developing countries (Almeida, 2007). For instance, using the panel of Indonesian manufacturing data to control for unobserved plant level characteristics, Lipsey and Sjöholm (2006) find that acquisition of Indonesian plant leads to substantially higher average wages of employees in acquired firms. Their results contrast with those for European countries which tend to find much smaller wage effects of foreign acquisition on employees (e.g., Almeida (2007) for Portugal, Conyon, Girma, Thompson and Wright (2002) for the United Kingdom).

[71] My regressions do not control for firm characteristics because information on the firms for which individuals work is not available. Lipsey (2004) suggests that it is better not to control for too many variables when answering a policy question such as whether or not a country should promote FDI. Whereas a country is concerned about whether foreign firms bring benefits to a host country, it may be less relevant whether it is because of, for instance, scale, productivity or capital intensity. It might be the case that larger, more productive and more capital-intensive domestic firms also pay higher wages, but such firms are scarce in developing countries (Lipsey, 2004).

It is noted that, through differencing, the individual specific characteristics η_i and the other time-invariant explanatory variables (e.g., gender, ethnicity) are eliminated. Since education levels do not change much for adults and everybody is two years older in 2004, human capital variables such as education and potential experience are not included.[72] $\boldsymbol{Location}_i$ dummies are also discarded since the households who moved out between 2002 and 2004 were not usually interviewed in 2004. If the individual did not change the ownership category of his or her employment, the ownership term also drops out. Thus, the coefficients $\boldsymbol{\alpha}$ are identified only from those who "switched" between different ownership categories.

4.2. Data and Summary Statistics

Out of the individuals whose ages range 15-59 in the VHLSS 2004, 10,526 persons are matched as having appeared in the VHLSS in both 2002 and 2004.[73] Table 2.7 demonstrates how these individuals changed their employment/ownership status, showing the numbers of individuals for each cell by the status in 2002 (by row) and by that in 2004 (by column). Of 10,526 panel individuals, about three quarters stayed in the same employment/ownership status, and the remaining quarter either changed employment status (unemployed[74]/employed) or the ownership category in which they work as the first job. Out of 109 individuals who reported working for foreign firms in 2004 (column 1 in Table 2.7), 36 individuals also worked for the foreign sector in 2002. Among 73 individuals who newly entered into foreign sector employment in 2004, 17

[72] The differential impacts of personal characteristics on wage growth depending on ownership may be estimated through the interaction terms between ownership and personal characteristics (Lemieux *et al*., 2007). However, since the coefficients of interaction terms between ownership and education turn out to be individually and jointly insignificant, these terms are not included in the regressions either.

[73] Since there exist some errors in the panel identifiers in the original dataset, I used the revised identifier codes provided by McCaig (2009a) to match the individuals between 2002 and 2004. Then, I eliminated some observations whose information on gender, age and education are inconsistent. In order to mitigate further the measurement error, I dropped one percent of individuals who experienced the largest wage changes. However, the regression results are not sensitive to these adjustments or an alternative way of matching based on location, gender, and age.

[74] "Unemployed" includes those who responded in the VHLSS 2004 as "do housework", "don't work since being too old/retired", "disabled", "unable to find a job" and "others".

persons were students in 2002, 29 persons came from formal sectors (12 from state and 17 from private sector work),[75] and 23 persons moved from informal sectors (8 from informal wage jobs and 15 from self-employment). These figures may understate the number of individuals who moved from informal sector work since the VHLSS data exclude a substantial number of migrants.[76]

Panel A in Table 2.8 reports the differences in log hourly wages[77] for 1,754 panel individuals who had wage information in both years by the ownership category in 2002 and by that in 2004. Overall, Vietnamese wage workers in my sample experienced hourly wage growth rate of 21 percent between 2002 and 2004. Those who worked in the state sector in 2004 experienced the highest hourly wage growth rate (26 percent), mainly reflecting the wage increase for those who stayed in the state sector in both years. Those who stayed within and moved into the foreign sector experienced a 20 percent wage growth rate. Individuals who moved from the informal wage sector jobs into the foreign-owned sector experienced the largest hourly wage growth at about 40 percent. Conversely, those who moved from foreign to domestic sector jobs appear to have experienced smaller wage gains relative to the average wage growth. The pattern of wage change is broadly consistent with the study by Martins (2008) for Portugal, which reports that movers from domestic to foreign firms tend to experience pay increases whereas movers from foreign to domestic firms may experience a pay cut when they move.

Panel B in Table 2.8 demonstrates the differences in the log *weekly* wages for the panel individuals which in turn reflect the changes in both hourly wages and hours worked. The

[75] For changes in ownership categories within the formal sectors, the changes may reflect either the change in nationality of the establishment for which an individual works or individual's move from one sector to another.
[76] The VHLSS is likely to exclude migrants who hold a temporary or no registration status since the sampling of the surveys is limited to the households who had permanent registration status. Based on the *Vietnam Migration Survey* (VMS) data in 2004, only 10 percent of migrants who work for foreign firms possess permanent registration status (see Table 3.3).
[77] The wages are converted to January 2002 constant prices using the deflators available in the VHLSS.

average weekly wage growth of 23 percent is slightly higher than the average hourly wage growth rate of 21 percent. Those who stayed within or moved into the foreign sector appear to have experienced the largest weekly wage growth at around 31 percent, partly reflecting an increase in working hours for those who moved into foreign sector jobs from the other wage sectors.

4.3. Regression Results of the Fixed-Effects Model

Table 2.9 demonstrates the results of worker-specific fixed-effects regressions to estimate the impacts of the changes in employer ownership category on hourly wage growth and weekly wage growth in columns (1) and (2) respectively. The result in regression (1) shows that the impact of foreign ownership on hourly wage growth is positive but is not statistically significant at the conventional level, perhaps due to the small number of individuals who moved between foreign and domestic sectors. Column (2) reports the regression result evaluating the impacts of ownership on weekly wage growth rate. Here, the coefficient for foreign ownership turns out to be positively significant at the five percent level, implying that foreign ownership is associated with higher weekly wage growth rate of about 19 percentage points relative to the average for the entire sample. Controlling for unobserved worker-specific characteristics, the fixed-effects estimates of the impacts of foreign ownership are much smaller than the cross-sectional estimates. The lower estimates of the foreign premium found in the fixed-effects model may be because some portion of the cross-sectional foreign premium is attributable to unobservable characteristics of individuals that are positively correlated with both foreign ownership and wages. However, further studies would be required to confirm these findings since the foreign wage effect in my regression is identified only by a small number of "switchers".

5. Conclusions

This paper investigates the differential impacts of Foreign Direct Investment (FDI) on wages for different types of workers (in terms of educational background and gender) in Vietnam using the *Vietnam Household Living Standards Surveys* (VHLSS) of 2002 and 2004. Most of the previous studies analyzing the impacts of FDI on wages used firm-level data and did not consider the wage effects for those working in informal sectors. This paper intends to fill the gap in the literature extending the wage comparison analysis to workers in the informal wage sector.

A series of Mincerian wage equations are estimated by skill levels and by gender. Several findings emerge. First, foreign firms are found to pay higher wages relative to domestic counterparts given observable characteristics of workers. The effects of foreign ownership on hourly wages are estimated to be about 30 percent and 46 percent higher wages relative to wages paid to similar workers employed with domestically-owned private firms and those working in the informal wage sector respectively. Second, it is found that the higher the individual workers' levels of education, the larger *on average* the wage premiums are for those who work for foreign firms. Third, unskilled women experience a larger foreign wage premium relative to unskilled men reflecting their low earning opportunities and higher gender gap in the informal wage sector.

Finally, exploiting the data of panel individuals who appear both in the VHLSS 2002 and 2004, a worker-specific fixed-effects model is estimated to control for workers' unobservable characteristics. The impact of foreign ownership on hourly wages turns out to be positive but insignificant perhaps partly due to the small number of individuals who "switched." However, the regression result which relates foreign ownership and *weekly* wages reveals a positively significant relationship, suggesting that the increased hours of work in foreign firm jobs relative

to working in the informal wage sector (where workers tend to be underemployed) is an important source of earnings gains.

One of the limitations of this paper is that the data exclude self-employed individuals and a substantial portion of migrants. Nevertheless, the extension of the analysis to the informal wage sector reveals additional insights on the impact of FDI on wages that were overlooked by previous firm-level studies. In particular, the empirical findings in this paper support the view that FDI has the potential to alleviate poverty and contribute to gender equality at lower levels of education by drawing women from informal to formal sector jobs and by paying unskilled women higher wages relative to alternative jobs in the informal wage sector.

Table 2.1. Structure of Enterprise Employment for the Period 2000-2007 (1,000s of employees)

.	2000	2001	2002	2003	2004	2005	2006	2007
A. Total Enterprises								
Agriculture/fishery/forestry	267.3	264.2	265.8	252.1	256.1	259.1	256.4	253.3
	(35.5)	(38.5)	(38.1)	(39.8)	(38.3)	(37.8)	(37.8)	(38.2)
Manufacturing Total	1823.1	2014.0	2440.7	2806.6	3161.9	3369.9	3711.1	4090.7
	(53.9)	(54.2)	(54.9)	(55.9)	(55.6)	(55.5)	(55.9)	(55.7)
Capital-intensive	710.9	742.1	862.1	935.6	1030.5	1074.9	1157.7	1232.9
	(41.7)	(42.1)	(42.0)	(42.3)	(41.5)	(42.0)	(40.7)	(39.8)
Labor-intensive	959.3	1089.1	1357.5	1618.0	1844.8	1976.2	2183.5	2417.7
	(65.9)	(65.5)	(66.1)	(66.6)	(66.1)	(65.0)	(66.0)	(65.8)
Skill-intensive	152.8	182.9	221.1	253.0	286.6	318.8	369.9	440.1
	(35.5)	(36.1)	(36.2)	(37.9)	(38.9)	(41.8)	(43.7)	(45.3)
Construction/Services	1447.5	1673.0	1951.3	2116.0	2352.2	2613.2	2747.8	3038.1
	(30.0)	(28.1)	(26.8)	(26.8)	(27.2)	(27.4)	(27.9)	(28.7)
Total	**3537.9**	**3951.3**	**4657.8**	**5174.8**	**5770.2**	**6242.2**	**6715.2**	**7382.2**
	(42.7)	**(42.1)**	**(42.1)**	**(43.2)**	**(43.2)**	**(43.0)**	**(43.8)**	**(44.0)**
B. Foreign-owned Enterprises								
Agriculture/fishery/forestry	3.9	4.3	5.4	6.4	7.7	7.7	7.9	8.3
	(38.3)	(35.7)	(38.0)	(39.8)	(40.3)	(43.0)	(43.5)	(43.6)
Manufacturing Total	363.7	443.1	636.0	800.0	973.6	1135.0	1349.2	1572.5
	(63.2)	(65.4)	(67.2)	(68.5)	(68.5)	(68.0)	(69.4)	(69.4)
Capital-intensive	73.9	85.2	102.5	119.7	137.7	154.9	186.3	206.6
	(39.0)	(41.3)	(41.5)	(43.1)	(45.7)	(46.3)	(47.4)	(46.6)
Labor-intensive	235.9	291.5	445.1	571.5	703.8	820.1	964.3	1120.6
	(73.3)	(74.9)	(75.7)	(76.2)	(75.2)	(73.6)	(75.0)	(74.6)
Skill-intensive	53.9	66.4	88.4	108.7	132.1	159.9	198.7	245.3
	(52.0)	(54.6)	(54.1)	(56.2)	(56.8)	(60.3)	(62.8)	(65.0)
Construction/Services	40.1	41.9	49.6	53.9	63.6	77.9	88.2	105.1
	(37.1)	(38.3)	(38.2)	(37.5)	(38.9)	(38.2)	(39.5)	(41.3)
Foreign-owned Total	**407.7**	**489.3**	**691.1**	**860.3**	**1044.9**	**1220.6**	**1445.4**	**1685.9**
	(60.4)	**(62.8)**	**(64.9)**	**(66.3)**	**(66.5)**	**(65.9)**	**(67.4)**	**(67.5)**
C. Private[*1] Enterprises								
Agriculture/fishery/forestry	37.0	38.4	40.7	32.3	36.1	37.9	37.1	40.8
	(8.4)	(8.6)	(7.6)	(10.9)	(11.7)	(14.0)	(15.6)	(17.6)
Manufacturing Total	570.1	702.3	868.1	1044.3	1236.8	1395.1	1586.4	1815.7
	(57.9)	(56.4)	(54.6)	(54.6)	(53.1)	(52.8)	(52.6)	(51.1)
Capital-intensive	202.9	238.1	301.8	360.0	428.6	487.8	556.8	641.8
	(49.3)	(49.5)	(48.2)	(47.7)	(46.0)	(47.3)	(45.8)	(44.0)
Labor-intensive	344.2	430.0	519.1	628.5	738.2	829.1	945.2	1061.8
	(65.3)	(63.2)	(61.6)	(61.6)	(60.3)	(59.0)	(59.3)	(58.6)
Skill-intensive	23.0	34.2	47.2	55.9	70.0	78.2	84.5	112.1
	(22.1)	(19.6)	(18.9)	(20.3)	(21.2)	(21.7)	(21.6)	(21.0)
Construction/Services	433.9	603.2	798.0	973.2	1202.6	1547.7	1746.3	2076.6
	(23.1)	(23.4)	(23.1)	(24.0)	(25.2)	(26.1)	(26.9)	(28.0)
Private Total	**1041.0**	**1343.8**	**1706.9**	**2049.9**	**2475.4**	**2980.7**	**3369.9**	**3933.2**
	(41.6)	**(40.2)**	**(38.8)**	**(39.4)**	**(39.0)**	**(38.5)**	**(38.8)**	**(38.6)**
D. State-owned Enterprises (SOE)s								
Agriculture/fishery/forestry	226.4	221.5	219.7	213.4	212.4	213.4	211.3	204.2
	(39.9)	(43.7)	(43.8)	(44.2)	(42.8)	(41.8)	(41.5)	(42.1)
Manufacturing Total	889.3	868.7	936.5	962.3	951.6	839.8	775.4	702.5
	(47.5)	(46.8)	(46.7)	(46.8)	(45.5)	(43.0)	(39.2)	(37.1)
Capital-intensive	434.2	418.8	457.8	456.0	464.3	432.1	414.7	384.5
	(38.6)	(38.1)	(38.1)	(37.7)	(36.0)	(34.6)	(30.9)	(29.3)
Labor-intensive	379.2	367.6	393.3	418.0	402.8	327.0	274.0	235.3
	(61.7)	(60.9)	(61.0)	(61.0)	(60.7)	(58.8)	(57.5)	(55.9)
Skill-intensive	75.9	82.4	85.4	88.3	84.5	80.7	86.7	82.6
	(27.7)	(28.0)	(27.2)	(26.7)	(25.5)	(24.5)	(21.4)	(19.7)
Construction/Services	973.5	1027.9	1103.7	1088.9	1086.0	987.6	913.3	856.4
	(32.8)	(30.5)	(28.9)	(28.7)	(28.6)	(28.5)	(28.8)	(29.0)
SOE Total	**2089.1**	**2118.1**	**2259.9**	**2264.6**	**2249.9**	**2040.9**	**1899.9**	**1763.1**
	(39.8)	**(38.6)**	**(37.7)**	**(37.9)**	**(37.1)**	**(35.9)**	**(34.5)**	**(33.7)**

Source: the *Enterprise Survey* Data (GSO)

Notes: Parenthetical numbers reflect the percentage of employees reflected in each cell who are female.

[*1]Private enterprises include collective, private, limited companies and joint stock companies with and without capital of state.

Table 2.2. Summary Statistics of Vietnam's Workers aged 15-59 from the VHLSS 2004

			By Gender		By Skill	
Ownership		Total	Male	Female	Skilled	Unskilled
Total	Number of Obs.	21022	10599	10423	3981	17041
	Share of female (%)	.50			.46	.51
	Age	35.0 (11.7)	34.8 (11.8)	35.3 (11.6)	35.0 (10.7)	35.0 (11.8)
	Education years	7.7 (3.7)	8.0 (3.6)	7.3 (3.8)	12.8 (1.5)	6.5 (3.0)
	hourly wage[*1] (VND 1,000)	5.3(4.7)	5.5 (5.1)	4.9 (3.9)	7.4 (6.3)	4.2 (3.0)
	Hours worked per week	34.8 (15.8)	34.9 (15.4)	34.7 (16.3)	38.6 (15.8)	33.9 (15.7)
Foreign	Number of Obs.	278	106	172	134	144
	Share of female (%)	.62			.57	.67
	Age	27.5 (7.8)	30.2 (8.7)	25.8 (6.7)	27.5 (7.8)	27.5 (7.9)
	Education years	10.4 (3.2)	10.8 (3.2)	10.2 (3.1)	13.1 (1.8)	7.9 (1.9)
	hourly wage (VND 1,000)	6.8 (6.9)	9.0 (9.7)	5.4 (3.7)	8.9 (9.2)	4.8 (2.2)
	Hours worked per week	45.1 (11.7)	44.8 (10.3)	45.4 (12.5)	44.1 (11.7)	46.1 (11.7)
State	Number of Obs.	2291	1281	1010	1581	710
	Share of female (%)	.44			.46	.39
	Age	37.7 (10.1)	38.8 (10.0)	36.2 (10.1)	37.3 (9.8)	38.4 (10.8)
	Education years	11.9 (3.2)	11.9 (3.3)	11.9 (3.0)	13.6 (1.8)	8.2 (2.3)
	hourly wage (VND 1,000)	7.1 (5.8)	7.4 (6.6)	6.8 (4.5)	7.9 (6.2)	5.4 (4.1)
	Hours worked per week	41.2 (11.5)	41.5 (11.3)	40.9 (11.7)	40.8 (10.9)	42.2 (12.7)
Private	Number of Obs.	945	586	359	328	617
	Share of female (%)	.38			.41	.36
	Age	30.2 (10.3)	31.6 (10.7)	27.8 (9.0)	30.7 (10.0)	29.9 (10.4)
	Education years	9.2 (3.4)	9.2 (3.4)	9.3 (3.5)	12.8 (1.5)	7.3 (2.5)
	hourly wage (VND 1,000)	5.1 (4.6)	5.6 (5.1)	4.3 (3.5)	6.4 (6.2)	4.4 (3.2)
	Hours worked per week	42.2 (14.0)	42.5 (14.6)	41.8 (12.8)	42.6 (13.3)	42.1 (14.3)
Informal Wage	Number of Obs.	3109	2123	986	301	2808
	Share of female (%)	.32			.27	.32
	Age	31.2 (10.8)	31.2 (10.5)	31.3 (11.2)	30.7 (10.4)	31.3 (10.8)
	Education years	6.6 (3.4)	7.0 (3.3)	5.9 (3.5)	12.1 (.67)	6.1 (3.0)
	hourly wage (VND 1,000)	3.9 (2.7)	4.3 (2.9)	3.1 (2.0)	5.0 (3.6)	3.8 (2.6)
	Hours worked per week	35.1 (14.6)	36.1 (13.5)	33.0 (16.5)	36.0 (15.6)	35.0 (14.5)
Self-employed	Number of Obs.	14399	6503	7896	1637	12762
	Share of female	.55			.49	.56
	Age	35.9 (11.9)	35.5 (12.2)	36.2 (11.6)	35.1 (11.2)	36.0 (12.0)
	Education years	7.1 (3.4)	7.4 (3.3)	6.8 (3.4)	12.2 (.78)	6.4 (3.0)
	hourly wage	n.a.	n.a.	n.a.	n.a.	n.a.
	Hours worked per week	33.0 (16.4)	32.3 (16.1)	33.5 (16.6)	35.6 (19.5)	12.7 (15.9)

Notes: See the text for the definition of each ownership category. The standard deviations are between parentheses.
[*1] Average hourly wage is calculated dividing annual income from first job by hours worked for 6623 individuals who have wage employment as first job. The wage includes bonus/award, social allowances, and trip subsidy.

Table 2.3. Impacts of FDI on Wages

	Full Sample[*1]			Subset of Workers in the Formal Sector[*2]		
	(1)	(2)	(3)	(1)	(2)	(3)
Foreign dummy	.40***	.50***	.38***	.25***	.32***	.26***
	(.034)	(.037)	(.035)	(.037)	(.038)	(.035)
State dummy	.25***	.31***	.28***	.042	.13***	.15***
	(.21)	(.025)	(.023)	(.028)	(.031)	(.028)
Private dummy	.11***	.14***	.071***			
	(.022)	(.023)	(.021)			
Female	-.15***	-.10***	-.11***	-.061***	.0091	-.0012
	(.016)	(.015)	(.015)	(.021)	(.021)	(.020)
Married	.020	.018	.052***	.0068	.015	.069***
	(.019)	(.019)	(.018)	(.029)	(.028)	(.026)
Minority	-.11***	-.11***	-.061**	-.094**	-.054	.012
	(.029)	(.029)	(.030)	(.045)	(.045)	(.048)
Education	.048***	.049***	.053***	.075***	.079***	.078***
	(.002)	(.0025)	(.0024)	(.0032)	(.0036)	(.0034)
Potential experience	.032***	.031***	.027***	.041***	.041***	.032***
	(.0030)	(.0027)	(.0025)	(.0044)	(.0042)	(.0039)
Experience^2	-.0006	-.0006***	-.0005***	-.0007***	-.0007***	-.0005***
	(.0006)	(.00006)	(.00006)	(.0001)	(.0001)	(.000095)
Urban			.090***			.12***
			(.016)			(.021)
Industry dummies		X	X		X	X
Regional dummies			X			X
Number of obs.	6623	6623	6623	3514	3514	3514
R^2	.24	.28	.35	.20	.25	.34

Notes:
[*1]The informal wage sector is the omitted ownership category.
[*2]The private domestic sector is the omitted ownership category.
The dependent variable is the log of hourly wage.
*, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level, respectively.
The robust standard errors are between parentheses.

Table 2.4. Impacts of FDI on Wages by Educational Attainment

	Full Sample[*1]					Subset of Workers in the Formal Sector[*2]				
	College and above	Upper-secondary	Lower-secondary	Primary	No Degree	College and above	Upper-secondary	Lower-secondary	Primary	No Degree
Foreign dummy	.73***	.37***	.36***	.34***	.27*	.42***	.29***	.27***	.24***	-.10
	(.23)	(.065)	(.059)	(.062)	(.14)	(.13)	(.064)	(.061)	(.071)	(.16)
State dummy	.44***	.19***	.35***	.29***	.23***	.12	.13***	.24***	.15**	.12
	(.20)	(.049)	(.039)	(.054)	(.085)	(.079)	(.051)	(.053)	(.069)	(.097)
Private dummy	.33	.041	.075*	.087**	.10**					
	(.22)	(.052)	(.040)	(.035)	(.046)					
Female	-.035	-.038	-.14***	-.23***	-.23***	-.033	-.0008	.020	-.15***	-.018
	(.035)	(.035)	(.032)	(.027)	(.030)	(.035)	(.039)	(.046)	(.055)	(.080)
Married	.080	.15***	.026	.059**	.030	.079	.17***	-.016	.11*	-.0017
	(.049)	(.046)	(.036)	(.030)	(.037)	(.048)	(.053)	(.051)	(.066)	(.088)
Minority	.079	.011	.055	-.17***	-.088**	.079	.065	.14	-.083	-.040
	(.10)	(.093)	(.070)	(.063)	(.039)	(.11)	(.10)	(.092)	(.11)	(.15)
Education	.016		.021	.020**	.00085	.021		.050*	.030	.0083
	(.017)		(.018)	(.010)	(.0089)	(.01)		(.026)	(.020)	(.025)
Potential experience	.031***	.023***	.018***	.022***	.026***	.034***	.026***	.017**	.015	.070***
	(.0079)	(.0069)	(.0054)	(.0049)	(.0071)	(.0076)	(.0083)	(.0083)	(.011)	(.018)
Experience^2	-.0003	-.0003*	-.0004***	-.0004***	-.0005***	-.0004*	-.0003	-.0002	-.0001	-.0012***
	(.0002)	(.0002)	(.00013)	(.00011)	(.00013)	(.00021)	(.00019)	(.0002)	(.00026)	(.0003)
Urban	.059	.039	.12***	-.00079	.074*	.047	.070*	.28***	.021	.032
	(.038)	(.034)	(.032)	(.029)	(.042)	(.038)	(.038)	(.049)	(.054)	(.091)
Industry dummies	X	X	X	X	X	X	X	X	X	X
Regional dummies	X	X	X	X	X	X	X	X	X	X
Number of obs.	849	1495	1734	1522	1023	838	1205	851	454	166
R^2	.34	.25	.27	.27	.21	.34	.26	.30	.25	.46

Notes:
[*1]The informal wage sector is the omitted ownership category.
[*2]The private domestic sector is the omitted ownership category.
The dependent variable is the log of hourly wage.
*, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level, respectively.
The robust standard errors are between parentheses.

Table 2.5. Impacts of FDI on Wages by Gender

	Full Sample[*1]						**Subset of Workers in the Formal Sector**[*2]					
	Full Sample		Subset of Skilled Workers		Subset of Unskilled Workers		Full Sample		Subset of Skilled Workers		Subset of Unskilled Workers	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Foreign dummy	.36***	.46***	.49***	.44***	.27***	.45***	.30***	.26***	.37***	.37***	.25***	.24***
	(.057)	(.047)	(.094)	(.094)	(.070)	(.053)	(.058)	(.045)	(.096)	(.083)	(.095)	(.067)
State dummy	.25***	.37***	.20***	.27***	.29***	.41***	.16***	.16***	.088	.20***	.25***	.16***
	(.030)	(.037)	(.058)	(.080)	(.040)	(.044)	(.038)	(.041)	(.056)	(.058)	(.053)	(.056)
Private dummy	.029	.16***	.098	.069	.0095	.20***						
	(.027)	(.035)	(.061)	(.086)	(.029)	(.039)						
Married	.055**	.056**	.074	.18***	.061**	.017	.049	.10***	.077	.20***	.049	..011
	(.025)	(.026)	(.054)	(.047)	(.027)	(.030)	(.041)	(.035)	(.058)	(.046)	(.061)	(.051)
Minority	-.10***	.032	-.11	.090	-.11***	.0008	.00022	077	-.034	.072	.0044	-.0003
	(.039)	(.041)	(.11)	(.087)	(.040)	(.047)	(.064)	(.067)	(.086)	(.086)	(.074)	(.0002)
Education	.052***	.052***	.10***	.10***	.021***	.017***	.082***	.073***	.11***	.098***	.042***	.029***
	(.0032)	(.0039)	(.055)	(.011)	(.0039)	(.0049)	(.0064)	(.0051)	(.010)	(.011)	(.009)	(.010)
Potential experience	.028***	.022***	.027***	.023***	.025***	.015***	.033***	.027***	.032***	.025***	.029***	.021***
	(.0034)	(.0037)	(.0079)	(.0075)	(.0037)	(.00047)	(.0058)	(.0054)	(.0090)	(.0077)	(.0086)	(.0080)
Experience^2	-.0005***	-.0004***	-.0004**	-.0002	.026**	-.0002**	-.0006***	-.0003***	-.0005**	-.0003	-.0005***	-.0003
	(.00007)	(.00008)	(.00019)	(.0002)	(.0037)	(.0001)	(.0001)	(.00014)	(.0002)	(.0002)	(.0002)	(.0002)
Urban	.12***	.025	.13***	.033	.098***	.054*	.18***	.044	.17***	.030	.19***	.13***
	(.021)	(.025)	(.037)	(.038)	(.024)	(.031)	(.030)	(.029)	(.041)	(.039)	(.047)	(.047)
Industry dummies	X	X	X	X	X	X	X	X	X	X	X	X
Regional dummies	X	X	X	X	X	X	X	X	X	X	X	X
Number of obs.	4096	2527	1321	1023	2775	1504	1973	1541	1100	943	873	598
R^2	.31	.45	.34	.41	.25	.32	.34	.39	.34	.40	.32	.30
Wald Test												
Chi-square	1.53		.15		4.42		.34		.00		.05	
P-value	.22		.70		.035		.56		.99		.83	

Notes:
[*1]The informal wage sector is the omitted ownership category.
[*2]The private domestic sector is the omitted ownership category.
The dependent variable is the log of hourly wage.
*, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level, respectively.
The robust standard errors are between parentheses.

Table 2.6. Regression Results for Alternative Specifications

	(1)	(2)[*1]	(3)	(4)	(5)		
					Labor-Intensive	Capital-Intensive	Skill-Intensive
Foreign dummy	.38***	.59***	.38***	-.029	.36***	.52***	.74***
	(.035)	(.045)	(.038)	(.097)	(.055)	(.082)	(.19)
State dummy	.28***	.45***	.28***	-.19***	.32***	.39***	.23
	(.023)	(.028)	(.022)	(.053)	(.045)	(.065)	(.23)
Private dummy	.071***	.21***	.069***	-.093*	.16***	.13**	.36*
	(.021)	(.026)	(.021)	(.049)	(.037)	(.058)	(.21)
Foreign*education				.047***			
				(.0097)			
State*education				.051***			
				(.0050)			
Private*education				.023***			
				(.0055)			
Female	-.11***	-.17***	-.19***	-.12***	-.24***	-.29***	-.055
	(.015)	(.017)	(.029)	(.014)	(.031)	(.043)	(.13)
Married	.052***	.039*	.027	.055***	-.0061	.11**	.16
	(.018)	(.021)	(.019)	(.017)	(.037)	(.054)	(.14)
Minority	-.061**	-.079**	-.12***	-.057*	-.25***	-.23**	-.79*
	(.030)	(.034)	(.034)	(.030)	(.077)	(.11)	(.46)
Education	.053***	.056***	.062***	.030***	.033***	.048***	.070***
	(.0024)	(.0028)	(.0043)	(.0032)	(.0075)	(.0068)	(.022)
Potential experience	.027***	.059***	.025***	.026***	.025***	.012	.036
	(.0025)	(.0032)	(.0026)	(.0024)	(.0058)	(.0081)	(.025)
Experience^2	-.0005***	-.0012***	-.00047***	-.00044***	-.0004***	-.0001	-.0004
	(.00006)	(.000072)	(.000055)	(.000054)	(.00013)	(.00018)	(.00056)
Urban	.090***	.10***	.18***	.076***	.064*	.15***	-.15
	(.016)	(.019)	(.034)	(.016)	(.037)	(.050)	(.13)
Selection correction term			.26***				
			(.098)				
Industry dummies	X	X	X	X	X	X	X
Regional dummies	X	X	X	X	X	X	X
Number of obs.	6623	6623	6623	6623	1086	613	84
R^2	.35	.41	.35	.36	.38	.47	.52

Notes: The dependent variable is the log of hourly wage except in Model (2).
[*1] The dependent variable is the log of weekly wage.
The informal wage sector is the omitted ownership category.
*, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level, respectively.
The robust standard errors are between parentheses.

Table 2.7. Changes in Employment Status/Ownership for the Panel Individuals 2002-2004

		2004							
		Foreign	State	Private	Informal Wage	Self-employed	student	Unemployed	2002 Total
	Foreign	36	6	8	11	3	4	3	71
2	State	12	710	33	18	57	3	19	852
0	Private	17	12	81	24	20	1	1	156
0	Informal wage	8	26	80	672	306	15	44	1151
2	Self-employed	15	94	94	406	5071	129	194	6003
	Student	17	59	38	87	391	1062	75	1729
	Unemployed	4	20	16	67	213	25	219	564
	2004 Total	109	927	350	1285	6061	1239	555	10526

Source: Author's calculation based on the VHLSS 2002 and VHLSS 2004.
Notes: The ownership is based on an individual's "most time-consuming job in the last 12 months".

Table 2.8. Log Differences in Hourly and Weekly Wages for the Panel Individuals 2002-2004

		A. Log Differences in Hourly Wages					B. Log Differences in Weekly Wages				
		2004					2004				
		Foreign	State	Private	Informal wage	2002 Total	Foreign	State	Private	Informal wage	2002 Total
2	Foreign	.19	.06	.04	.07	.13	.24	.21	.17	-.03	.18
0	State	.13	.27	.07	-.10	.25	.25	.28	.22	-.03	.27
0	Private	.18	.01	.10	.17	.11	.35	.06	.15	.07	.16
2	Informal wage	.40	.14	.22	.20	.20	.67	.23	.27	.18	.20
	2004 Total	.20	.26	.14	.19	.21	.31	.27	.21	.17	.23

Source: Author's calculation based on the VHLSS 2002 and VHLSS 2004.

Table 2.9. Results of Worker-Specific Fixed Effects Model

	(1)	(2)
ΔForeign dummy	.079	.19**
	(0.084)	(.083)
ΔState dummy	.095	.049
	(0.072)	(.059)
ΔPrivate dummy	.023	.032
	(0.047)	(.053)
Δmarried	-.044	-.11
	(0.059)	(.068)
ΔIndustry dummies	X	X
Number of Obs.	1727	1712
R^2	0.034	0.039

Notes: The dependent variables are the difference in logs of hourly wages in regression (1) and the difference in logs of weekly wages in regression (2).
The informal wage sector is the omitted ownership category.
** indicates that the coefficients are significant at the 5 percent level.
The robust standard errors are between parentheses.

Appendix Table 2.A.1. Impacts of FDI on Wages by Educational Attainment and by Gender

A. Impacts on Male Workers

	Full Sample[*1]					Subset of Workers in the Formal Sector[*2]				
	College and above	Upper-secondary	Lower-secondary	Primary	No Degree	College and above	Upper-secondary	Lower-secondary	Primary	No Degree
Foreign dummy	1.12***	.42***	.37***	.23*	-.20	.62***	.32***	.38***	.20	-.64*
	(.33)	(.098)	(.097)	(.13)	(.21)	(.20)	(.099)	(.11)	(.15)	(.34)
Number of obs.	465	856	1182	1005	588	457	643	515	259	99
R^2	.36	.22	.28	.22	.21	.36	.24	.35	.31	.58

B. Impacts on Female Workers

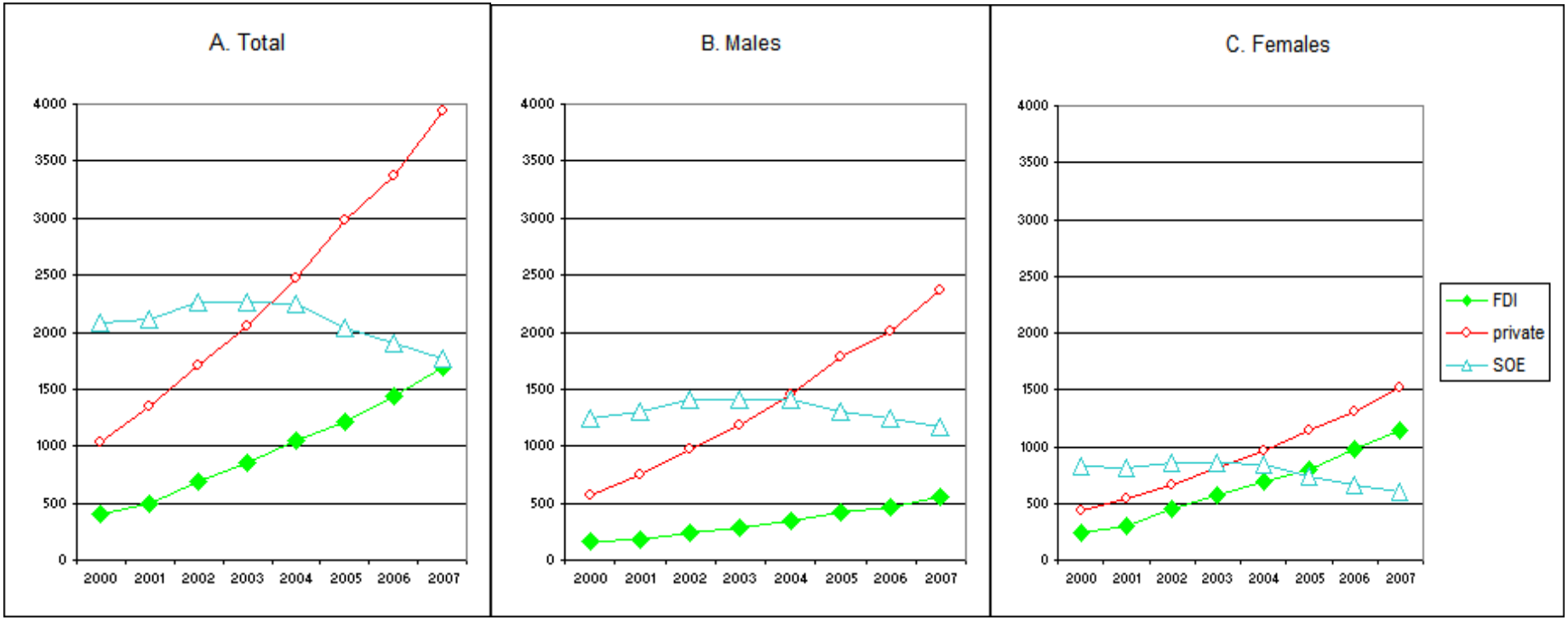
	Full Sample[*1]					Subset of Workers in the Formal Sector[*2]				
	College and above[*3]	Upper-secondary	Lower-secondary	Primary	No Degree	College and above	Upper-secondary	Lower-secondary	Primary	No Degree
Foreign dummy	.26	.40***	.40***	.49***	.45***	.37**	.32***	.18**	.33***	-.014
	(.22)	(.10)	(.090)	(.073)	(.17)	(.18)	(.083)	(.083)	(.082)	(.015)
Number of obs.	384	639	552	517	435	381	562	336	195	67
R^2	.35	.36	.37	.34	.24	.35	.36	.35	.31	.62

C. Wald Test Results to Test Whether the Coefficients for Foreign Ownership are Equal between Men and Women

Chi-square	5.05	.07	.04	3.10	6.33	.89	.00	2.80	.71	4.52
P-value	.025	.79	.84	.078	.012	0.35	.99	.094	.40	.033

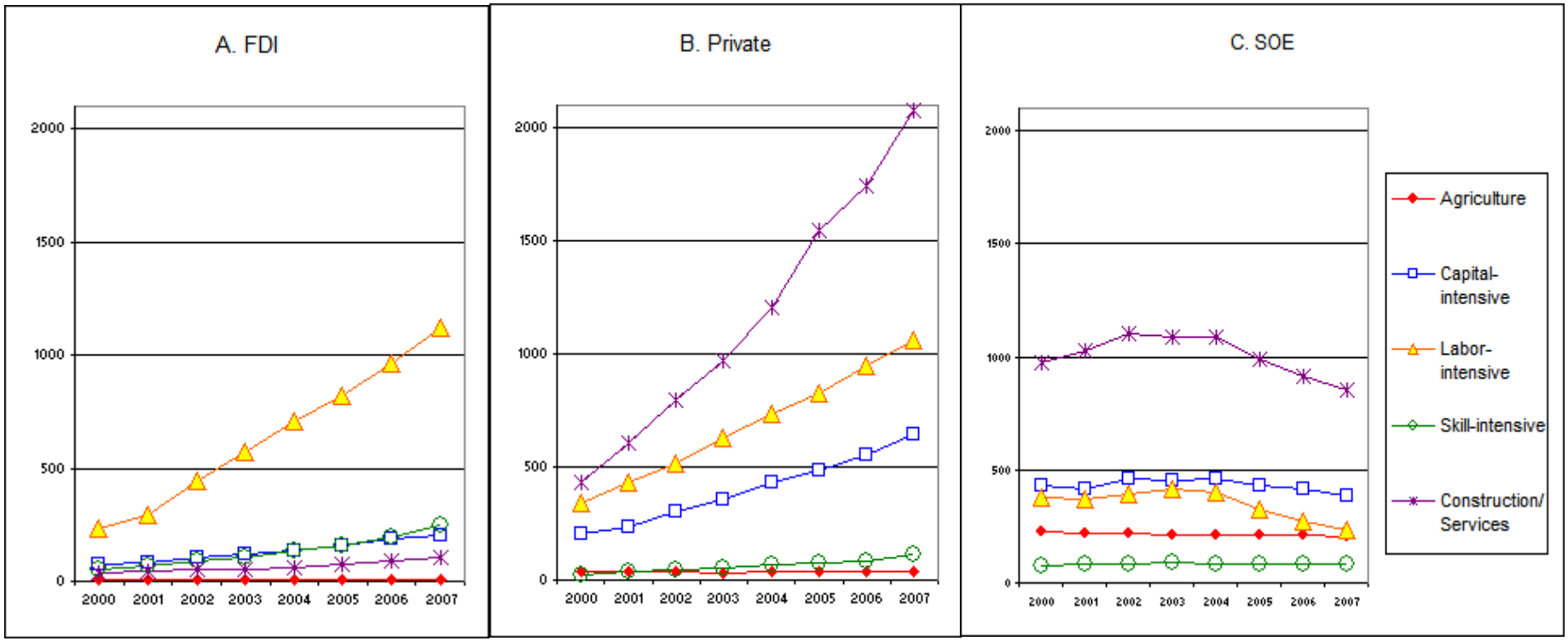
Notes:
[*1]The informal wage sector is the omitted ownership category.
[*2]The private domestic sector is the omitted ownership category.
[*3] A note of caution is appropriate: only three women with an educational attainment of college and above reported working in the informal wage sector, which is the base category.
To conserve the space, only the coefficients for foreign ownership are reported. The control variables included are the same as those in Table 4.
The dependent variable is the log of hourly wage.
*, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level, respectively.
The robust standard errors are between parentheses.

Figure 2.1. Structure of Enterprise Employment by Ownership and by Gender for the Period 2000-2007



Source: *Enterprise Survey* Data 2000-2007 (GSO)
Notes: The numbers of employment are by thousands.

Figure 2.2. Structure of Enterprise Employment by Ownership and by Economic Sector for the Period 2000-2007



Source: *Enterprise Survey* Data 2000-2007 (GSO)

Notes: The numbers of employment are by thousands.

The manufacturing sector is disaggregated into labor-, capital-, and skill-intensive sectors. The labor-intensive sector includes textiles, apparel, footwear/leather products, wood products, furniture/miscellaneous manufacturing, metal products, and non-metallic mineral products. The capital-intensive sector is defined as mining, food products, basic manufacturing, and chemical, rubber, plastic products. The skill-intensive sector consists of electronics/machinery and transport equipment.

Chapter 3: Foreign Direct Investment (FDI) And Internal Migration in Vietnam: a Two-Stage Approach

1. Introduction

Since Vietnam started its transition from a centrally-planned economy towards a market-oriented economy with its *doi moi* ("renovation") policy in 1986, Vietnam has been among the fastest growing economies with an average annual growth rate of 7.0 percent.[78] Vietnam also made considerable progress in liberalizing its trade and Foreign Direct Investment (FDI) policies. These reforms were accompanied by substantial reductions in poverty: the poverty rate[79] dropped from 58.1 percent in 1993 to 37.4 percent in 1998 and 19.5 percent in 2004 (ADB, 2006). On the other hand, several studies indicate that the economic reforms have widened economic disparities across Vietnam's regions (e.g., ADB, 2006; Glewwe, Gragnolati, and Zaman, 2000; Liu, 2001).

The *doi moi* policy introduced a number of changes which promoted labor mobility (Dang, Goldstein and McNally, 1997; Dang, Tacoli and Hoang, 2003). De-collectivization in agriculture increased agricultural productivity which in turn exacerbated the problem of surplus labor in rural areas. Vietnam's subsidy and ration scheme, which was tied to the system of household residence certificates (*ho khau*) in home areas, was abolished and people became less dependent on government for their basic necessities. While the government of Vietnam controlled labor relocation policy in prior years, migration patterns after the implementation of *doi moi* have tended to be increasingly spontaneous[80] as individuals move to destinations with better economic opportunities. In particular, several studies point out a growing trend of internal migration among

[78] The average for the period 1986-2007 (World Bank).
[79] The poverty rate is measured as the percentage of population that cannot afford a threshold consumption basket with food spending being sufficient to purchase 2100 calories per day.
[80] Two types of population movement are usually distinguished in the migration literature for Vietnam. Organized migration refers to participation on government sponsored programs in which migrants are typically provided with free transportation and basic necessities for re-settlement. Spontaneous migration involves a migration pattern in which migrants are responsible for the costs of relocation and choice of destination (Dang *et al.*, 2003).

young women moving to the regions that are the main recipients of FDI (e.g., Dang *et al.*, 2003; GSO, 2005).

This paper investigates the determinants of internal migration and destination choices using the *Vietnam Migration Survey* (VMS) 2004 and the *Vietnam Household Living Standard Survey* (VHLSS) 2004. The contribution of this paper to the literature is threefold. First, to the best of my knowledge, this is the first study which introduces FDI as a main determinant of migration in formal regression analyses in Vietnam. Second, this study differentiates how the determinants of migration vary depending on job outcomes (defined by ownership) and in terms of rural- vs. urban destinations. Finally, the paper employs a two-stage model to investigate characteristics of both sending and receiving areas. In the first stage, multinominal logit models are employed to determine how the characteristics in source areas and personal attributes "push" individuals to move out. In the second stage, conditional logit models are estimated to investigate how destination-specific characteristics "pull" different types of migrants.

Section 2 reviews the trends and context of internal migration. Section 3 summarizes related studies in the current literature. Section 4 implements a series of regressions to assess the determinants of migration and destination choices. Section 5 presents concluding remarks.

2. Background

Following the country's reunification in 1975, the government of Vietnam implemented an extensive national population and labor relocation policy (Dang *et al*., 1997; Dang *et al.*, 2003). *Inter alia*, the government organized resettlement programs with the establishment of the so-called "New Economic Zones" (NEZs). In order to redress imbalances in population density, the government encouraged rural to rural and urban to rural migration, and migration flows to urban areas were strictly controlled through a variety of policies. The most important of such policies

was the system of household residence certificates (*ho khau*), which were required for access to subsidized food, housing, education and social services (Dang *et al.*, 2003).

The *doi moi* policy adopted since 1986 brought about a number of changes that facilitated the development of a variety of migration flows (Dang *et al.,* 1997; Dang *et al.*, 2003, Phan and Coxhead, 2010). First, the household contract system released farmers from collective employment and allocated land-use rights to individual households. This in turn raised agricultural productivity and exacerbated labor surplus in rural areas. Second, although the *ho khau* system continued, the subsidy system was abolished, making the *ho khau* system less effective as a tool to control labor movement. Finally, the development of transport systems and telecommunications across regions has facilitated spatial mobility. The reduction in impediments to labor mobility, together with growing regional differences in income and economic opportunities, led to a considerable increase in rural-urban migration.[81]

According to the 1999 *Population and Housing Census*, about 4.5 million individuals or 6.5 percent of the population over five years of age in Vietnam changed their places of residence during the period 1994-1999 (GSO/UNDP, 2001). Table 3.1 breaks down the numbers of inter-provincial migrants for the period 1994-1999 across eight regions and two major cities and by gender.[82] The first three, the next three and the last three columns demonstrate the numbers of in-migration, out-migration and net migration defined as the balance between in-migration and out-migration respectively.

During the period 1994-1999, the increase in inter-provincial migration has been driven by rural-urban flows mainly to two large cities and the Southeast region. Ho Chi Minh City

[81] The percentage of population living in urban areas increased from 19.4 percent in 1989 (UNFPA, 2007) to 25.8 percent in 2004 (author's calculation based on the VHLSS 2004).

[82] The table shows the numbers for inter-provincial migration. During the period 1994-1999, about 2.0 million persons crossed provincial boundaries whereas the remaining migrants moved within provinces (GSO/UNDP, 2001).

(HCMC) was the largest recipient of inter-provincial migration with a net gain of 410,553 people. The Southeast region (excluding HCMC) and Hanoi also gained by 190,345 and 114,617 persons respectively. Partly driven by the coffee boom in the 1990s, the Central Highlands also gained 198,467 people who were mainly agricultural migrants.[83] The other regions experienced net population loss to migration during the same period. Table 3.1 shows that HCMC and surrounding Southeast area received significantly more female than male in- and net-migrants.[84]

Since *doi moi*, the regional disparity in economic and other characteristics between rural and urban areas and across Vietnam's provinces appears to have increased (Glewwe *et al.,* 2000; Liu, 2001; ADB, 2006). The economic inequality across locations is generally viewed as the main motive for migration. Table 3.2 presents some key economic indicators which may affect spatial mobility by urban/rural location and by Vietnam's two big cities and eight regions.

Evaluating the standard of living by per capita expenditure, Table 3.2 reveals disparity between urban and rural areas and across regions. In 2004, the per capita average monthly expenditure in urban areas (VND 661,649) was more than double that in rural areas (VND 316,564). By this measure, HCMC, followed by Hanoi, and the Southeast (other than HCMC) attained the highest standard of living, while people living in the mountainous areas in the Northwest, Northeast and Central Highlands, as well as those residing in the North Central Coast, lagged behind. The gap in living standards correlates in part to personal characteristics of residents such as ethnicity and education level. In particular, it is recognized that poverty in Vietnam is strongly associated with

[83] Following reunification in 1975, the government designated Dak Lak in the Central Highlands as a New Economic Zone (NEZ) and established state farms and cooperatives for cash crop production, notably coffee. Whereas migration was initially induced by government programs, substantial migration into Dak Lak occurred spontaneously since the late 1980s. The rise of Vietnam's coffee exports nearly doubled GDP in Dak Lak in the 1990s, but the share of income derived from coffee production has somewhat diminished following the coffee price collapse (Ha and Shively, 2008).

[84] Whereas males outnumbered females in the inter-provincial migration during the period 1984-1989, more females moved inter-provincially during the period 1994-1999 (GSO/UNDP, 2001). During the latter period, females outnumbered males in the rural-to-urban stream, there were almost equal numbers of male and female migrants in the rural-to-rural and urban-to urban streams, and males dominated only for the urban-to-rural stream (*ibid.*, p. 52).

ethnicity (ADB, 2006; Epprecht, Müller, and Minot, 2009; Hung and Reilly, 2009).[85] Table 3.2 shows that minorities are especially concentrated in the mountainous regions, recording 80.5 percent of the total population in the Northwest, 40.8 percent in the Northeast and 32.0 percent in the Central Highlands. In terms of educational attainments, Vietnamese population aged 15 and over achieved an average of 7.2 total years of education. Educational attainments varied across locations; urban dwellers tended to be better educated with 8.7 years of educational attainment on average as compared to those in rural areas with 6.6 years of education.

The regional disparities can also be viewed in terms of employment opportunities. Table 3.2 reveals that 30.7 percent of workers in Vietnam (50.7 percent in urban areas and 24.3 percent in rural areas) are engaged in wage employment. The share of wage employment in total employment is especially high in HCMC and Hanoi accounting for 59.4 percent and 56.4 percent respectively. Table 3.2 also demonstrates that the proportions of workers who are employed in state and foreign sectors relative to total workers are 10.1 percent and 2.2 percent respectively. Employment in these sectors is nearly four times higher in urban areas relative to rural areas, (23.2 percent as opposed to 6.0 percent for state sector and 4.9 percent against 1.3 percent for foreign sector). As one might expect, state employment is highest in proportion in Hanoi (32.7 percent). The proportion of workers employed by the foreign sector is particularly high in the Southeast (11.4 percent in HCMC and 11.3 percent in the rest of the Southeast).

Since the first Law on Foreign Direct Investment took effect in 1987, Vietnam has received a considerable inflow of FDI with a cumulative FDI stock of $40.2 billion in 2007 (UNCTAD).[86] Figure 3.1 shows the evolution of employment by foreign firms by gender for the period 2000-2007.

[85] While only 13.5 percent of the ethnic Vietnamese (Kinh) and Chinese were poor, 60.7 percent of ethnic minorities lived below the poverty line in 2004 (ADB, 2006). See Hung and Reilly (2009) for analyses of ethnic wage gap.
[86] For the year 2007, foreign owned firms accounted for 18.0 percent of Vietnam's Gross Domestic Product (GDP) and 44.6 percent of industrial output (GSO, 2008).

Since the early 2000s, the number of workers employed by foreign firms more than quadrupled, increasing from 0.4 million in 2000 to 1.7 million in 2007. Two external events contributed to the surge. In 2001, the U.S.-Vietnam Bilateral Trade Agreement (BTA) came into effect with the United States extending Most-Favored-Nation (MFN) status to Vietnam. As a result, Vietnam's exports to the U.S., in particular, those of labor-intensive manufacturing, rose dramatically, and this in turn led to a substantial expansion of FDI inflow in these sectors (see chapter 2). Furthermore, the negotiation process for Vietnam's accession to the World Trade Organization (WTO)[87] played a catalytic role in accelerating Vietnam's domestic reforms contributing to an improvement of Vietnam's business and investment climate (Parker, Riedel, and Phan, 2007). Figure 3.1 demonstrates that the employment by foreign firms is disproportionately held by females: in recent years, about two-thirds of foreign-sector workers were female partly reflecting the expansion of export-oriented female-intensive manufacturing such as clothing, footwear and electronics.

Foreign firm employment is concentrated in a few provinces. Figure 3.2 shows the foreign sector employment levels in seven provinces (out of 64 provinces) in which foreign enterprises generated the most employment during the period 2000-2007. Foreign sector employment is overwhelmingly concentrated in HCMC and two provinces adjacent to HCMC, namely Binh Duong and Dong Nai provinces. Foreign sector employers in these three provinces alone created about 0.82 million jobs during the period 2000-2007, accounting for about 73 percent of total foreign employment in 2004. Although the employment by foreign firms in two big cities in the North (namely Hanoi and Hai Phong) grew especially in recent years, the number of individuals employed in foreign sector in these cities in 2004 was relatively small compared to the South,

[87] Vietnam became a full member of the WTO in January 2007.

accounting for only 4.9 percent of Vietnam's total foreign jobs for Hanoi, and 2.3 percent for Hai Phong.

3. Determinants of Internal Migration

The literature[88] has long recognized that migrants tend to move in response to differences in earning opportunities. For instance, the human capital model of Sjaastad (1962) hypothesizes that the migration decision is influenced by the present value of the difference in income streams between alternative locations. According to his model, the higher rate of migration among the young can be understood as a logical outcome of investment decision-making since the young face a longer life investment horizon. A large number of studies estimated migration equations that relate the outcome of migration to income differentials, cost[89] of migration and a variety of other explanatory variables. Most of these studies find a positive impact of income in destination, a negative effect of income in origin, and a negative effect for distance between sending and receiving areas (Lucas, 1997).

Extending the wage-differential approach, Todaro (1969) formulates a rural-urban migration model that incorporates the probability of obtaining a modern sector job as an additional determinant of migration. Furthermore, the model of Harris and Todaro (1970) demonstrates that, under certain circumstances, urban job creation may actually exacerbate unemployment by inducing more migrants to urban areas. Several empirical studies incorporate measures of unemployment in their estimates of migration decision functions, but the results are mixed. For instance, no significant relationship between the unemployment rate and migration is revealed in

[88] See Lucas (1997) for a review.

[89] Geographical distance between origin and destination areas is typically used as a proxy for the cost of migration in the literature, assuming that the latter variable captures transportation costs, psychological costs, and costs of acquiring information (Lucas, 1997).

Peru (Falaris, 1979) whereas both wage and unemployment differentials are found to be important determinants of migration in Botswana (Lucas, 1985)[90] and Albania (Cattaneo, 2008).

For Vietnam, several studies assess empirically the determinants of internal migration (Dang *et al.*, 1997; Nguyen, Tran, Nguyen and Oostendorp, 2008; Niimi, Pham and Reilly, 2009; Phan and Coxhead, 2010). Studying the 1989 census data, Dang *et al.* (1997) find that while the government intervention played a key role in moving people from sending provinces/cities to targeted resettlement areas, people still moved into the urban areas which gained population, on balance, from migration. Their study also finds that, even during the initial phase of the *doi moi* policy, women tended to go to areas with higher relative levels of industrial development.

Using the 1989 and 1999 *Censuses of Population and Housing* data, Phan and Coxhead (2010) estimate a standard macro migration equation to examine the determinants of inter-provincial migration flows in Vietnam. Whereas they find that provinces with a higher per capita income attract more migrants, the coefficient for income in the sending province in their regression turns out to be positively significant. As a potential explanation, they suggest that the "liquidity constraint effect"[91] in poorer regions outweighs the "push" effect of migration in Vietnam. For their sub-sample in which the receiving provinces are restricted to HCMC and surrounding areas, they find an inverse U-shape relationship between the out-migration rates and incomes of provinces of origin as predicted by the liquidity constraint hypothesis. Phan and Coxhead (2010) also examine the impact of migration on inter-provincial inequality relating the out-migration

[90] Lucas (1985) explores empirically Todaro (1969) and Harris-Todaro (1970) hypotheses adopting micro data at the individual level in the context of Botswana. In addition to estimating prediction equations for earnings, Lucas develops prediction equations for likelihoods of employment. His results derived from multinominal logistic regressions reveal that the higher the chance of finding employment in town and the higher is the person's earnings in town, the more likely it is that a person will migrate to town from his or her home village. Conversely, the greater the chance of finding employment in the home village and the higher the wage for a person at home, the lesser is the propensity to migrate.

[91] According to Phan and Coxhead (2010), the "liquidity constraint effect" means that poorer provinces have low capacities to finance migration costs and that this in turn leads to poverty related labor immobility. The liquidity constraint hypothesis predicts that out-migration rate first increases with respect to a sending province's income and then decreases as income rises.

rate between pairs of provinces in one period to the change in income differential between these provinces in the next period. They find an inequality-reducing impact of migration for the flows going to HCMC and surrounding provinces. These results are consistent with Niimi *et al*.'s study (2009)[92], which finds that a migrant who works in the foreign invested sector is more likely to remit money home, thus trickling-down the benefits of FDI to rural areas.

Nguyen *et al.* (2008) investigate the determinants of migration in the *sending* areas using the data on the panel households from the VHLSS (2002, 2004). They generally find that larger households tend to have more migrants; households with members of age between 15 and 25 years are more likely to have out-migrants; and higher educational attainments of household members increase the probability of out-migration. Interestingly, for the "economic" migrants, they find evidence of the existence of a "migration hump" with an inverted U-shape revealing that the probability of out-migration rises with per capita expenditure levels up to a certain threshold level and falls afterwards.[93] Nguyen *et al.* (2008) also find a negatively significant coefficient for the dummy variable indicating whether or not the household resides in a "commune with enterprises, factories, or trading village within 10 km" and suggest the importance of non-farm economic activities to deter migration. However, for the sample limiting to "economic" migrants, the coefficient for the latter variable turns out to be insignificant. The lack of the significance of the variable may be because their data reflect only the characteristics of sending areas and the economic opportunities in destination areas are not taken into account.

4. Migration Behavior in Vietnam

4.1. Data Sources

[92] Niimi *et al.*'s study (2009) examines the determinants of remittance using data from the VMS.
[93] Nguyen *et al.* (2008) find that the probability of economic out-migration peaks when annual per capita expenditure level reaches VND 4,674,000 or 3,878,000 in the regressions without and with commune characteristics respectively.

The *Vietnam Migration Survey* 2004 (VMS) was conducted by Vietnam's General Statistics Office (GSO) with the technical support of the United Nations Population Fund (UNFPA) as an intercensal survey between the 1999 and 2009 censuses (GSO, 2005). In the VMS, about 5,000 migrants in the *destination* areas were interviewed. A migrant is defined as "a person aged 15-59 who had moved to their current district/quarter from another district/quarter during the five years prior to the survey, and who had resided at their current place of residence one month or more" (GSO, 2005, p. 14). The eleven cities and provinces covered by the VMS represent five areas,[94] namely Hanoi; the Northeast Economic Zone (including Quang Ninh, Hai Phong and Hai Duong); Ho Chi Minh City; the Southeast Industrial Zone (Binh Duong and Dong Nai) and the Central Highlands (Gia Lai, Dac Lac, Dac Nong, and Lam Dong). Most of the migrants who went to the Central Highlands were interviewed mainly to understand the pattern of rural-rural migration as compared to urban-rural migration (GSO, 2005).

On the one hand, since the survey covers only eleven provinces as migrants' destination areas, and information to construct sampling weights that would adjust for the unequal probability of selection is not available (GSO, 2005), the VMS is not a suitable data source to evaluate the general trend of internal migration in Vietnam. On the other hand, there are several advantages in using the VMS for the purpose of analyzing the role of FDI in influencing migration patterns. First, the sample includes the majority of provinces which attracted FDI.[95] Second, unlike the census data which exclude temporary migration, the sample includes migrants with temporary or no household registration. Coverage of the latter migrants is important since many migrants who work for foreign firms tend to hold a temporary status (see Table 3.3). Third, the VMS includes detailed information on individual characteristics and migration outcomes in destination areas;

[94] These eleven provinces were selected based on the high levels of *in*-migrants in the 1999 census (GSO, 2005).
[95] The eleven provinces covered by the VMS accounted for 75.2 percent of foreign capital resources (GSO, 2008, p. 455) and absorbed 83.3 percent of foreign employment (*Enterprise Survey* data, GSO) in 2004.

this in turn permits an analysis of differential patterns of migration. Moreover, since one can identify from the VMS where migrants came from, this in turn makes it possible to examine the characteristics of their origin areas.

In order to study the characteristics of migrants relative to non-migrants, the data on non-migrants are taken from the *Vietnam Household Living Standard Survey* 2004 (VHLSS 2004). The VHLSS 2004 data are also used to compute the province (and urban/rural) level variables in origin and destination areas. The VHLSS 2004 is the fourth Living Standard Measurement Survey conducted by the GSO, under the technical support of the World Bank. The VHLSS 2004 covers 9,188 households and the data are generally recognized to be high quality and representative of Vietnam as a whole.

4.2 Descriptive Statistics

The first and second columns of Table 3.3 compare the descriptive statistics of migrants vs. non-migrants constructed from the VHLSS 2004 and VMS 2004 respectively.

For the sample of migrants taken from the VMS, those of 15-59 years of age who work, and those who do not work but sought employment, are included. As a comparison group, the sample of non-migrants is constructed from the VHLSS 2004. Non-migrants are defined as those who are 15-59 years of age and either work, or don't work but sought employment, and who resided at the same place five years prior to the survey.[96] From both samples, individuals who are students, do housework, or are unemployed but are not seeking employment, have been excluded. This results in a sample of 4,476 migrants and 16,878 non-migrants.

For migrants, the data are further disaggregated into four categories of migration outcomes defined by ownership and destination: migrants who reported to work in foreign, state[97] and

[96] In order to exclude migrant households, I only included households who responded that they have lived in the same house since 1999 or earlier.
[97] The state sector includes government and state-owned enterprises (SOE)s.

private[98] sectors in two big cities and economic/industrial areas are referred to "Foreign", "State" and "Private" respectively. Into the final category, I classify migrants who went to the Central Highlands to proxy for agricultural migrants ("Agriculture").

Table 3.3 reveals that there are substantial differences in demographic and economic characteristics between migrants and non-migrants, and among migrants, depending on migration outcomes. In terms of demographic characteristics, the migrants are generally younger relative to non-migrants with an average age of 28.7 years for migrants as opposed to 35.2 years for non-migrants. Migrants are more educated with their average education of 9.2 years as compared to 7.9 years for non-migrants. In 2004, the proportion of individuals who were unemployed (defined as "those who are not working but sought employment") is relatively low for both migrants and non-migrants registering 0.9 percent and 1.1 percent respectively. For migrants, the proportion of those who were unemployed in origin areas[99] is 2.6 percent, which is a much higher rate than the average proportion of the unemployed after migration.

Among migrants, those who work for foreign firms are the youngest on average at 23.5 years of age whereas those who moved to the Central Highlands for mainly agricultural activities tend to be older at 32.3 years on average. Whereas the state sector appears to have attracted the most educated migrants (with 12.4 years of average educational attainment), those who went to the Central Highlands are least educated (average 6.7 years). The proportion of females in the foreign-owned sector is especially high with three quarters of workers being women.

[98] In terms of migrants who work for the domestic non-state sector, the VMS does not distinguish between workers who are employed by formal enterprises and those who work in the informal sector.

[99] In the survey, each migrant is asked about the main activity in the last six months before migrating. The proportion of those who responded as "unemployed and looking for work" is defined as the proportion of unemployed in the origin area.

The average monthly earnings reported in the VMS,[100] are VND 1,247,496, VND 1,112,091, and VND 907,136 for "State", "Private" and "Foreign" workers respectively,[101] whereas the migrants who went to the Central Highlands earned VND 504,208 on average. Although the income levels of migrants before migration are not reported in the VMS, the survey questionnaire includes a question about migrants' self-assessments on the change in income before vs. after migration on five scales. Table 3.3 demonstrates that approximately 84.7 percent of migrants feel that their incomes are better (78.6 percent) or much better (6.1 percent) whereas few migrants (3.5 percent) reported that their income is worse or much worse. For those who work for foreign firms, the proportion of migrants who responded that their incomes are better or much better is slightly higher than the average of migrants at 87.9 percent. Migrants who went to the Central Highlands did not improve their incomes as much: the proportion of those who feel that their incomes are better is lower than average at around 74.1 percent whereas that of those who think that their incomes are worse is higher than average (9.7 percent).

In terms of the household registration status[102] for migrants, 17.9 percent of migrants are registered in the category of permanent household (KT1 or KT2). Only 10.2 percent of migrants who work for foreign firms possess permanent registration status.

The migrants interviewed in the VMS originated in all Vietnam's 64 provinces. Whereas about two thirds (63.7 percent) of them resided in urban[103] areas after their migration, about 78.3

[100] The actual income figures are not used in the empirical analyses since the income differentials in the model are computed based on expectations. Comparing actual wages and predicted wages, it turns out that the Mincerian wage regressions in the empirical section predict migrants' actual incomes reasonably well.

[101] The lower wages amongst the workers in foreign affiliates relative to the other sectors may reflect their younger age, the higher proportion of females who work in this sector and the low-wage industries for which they work such as clothing and footwear manufacture (see Chapter 2).

[102] There are four levels of registration status: KT1 (permanent registration in the district where the person resides); KT2 (permanent registration at another district of the same province); KT3 (temporary registration for six months or more); and KT4 (temporary registration for a period of less than six months) (GSO, 2005). In order to obtain permanent registration, a migrant must meet three conditions which in practive may be difficult to meet: permission from the place of origin; a permanent job in the place of destination; and own housing in the place of destination (GSO, p. 72, 2005).

percent of them came from rural areas. The "distance" of re-location, which is approximated by the distance between the capitals of a migrant's source province and destination province, averaged around 563 kilometers for the entire sample.[104] About 79.8 percent of those who work for foreign firms came from rural areas, traveling long distances (771 kilometers on average). The migrants to the Central Highlands also tended to come from remote provinces at an average "distance" of 874 kilometers. In contrast, the "distance" of re-location for those who work for the state sector is relatively small at 226 kilometers on average.[105]

4.3. Models and Estimation Results

At the first stage, I use multinominal logit models (Greene, 2003, Chapter 21.7.1) to investigate the determinants of migration decision. At the second stage, I implement conditional logit models (Greene, 2003, Chapter 21.7.2) to explore the determinants of destination choices among migrants. These two separate analyses are designed to be complementary in addressing the questions of (i) who are migrating, and (ii) why they are doing so.

(i) First-Stage Models of the Determinants of Migration

A multinominal logit model is a useful tool to examine how the determinants of migration differ according to the four migration outcomes defined above. The VMS includes information about the province from which the migrants originated and whether or not the area of origin is urban or rural. This information in turn enables us to link migration outcomes in the destination areas with characteristics of the sending areas. The models are motivated by a random utility model for the ith individuals faced with J choices. Let utility of the j^{th} choice be defined as

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[103] Destination or origin areas are referred to as "urban" if migrants reported that they reside(d) in "large city", "small city", or "town"; areas are referred to as "rural" if migrants reported living in "countryside."

[104] The land distance between Hanoi and HCMC is 1710 kilometers. The distance between Buon Ma Thuot (the capital of Dak Lak in the Central Highlands) and Hanoi is 1390 kilometers whereas that between Buon Ma Thuot and HCMC is 375 kilometers. (http://sinhcafe.com.vn/Desktop.aspx/News/Transportation/Land/#cities)

[105] The shorter distance may partly reflect a large migration flow to Hanoi and other northern cities from neighboring provinces, and partly governments' practice of transferring their personnel on a local basis (GSO/UNDP, 2001).

$$U_{ij} = x_i^{'}\beta_j + \varepsilon_{ij}$$

where x_i is a vector of a set of individual- and origin-specific characteristics. The model involves five choices (J=5) including: staying in home areas (category 1), moving out to big cities/industrial areas and work in "Foreign" (category 2), "State" (category 3) and "Private" (category 4) sectors, and moving to the Central Highlands for agricultural activities (category 5). If the individual makes choice j, it is assumed that U_{ij} is the maximum among the J utilities. Thus, the model is driven by the probability that choice j is made, which is

$Prob_{ij} \equiv Prob\ (U_{ij} > U_{ik}$ for all other $k \neq j)$.

If the error terms are assumed to be independent and identically distributed with the Gumbel distribution, this gives rise to the multinominal logit model. The probability of an individual being in a selected outcome can be expressed as:

$$Prob_{ij} = \frac{\exp(x_i^{'}\beta_j)}{\sum_{k=1}^{5}\exp(x_i^{'}\beta_k)} \quad j=1,\ldots,5.$$

In the model, there is one set of β's for each state j. For the purpose of identification, the coefficient for the outcome being non-migrant (category 1) is set to zero (β_1=0), and all the migration outcomes are estimated in relation to this benchmark. Personal characteristics include age, gender (a value of one if female), education and minority status (a value of one if minority).[106] Employment status is a dummy variable indicating whether or not the individual is unemployed (for migrants, the dummy represents the status before migration).

In particular for the migrant sub-sample that is drawn from the VMS, information on economic conditions (such as income levels or the type of work) prior to the migration decision is not available beyond whether or not he or she was employed. Thus, a set of economic variables

[106] Vietnam comprises about 54 ethnic groups of which the largest group is the Kinh (84 percent of total population). The minority is defined to represent all ethnic groups other than the Kinh majority and Hoa (the Chinese).

aggregated at the province (and urban/rural) level is used in order to proxy for the origin characteristics.[107] Average per capita monthly household expenditures and average per capita land areas owned by households[108] are computed by province (and urban/rural) from the VHLSS 2004 for both migrants and non-migrants in order to capture the living standards and the opportunities for agricultural, forestry, and fishery activities respectively. Whereas the unemployment rate in Vietnam for the year 2004 was relatively low, underemployment is a common phenomenon in Vietnam especially in rural areas.[109] Foreign- and state-owned sectors may provide superior jobs, offering workers with full-time employment opportunities and paying higher wages per unit of time (see chapter 2). To proxy for the chance of obtaining a job in the state sector, the proportion of state workers in total employment at each sending area is calculated from the VHLSS 2004. In terms of the proportion of workers employed by foreign affiliates, the number of workers in the latter sector for each location are taken from the *Enterprise Survey* data (GSO)[110] and divided by the total employment. The coefficients for standard of living, land holding, and job opportunities in origin are expected to be negative as the lack of opportunity in the source area may push individuals to relocate.

In order to study the determinants of migration decision for the migrants as a whole, I first run a logit model relating a dichotomous outcome of migration (migrant vs. non-migrant) to a set of personal and origin characteristics.[111]

[107] Since there are 64 provinces and each province consists of urban and rural areas, there are 128 sending areas in my regressions.
[108] The per capita land area owned by the household members consists of "farming, forestry land and water surface area for aquaculture, residence land and garden, pond next to housing land".
[109] Rural workers of working age worked only about 79 percent of working hours in 2004 (GSO, 2006, p.57).
[110] There are two reasons why the *Enterprise Survey* data are more suitable to compute the number of foreign jobs than the data from the VHLSS 2004. First, the VHLSS is likely to under-represent the temporary migrants working in the foreign sector since the sampling of the latter data is based on the households' permanent registration status. Second, the number of workers who reported to work for foreign sector (278 observations) in the VHLSS 2004 is too small to reflect the varying employment opportunities at the province level.
[111] The logit model can be viewed as a special case of the multinominal logit model when J=2.

Table 3.4 demonstrates the results of logit regressions. All coefficients are reported in terms of the impacts of the variables on the odds ratios, i.e., the ratios of the odds of migration occurring relative to staying. Thus, an estimated coefficient more (less) than one indicates that the independent variable is associated with a higher (lower) probability of migration. Since there are both individual and province level variables in my regressions, the standard errors are adjusted for within province correlation (clustering). It is found that the younger and the more educated individuals are more likely to migrate; these results are in line with the theory (e.g., Sjaastad, 1962) and empirical results in the literature. The result of a regression model that includes dummies that denote the stages[112] of education (column 2) confirms that the probability of migration increases monotonically as the education level increases (the upper secondary education is the omitted category). Females are more likely to migrate relative to males, which is consistent with the trend found in the 1999 census data (GSO/UNDP, 2001). The impact on the odds ratio of unemployment in origin is found to be greater than one, implying that the difficulty of finding a job in the place of origin is likely to be one of the determinants of migration. The effect of land on the odds ratio is found to be less than one indicating that the less available land is in the place of origin, the more likely it is for the person to move out.

In order to proxy for the standard of living in the location where he or she resides, Model (3) introduces the per capita expenditure as a set of dummy variables by four quartiles.[113] (The upper-middle quartile is the omitted category). The coefficient estimates turn out to be consistent

[112] Five stages of education - college (and above), upper secondary (grade 12 completed), lower-secondary (grade 9-11 completed), primary (grade 5-8 completed) and no primary (less than grade 5 completed) - are considered.

[113] The lowest quartile represents those who live in a location where the average monthly per capita expenditure is less than 298,000 VND. The ranges of average expenditures of the lower-middle, upper-middle, and highest quartiles are 298,000-339,000, 339,000-449,000 and above 449,000 VND respectively.

with the "liquidity constraint hypothesis" (Phan and Coxhead, 2010) and to the existence of a "migration hump" (Nguyen *et al.*, 2008), but are not statistically significant.[114]

Next, let us turn to the more elaborate multinational logit model of migration decision. Table 3.5 presents the results where it should be noted that for purpose of identification non-migrants constitute the base category. The coefficients are reported in terms of the impacts of the variable on the relative risk ratios, i.e., the ratios of the probability of each outcome relative to the probability of the base category.[115] Thus, an estimated coefficient more (less) than one indicates that the explanatory variable increases (reduces) the probability of the individual selecting each migration category relative to staying in the origin area. The human capital variables are introduced both as the total years of education (Panel A) and as a series of education stage dummies (Panel B).

The results show a striking difference in migration patterns among different types of migration. The coefficients for total education years in Panel A imply that the positive impact of educational attainment on the probability of migrating relative to the probability of staying is the strongest for the migrants who end up working in the state sector, followed by those working in foreign and private sectors. Introducing a series of education stage dummies (the upper-secondary educational attainment is the omitted category) in Panel B, it is found that the relative probability of migrating and working in state sector employment increases monotonically as the stage of educational achievement increases. In terms of the migrants who end up working in the foreign and private sectors, there appears to be an intermediate selection: the coefficients for the

[114] The coefficient for the lower-middle quartile is found to be greater than one and those of the lowest and the highest quartiles turn out to be less than one, suggesting that individuals residing in the areas with a living standard belonging to the lower-middle quartile are most likely to migrate. However, these coeffieicts are not statistically significant. My regression result including the log of the monthly per capita expenditure and its square terms indicates that the probability of out-migration peaks when the expenditure level reaches around VND 356,000. The latter result is in line with Nguyen *et al.*'s estimate, but is not statistically significant either.

[115] For the continuous variables, the reported values represent the impact of a one standard deviation change in each explanatory variable on the relative risk ratios of the individual selecting each migration outcome relative to staying.

education categories are less than one implying that individuals who have an upper-secondary education (followed by workers with a lower-secondary education) are those most likely to be drawn into the "Foreign" and "Private" migration categories.

Relative to males, female workers are highly likely to migrate to work in the foreign sector,[116] and, to a lesser extent, in the state sector. There is no statistically significant impact of gender on the relative probability of migrating for those who belong to the other migration categories. Ethnic minority status is associated with a significantly lower probability of moving to big cities/ industrial areas relative to staying in comparison with the Kinh majority and Hoa (the Chinese), whereas it raises the relative probability of moving to the Central Highlands.

The impact of land holding in origin areas on the relative probability of migrating to the big cities/industrial areas is negative. In terms of job opportunities in origin areas, it is found that living in the areas with higher levels of foreign job opportunities prior to migration raises one's relative probability of moving to work for foreign sector employers. This seems counterintuitive, but further examination of the data reveals that the latter result may reflect the fact that some migrants employed by foreign firms came from within the same provinces.[117] Similarly, residing in areas with higher job opportunities in state organizations is associated with a higher relative probability of migrating to work for state sector employment. Perhaps this is because a relatively high proportion of migrants in the latter category come from urban areas (41.8 percent) where more state jobs tend to be available.

[116] The relative risk ratio of 3.25 implies that, *ceteris paribus*, the relative probability of moving and working in foreign sector is 225 percent higher for females relative to males.

[117] In my sample, about 82 percent of migrants moved inter-provincially. Among intra-province migrants, nearly two-thirds moved between urban and rural areas in the same provinces. Only one-third of intra-province migrants (six percent of migrants in my sample) moved within the same province and urban/rural cells. The VMS reported that workers who work for foreign firms came from 56 provinces all over Vietnam. On the one hand, many of them came from poorer areas where there are few employment opportunities in foreign firms: the three most important source provinces were Than Hoa, Nghe An, and Ha Tinh in the North Central Coasts. On the other hand, about 16 percent of them moved within the same provinces including relocations within areas with relatively high foreign presence.

Overall, the multinominal logit models proved to be useful to analyze how individual attributes and origin characteristics would affect different migration outcomes. However, the models do not reveal clear insights on the role of job opportunities in source areas in influencing migration decisions. At first glance, it seems unexpected that the relative probabilities of moving out to work in foreign and state sectors *increase* as foreign and state job opportunities in origin areas increase respectively**.** This is perhaps because the models at the first stage fail to take account of the characteristics of potential destination areas. This limitation suggests a need to pursue a second-stage model.

(ii) The Second-Stage Model on Destination Choices

This section implements conditional logit models to examine how the differences in a series of economic opportunities in potential destinations would have affected the migrants' destination choices. Each migrant in the sample faces 18 location choices (N=18), i.e., 17 alternative destination[118] choices (if moved) and a choice to stay in the source province. Suppose that the utility level of choosing area j for the ith individual is

$$V_{ij} = z_{ij}^{'}\gamma + e_{ij}$$

where z_{ij} is a vector of destination-specific attributes including expected income, land availability, the likelihood of obtaining a job in the foreign sector, the prospect of obtaining a job in the state sector, and distance between origin and potential destination areas. Unlike the multinominal logit model, in the conditional logit model, z_{ij} varies across potential destinations whereas the parameter γ is constant across choices. If the individual chooses destination j over all other locations, it is assumed that the utility is the highest; i.e., $V_{ij} > V_{ik}$ for all other $k \neq j$. Then,

[118] Whereas the migrants who moved to HCMC, Hai Phong, and Hai Duong were interviewed only in urban areas, those who went to Dac Lac and Dac Nong were surveyed only in rural areas. This results in 17 alternative destinations.

provided that e_{ij} has an independent Gumbel distribution, the probability of an individual i choosing area j is

$$Prob_{ij} = \frac{\exp(z_{ij}'\gamma)}{\sum_{k=1}^{18}\exp(z_{ik}'\gamma)} \quad j=1,\ldots 18.$$

Since the outcome variables are not available for alternative locations except for the location where the migration actually took place, the differentials in economic opportunities are constructed based on migrants' expectations. The proportions of foreign- and state-employment relative to total employment at the province (and urban/rural) level, which are in turn the same variables defined at the first stage, are used to proxy for migrants' expectations of obtaining a job in these sectors. Similarly, the land holding variable employed at the first stage is assumed to capture migrants' expectation toward agricultural, forestry and fishery opportunities in potential destination areas.

It has long been recognized that migrants tend to move to the location that yields them the highest expected earnings. The expected incomes for migrants across different locations are likely to depend on both individual- and location-specific characteristics. A predicted earning equation (Lucas, 1985) reflecting these variables is therefore developed using the data from the VHLSS 2004. The expected monthly wages for 18 alternative locations for each migrant are estimated applying the standard Mincerian equations. Since the returns to personal characteristics may be different depending on Vietnam's regions, region-specific wage regressions are run to derive estimated coefficients α for each region k.[119]

$$\hat{LnW}_{ijk} = X_i \hat{\alpha}_k + D_{ijk} \hat{\delta}_{jk}$$

[119] Since there are not enough observations to run earnings regressions at the province level, the regressions are run at the level of Vietnam's regions and two major cities.

where X_i is a vector of individual characteristics for migrant i including gender, minority status, years of schooling, potential experience,[120] experience squared and marital status as well as a dummy for whether or not the location is an urban as opposed to rural area. Province dummies (D_{ijk}) consist of dummy variables for Vietnam's provinces. In this specification, there remains a potential sample selection problem into wage employment. For this reason, region-specific wage equations with selection correction terms were also considered using Heckman's two-step procedure (Heckman, 1979) but these estimates were dismissed because the predicted wages took on implausible values.[121]

Finally, the distance in kilometers between the capital cities of the source province and those in potential destination provinces is included as a proxy for the cost of migration. The coefficients for the likelihoods of obtaining a job in the foreign and state sectors are expected to be positive, assuming that migrants relocate seeking better employment opportunities. The coefficient for predicted income in destination is expected to be positive as migrants are presumed to move seeking higher earning opportunities. The coefficients for distance are expected to be negative.

Column 1 in Table 3.6 demonstrates the results of the conditional logit regressions by different control variables. The regressions are estimated on the sample of migrants surveyed in the VMS only. In the conditional logit model, the impacts of individual characteristics are not directly estimated since the latter variables do not vary across potential destinations. Thus, a strategy to

[120] Potential experience is calculated as age minus six minus education years.

[121] In the first stage, probit models are used to determine the selection process into wage employment. The coefficients for the selection terms turn out to be either insignificant or positively significant (depending on the regions) implying that individuals selected into wage employment tend to earn higher wages than those with similar observable characteristics randomly drawn from the population. Finally, expected monthly wages are computed applying the coefficient estimates obtained in the second stage and removing the selection correction terms. However, comparing the predicted wages and the actual wages reported in the VMS, the predicted wages for the cities/industrial areas turn out to be lower than plausible levels. This is perhaps because individuals' selections into wage and destination are not random, i.e., migrants who went to the cities/industrial areas may have moved in order to find wage employment whereas those who moved to the Central Highlands may have migrated for non-wage activities.

run separate regressions by the subsets of different types of workers, namely by gender (Column 2-3), by educational attainment (column 4-8), and for a subset of ethnic minority (column 9), is employed.

In Panel A, I begin with a specification that includes only the proportions of workers employed in foreign firms relative to total employment in potential destination areas. The coefficients for the foreign job turn out to be positively significant at the one percent level both for male and female suggesting that migrants on average tend to move to destinations with a greater presence of foreign affiliates. The latter results contrast with the first-stage models, which did not reveal a clear relationship between the employment opportunities by foreign affiliates in origin areas and out-migration.

Panel B through Panel E sequentially add control variables including the prospect of obtaining a job in the state sector (Panel B), expected earnings (Panel C), land availability (Panel D) and distance (Panel E). Several general patterns emerge from the regression matrix by control variables and by the subset of migrants in Table 3.6. The magnitudes of the coefficients of the regressions by gender suggest that migration responses to the increase in foreign job opportunities are stronger for female than for male workers. The coefficients for the foreign job for a subset of the ethnic minority individuals turn out to be either negatively significant or insignificant, implying that they are less likely than Kinh majority and Hoa workers to go to areas where the chance of obtaining a foreign sector job is greater.

The coefficients for the foreign job obtained by the subset of workers with different educational attainments demonstrate that those who have upper-secondary education, followed by those with lower-secondary and primary education, are most strongly pulled to the areas with higher foreign job opportunities. In contrast, the coefficients for the foreign job variable for the higher-educated migrants (college or above) are unstable with their signs changing depending on

the control variables. The coefficients for foreign job for those without primary education are negatively significant implying that the least educated workers are less likely to be pulled to locations with higher foreign employment opportunities.[122] These results are consistent with the findings in the first-stage models, i.e., an intermediate selection of the migrants who ended up working in the foreign sector. Whereas the coefficients for state sector jobs turn out to be positively significant for the full sample, a positive association between state job opportunities in destination areas and the probability of migration appears to apply only to those who attended college or have at least some secondary education. For those without secondary education, the coefficients for the state job are found to be negatively significant.

The coefficients for expected income are positive and significant for most of the cases confirming the importance of the latter variable as a determinant of destination choice. With the inclusion of the income variable, the magnitudes of the coefficient for foreign job are reduced, but remain positively significant implying that the foreign job opportunities are an additional determinant of migration. The qualitative results of the coefficients for foreign job are robust regardless of the insertion of alternative income terms as control variables.[123]

In terms of the impact of land differential, a robust pattern emerges: the less educated is the migrant, the more important is land availability as a determinant of destination choice. In particular, as the level of educational attainment increases, the sign of the coefficients for land availability changes from positive to negative and the magnitudes of the coefficient tend to

[122] Further examination of the data reveals that the very different coefficients for the foreign job for the subset of "no primary" migrants are largely driven by the minority migrants who account for about 51 percent of the latter migrants in my sample. Excluding the minority migrants, the coefficients for the foreign job for the "no primary" migrants turn out to be either positively significant or insignificant.

[123] Using the predicted wages estimated by the region-specific earnings equations with the selection correction terms, the qualitative results on the coefficients for foreign job remain very similar. However, in some sub-samples, the coefficients for the income term show wrong signs perhaps because the predicted wages may underestimate expected wages in the cities/industrial areas. Using the "average per capita expenditure" defined at the first stage as a proxy of income, the coefficients for the latter variable turn out to be highly positively significant but the qualitative results on foreign job remain essentially unchanged.

decrease. A potential explanation is that land availability reflects land-intensity of jobs that migrants seek at destination areas, i.e., more educated workers tend to seek less land-intensive work whereas less educated individuals are more likely to pursue land-intensive activities. The result is also consistent with the observation that the least educated workers tend to be engaged in farming in Vietnam (Vijverberg *et al.*, 2006). Workers in ethnic minority category are also found to be strongly pulled to the locations where land is abundant. The coefficients for distance reveal expected negative signs for all the regressions except for the ethnic minority subset, confirming that individuals are usually more likely to choose destinations which are closer. The positive coefficients for distance for ethnic minority are likely to reflect a large migration flow from the northern remote provinces to the Central Highlands.[124]

5. Conclusions

This paper investigates the role of FDI as a determinant of internal migration and destination choices using the *Vietnam Migration Survey* (VMS) 2004 and the *Vietnam Household Living Standards Survey* (VHLSS) 2004. In terms of personal characteristics of migrants, it is found that the migration response to foreign job opportunities is larger for female relative to male workers; there appears to be intermediate selection in terms of educational attainment; and ethnic minorities are less likely to relocate in search of a foreign job relative to the Kinh majority and Hoa whereas they are more likely to move in search for agricultural opportunities.

The results of multinominal logit models which focus on the origin areas, no evidence is found that scarce foreign job opportunities are a reason to push individuals to move out. In contrast, the conditional logit regressions which study the characteristics in *destination* areas reveal a robust pattern that migrating individuals on average tend to go to locations with higher foreign

[124] Amongst minority migrants reported in the VMS, 80.9 percent of them moved to the Central Highlands of which 42.0 percent came from the Northeast region.

employment opportunities, even controlling for income differentials, land differentials and distances between sending and receiving areas.

Finally, a limitation of this study is that, since the VMS 2004 was interviewed only in eleven provinces, the data should not be viewed as representing the migration patterns of Vietnam as a whole. In particular, whereas this research emphasizes the differential migration patterns depending on migration types, it is not within the scope of this paper to analyze the relative importance of each type of migration. This paper also suggests that the impact of FDI on internal migration be understood in the context of external environment. Specifically, the year 2004 and the preceding years were the time when the labor demand by foreign firms expanded substantially, mainly stimulated by the U.S.-Vietnam Bilateral Trade Agreement (BTA) (2001). The substantial increase in foreign employment, especially that in female-intensive manufacturing, is likely to have accelerated a migration flow of women towards the areas where FDI is concentrated. How negative external shocks would affect labor demand, urban unemployment, and migration patterns in a developing country is an important issue and is a subject for future research.

Table 3.1. Inter-provincial Migration Flows by Regions/Major Cities and by Gender, 1994-1999

	In-migrants			Out-migrants			Net-migrants		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Hanoi	80266	76078	156344	25278	16449	41727	54988	59629	114617
Red River Delta*[1]	59451	41371	100822	186825	177547	364372	-127374	-136176	-263550
Northeast	69439	62136	131575	135887	114669	250556	-66448	-52533	-118981
Northwest	13197	12047	25244	15040	13161	28201	-1843	-1114	-2957
North Central Coast	37182	26409	63591	160006	173469	333475	-122824	-147060	-269884
South Central Coast	54570	56904	111474	91329	96497	187826	-36759	-39593	-76352
Central Highlands	130563	117908	248471	27492	22512	50004	103071	95396	198467
HCMC	228670	260257	488927	44256	34118	78374	184414	226139	410553
Southeast*[2]	208476	224200	432676	121856	120475	242331	86620	103725	190345
Mekong River Delta	119419	122861	242280	192202	230167	422369	-72783	-107306	-180089

Source: GSO/UNDP, 2001.
Notes: *[1]The region excludes Hanoi; *[2]the region excludes HCMC.

Table 3.2. Economic Indicators by Urban/Rural and By Regions

		Hanoi	Red River Delta*[1]	Northeast	Northwest	North Central Coast	South Central Coast	Central Highlands	HCMC	Southeast*[2]	Mekong River Delta	Total Vietnam
Expenditure*[3]	Rural	387	323	281	213	253	298	277	569	410	350	**317**
(VND 1,000)	Urban	915	586	543	509	443	556	476	946	571	511	**662**
	Total	**710**	**359**	**330**	**252**	**279**	**371**	**332**	**898**	**458**	**382**	**405**
Land holding*[4]	Rural	.041	.069	.195	.316	.120	.134	.258	.042	.213	.176	**.152**
(hectare)	Urban	.008	.020	.040	.046	.022	.020	.138	.004	.063	.065	**.036**
	Total	**.021**	**.062**	**.166**	**.280**	**.107**	**.102**	**.225**	**.009**	**.169**	**.154**	**.122**
Minority*[5]	Rural	.0	1.0	46.7	89.2	11.9	7.0	40.6	1.5	8.1	6.5	**15.8**
(%)	Urban	.0	.6	14.5	23.3	.6	.5	9.7	.6	.7	3.6	**3.1**
	Total	**.0**	**.9**	**40.8**	**80.5**	**10.4**	**5.2**	**32.0**	**.7**	**5.9**	**5.9**	**12.5**
Education*[6]	Rural	8.3	7.8	7.0	4.9	7.5	6.4	5.5	7.2	6.2	5.3	**6.6**
(years)	Urban	10.7	9.4	9.9	8.9	9.5	8.6	8.3	8.7	7.9	6.9	**8.7**
	Total	**9.8**	**8.1**	**7.5**	**5.5**	**7.8**	**7.1**	**6.4**	**8.5**	**6.7**	**5.6**	**7.2**
Wage employment*[7]	Rural	44.5	27.3	13.3	8.0	15.9	26.8	16.3	48.3	35.7	30.2	**24.3**
(%)	Urban	64.2	48.4	46.9	46.1	47.3	48.3	34.6	61.2	48.2	42.9	**50.7**
	Total	**56.4**	**30.0**	**18.9**	**12.4**	**19.6**	**32.7**	**21.0**	**59.4**	**39.3**	**32.7**	**30.7**
State employment[8]	Rural	18.7	6.5	6.1	3.9	5.0	6.9	5.4	11.6	7.4	4.3	**6.0**
(%)	Urban	41.9	24.9	33.4	38.6	32.0	22.7	14.0	18.1	17.0	16.5	**23.2**
	Total	**32.7**	**8.8**	**10.7**	**7.9**	**8.2**	**11.2**	**7.6**	**17.2**	**10.2**	**6.6**	**10.1**
Foreign employment[9]	Rural	2.9	.5	.1	.0	.1	.4	.2	10.7	11.1	.3	**1.3**
(%)	Urban	3.1	2.9	1.9	.9	.2	2.5	.6	11.5	11.6	.4	**4.9**
	Total	**3.0**	**.8**	**.4**	**.1**	**.1**	**1.0**	**.3**	**11.4**	**11.3**	**.4**	**2.2**

Source: Author's calculation using the VHLSS 2004 and the *Enterprise Survey* data 2004.

Notes: *[1]The region exclude Hanoi; *[2]the region excludes HCMC; *[3]the per capita average household monthly expenditure; *[4]land holding is defined as the average per capita areas owned by the household members including farming, forestry land and water surface area for aquaculture, residence land and garden, and pond next to housing land; *[5] the minority is defined to represent all ethnic groups other than the Kinh majority and Hoa (the Chinese); *[6]the average education years attained by those who are 15 and over; *[7]the proportion of workers who are engaged in wage employment relative to total workers; *[8]the proportion of workers employed by state sector relative to total workers**;** [9]the proportion of workers employed by foreign sector relative to total workers.

Table 3.3. Sample Characteristics of Migrants and Non-Migrants

	Non-migrants	Migrants[*1]				
	Total	Total	Foreign	State	Private	Agriculture
Number of Observations	16878	4476	922	560	2008	938
Urban (%)	24.3	63.7	72.1	85.0	82.0	4.2
Share of female (%)	49.5	55.6	75.4	51.4	49.9	50.7
Average age	35.2	28.7	23.5	29.1	29.3	32.3
	(11.9)	(8.8)	(4.9)	(8.7)	(9.1)	(9.3)
Minority (%)	16.3	9.4	4.2	.9	1.0	37.8
Average education years	7.9	9.2	9.7	12.4	9.3	6.7
	(3.7)	(3.4)	(2.4)	(2.9)	(3.3)	(3.6)
Unemployed[*2] (%)	.9	1.1				
Monthly income[*3] (VND 1,000)	888.7	957.8	907.1	1247.5	1112.1	504.2
	(756.8)	(909.2)	(651.0)	(989.7)	(955.3)	(511.5)
Statistics for Migrants						
Permanent registration status (%)		17.9	10.2	23.0	11.5	36.1
Unemployed in origin (%)		2.6	1.6	2.0	3.8	.5
Urban origin (%)		21.7	20.2	41.8	23.9	6.0
Distance (km)		563.2	771.4	226.4	419.1	874.4
		(666.3)	(719.1)	(455.7)	(618.1)	(629.8)
Income change after vs. after migration (%)						
Much better		6.1	5.5	5.6	7.9	3.1
Better		78.6	82.4	75.4	81.3	71.0
Same		11.8	10.7	17.8	8.7	16.1
Worse		3.3	1.4	1.3	1.9	9.1
Much worse		.2	.0	.0	.0	.6

Sources: The statistics of migrants and non-migrants are computed from the VMS 2004 and the VHLSS 2004 respectively.
Notes: Between parentheses are the standard deviations.
[*1]See the text for the definition of "State", "Foreign", "Private" and "Agriculture" categories.
[*2]The unemployed is defined as "those who are not working but sought employment."
[*3] Monthly incomes between non-migrants and migrants are not comparable due to the differences in definition and in sample coverage. Whereas the monthly incomes for non-migrants are based on wage employments, the incomes for migrants are converted into monetary terms in case of goods.

Table 3.4. Logit Regression Results for the Determinants of Migration Decision

	(1)	(2)	(3)
Total education years	1.09***		1.09***
	(6.18)		(5.81)
Education as stages[*1]			
No primary		.40***	
		(-6.29)	
Primary		.53***	
		(-7.27)	
Lower secondary		.73***	
		(-5.28)	
College		1.18	
		(1.04)	
Age	.95***	.95***	.95***
	(-12.50)	(-12.89)	(-13.31)
Female	1.31***	1.30***	1.32***
	(6.25)	(6.16)	(6.17)
Minority	.73	.72	.79
	(-1.32)	(-1.41)	(-.96)
Unemployed in origin	1.64**	1.62**	1.65**
	(2.20)	(2.13)	(2.26)
Per capita HH expenditure	.49	.52	
	(-1.56)	(-1.46)	
Expenditure by four levels[*2]			
The lowest quartile			.83
			(-.58)
Lower-middle quartile			1.13
			(.46)
Highest quartile			.70
			(-1.29)
Land holding in origin	.12*	.13*	.16*
	(-1.88)	(-1.81)	(-1.71)
Foreign job opportunity in origin	1.60	1.54	2.05
	(.89)	(.83)	(1.29)
State job opportunity in origin	.86	.83	1.11
	(-.18)	(-.23)	(.12)
Number of Observations	21354	21354	21354
Pseudo R2	.083	.084	.085

Notes: The dependent variable takes the value one if the person is migrant, zero otherwise.
The coefficients are reported as odd ratios.
The standard errors are based on heteroskedasticity-consistent estimates of the variance-covariance matrix and corrected for within province and urban/rural correlation (clustering).
The *t*-statistics are reported between parentheses.
[*1]The upper secondary education is the omitted category.
[*2]The upper-middle quartile is the omitted category.
*, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level respectively.

Table 3.5. Multinominal Logit Regression Results for the Determinants of Migration Decision

	A. Education Variable as Total Years of Education				B. Education Variable as Stages of Education			
	Foreign	State	Private	Agriculture	Foreign	State	Private	Agriculture
Total education years	1.17***	1.49**	1.07***	.98				
	(7.88)	(17.04)	(4.38)	(-1.03)				
Education as Stages[*1]								
No primary					.13***	.043***	.38***	1.35
					(-7.27)	(-7.06)	(-5.88)	(1.18)
Primary					.32***	.080***	.63***	1.64***
					(-8.46)	(-11.84)	(-3.61)	(2.67)
Lower secondary					.67***	.27***	.83**	1.43**
					(-3.70)	(-8.94)	(-2.49)	(2.06)
College					.49***	2.81***	.68***	.95
					(-2.73)	(7.58)	(-2.64)	(-.19)
Age	.88***	.93***	.95***	.98***	.88***	.94***	.95***	.99***
	(-18.42)	(-8.42)	(-12.34)	(-5.25)	(-19.27)	(-8.15)	(-12.15)	(-4.94)
Female	3.30***	1.23**	1.04	1.04	3.25***	1.17*	1.04	1.06
	(13.19)	(2.16)	(.73)	(.70)	(13.08)	(1.64)	(.64)	(.89)
Minority status	.27***	.11***	.099***	1.78**	.28***	.11***	.10***	1.88**
	(-4.19)	(-4.57)	(-6.23)	(2.15)	(-4.16)	(-4.56)	(-6.17)	(2.34)
Unemployed in origin	.67	.92	2.16***	.74	.64	.87	2.13***	.75
	(-1.17)	(-.22)	(2.96)	(-.66)	(-1.26)	(-.37)	(2.87)	(-.62)
Per capita HH expenditure	.52	.18**	.29***	1.36	.73	.24*	.34**	1.37
	(-.92)	(-2.02)	(-2.95)	(.26)	(-.47)	(-1.64)	(-2.52)	(.26)
Land holding	.072**	.021**	.0011***	12.53	.11*	.029**	.0013***	12.39
	(-2.16)	(-2.45)	(-6.11)	(1.48)	(-1.88)	(-2.29)	(-5.97)	(1.48)
Foreign job opportunity in origin	5.33***	2.24	2.31	.19	4.48***	1.83	2.12	.20
	(3.72)	(.70)	(.79)	(-1.10)	(3.35)	(.50)	(.70)	(-1.11)
State job opportunity in origin	.19	13.13**	.41	.0085**	.23	13.34**	.46	.010**
	(-1.00)	(2.16)	(-.81)	(-2.19)	(-.90)	(2.22)	(-.72)	(-2.11)
Number of Obs.	21354				21354			
Pseudo R2	.14				.14			

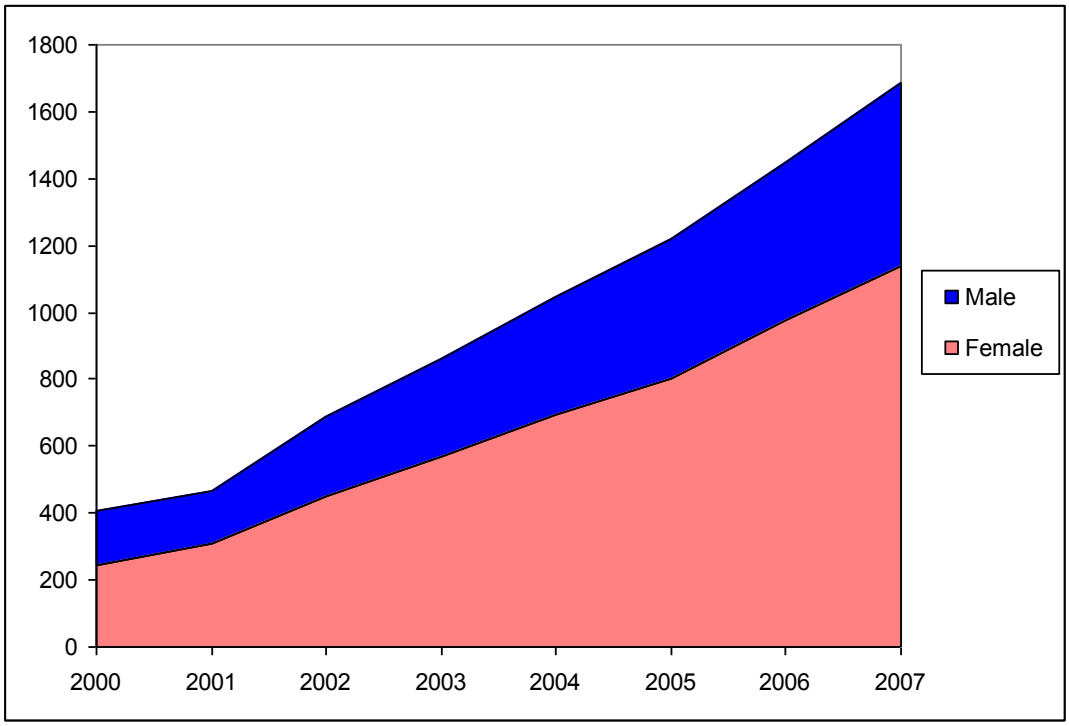
Notes: Being non-migrant is the base category; the coefficients are reported as relative risk ratios; [*1]the upper secondary education is the omitted category; the results for 48 individuals who were unemployed in destination areas are not reported; *, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level respectively; The standard errors in parentheses are based on heteroskedasticity-consistent estimates of the variance-covariance matrix and corrected for within province and urban/rural correlation (clustering); The *t*-statistics are reported between parentheses.

Table 3.6. Conditional-logit Regression Results for the Determinants of Destination Choice

	Full Sample	By Gender		By Educational Attainment					Subset of Minority
		Male	Female	College	Upper Secondary	Lower Secondary	Primary	No Primary	
Number of Migrants	4,476	1,989	2,487	327	1,147	1,643	993	366	422
Number of Choices	79567	35329	44238	5729	20386	29308	17660	6484	7464
A. Foreign Job									
Foreign job	1.32***	.96***	1.58***	-1.46***	1.71***	1.57***	1.47***	-.34	-.98**
	(.081)	(.13)	(.10)	(.51)	(.15)	(.13)	(.17)	(.39)	(.41)
Pseudo R2	.0090	.0044	.014	.0054	.016	.013	.012	.0004	.0027
B. Plus State Job									
Foreign job	1.80***	1.43***	2.06***	.86	2.90***	2.05***	1.41***	-.75**	-1.35***
	(.084)	(.13)	(.11)	(.56)	(.16)	(.13)	(.17)	(.38)	(.40)
State job	2.64***	2.60***	2.68***	8.21***	5.36***	2.71***	-.48*	-5.81***	-9.49***
	(.12)	(.18)	(.16)	(.46)	(.24)	(.20)	(.28)	(.60)	(.70)
Pseudo R2	.027	.023	.032	.20	.094	.032	.012	.057	.12
C. Plus Expected Income									
Foreign job	1.01***	.54***	1.33***	.42	2.06***	1.28***	.55***	-1.36***	-1.52***
	(.096)	(.16)	(.12)	(.62)	(.18)	(.15)	(.20)	(.43)	(.42)
State job	1.87***	2.04***	1.63***	7.81***	4.68***	1.96***	-1.61***	-6.90***	-10.55***
	(.13)	(.19)	(.18)	(.50)	(.25)	(.21)	(.32)	(.69)	(.80)
Expected income	1.74***	1.51***	2.11***	.51**	2.04***	1.81***	2.12***	1.62***	.82***
	(.066)	(.090)	(.099)	(.24)	(.14)	(.12)	(.14)	(.30)	(.20)
Pseudo R2	.050	.043	.060	.20	.12	.055	.044	.068	.12
D. Plus Land Availability									
Foreign job	1.12***	.52***	1.53***	1.36*	3.65***	1.61***	.48**	-.78***	-.21
	(.10)	(.16)	(.13)	(.83)	(.25)	(.17)	(.19)	(.38)	(.35)
State job	1.47***	2.13***	.98***	5.19***	2.84***	.93***	-.94**	-3.86***	-5.42***
	(.16)	(.24)	(.21)	(.60)	(.28)	(.25)	(.38)	(.82)	(.93)
Expected income	1.56***	1.55***	1.74***	-.10	.89***	1.33***	2.36***	2.48***	1.52***
	(.076)	(.10)	(.11)	(.23)	(.15)	(.13)	(.17)	(.33)	(.22)
Land availability	-.99***	.23***	-1.84***	-9.82***	-7.71***	-2.78***	1.30***	4.46***	6.51***
	(.23)	(.33)	(.31)	(1.42)	(.61)	(.38)	(.42)	(.66)	(.63)
Pseudo R2	.051	.044	.062	.24	.15	.061	.046	.089	.17
E. Plus Distance									
Foreign job	1.37***	.66***	1.91***	2.10***	3.92***	1.88***	.60***	-.69*	-.34
	(.099)	(.16)	(.13)	(.78)	(.26)	(.17)	(.19)	(.38)	(.35)
State job	.29**	1.06***	-.34	3.37***	1.00***	-.27	-1.40***	-3.83***	-5.22***
	(.16)	(.25)	(.22)	(.66)	(.32)	(.27)	(.39)	(.82)	(.93)
Expected income	2.36***	2.33***	2.59***	.83***	2.12***	2.15***	2.88***	2.52***	1.53***
	(.084)	(.12)	(.12)	(.27)	(.19)	(.14)	(.18)	(.34)	(.22)
Land availability	.11	1.47***	-.88***	-7.43***	-6.32***	-1.63***	1.92***	4.34***	6.81***
	(.23)	(.34)	(.31)	(1.47)	(.64)	(.39)	(.43)	(.65)	(.64)
Distance	-.93***	-.91***	-.96***	-1.60***	-1.03***	-.84***	-.78***	-.39***	.25**
	(.028)	(.043)	(.038)	(.16)	(.065)	(.047)	(.060)	(.094)	(.10)
Pseudo R2	.10	.092	.12	.32	.20	.10	.079	.098	.17

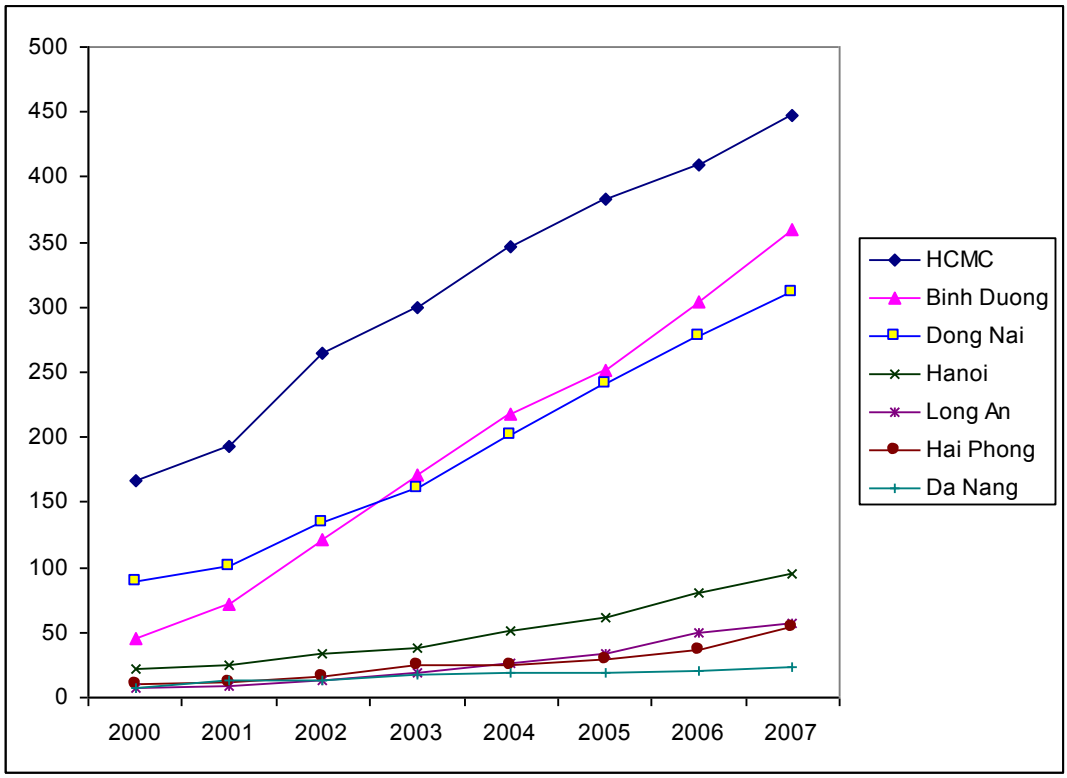
Notes: The dependent variable takes the value one if the location is a migrant's actual choice, zero otherwise; *, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level, respectively; the standard errors are between parentheses.

Figure 3.1. The Evolution of Employment by Foreign Enterprises, 2000-2007 (1,000)



Source: *Enterprise Survey* data 2000-2007 (GSO).

Figure 3.2. The Number of Workers Employed by Foreign Enterprises: Seven Leading Provinces, 2000-2007 (1,000)



Source: *Enterprise Survey* data 2000-2007 (GSO).

Chapter 4: Export Liberalization, Job Creation and the Skill Premium: Evidence from the U.S.-Vietnam Bilateral Trade Agreement (BTA)

1. Introduction

After a decade of economic stagnation, Vietnam adopted its *doi moi* ("renovation") policy in 1986 and started its transition from a centrally-planned to a market-oriented economy. Vietnam has also made substantial progress in liberalizing its trade and Foreign Direct Investment (FDI) policies. Vietnam's trade, measured by its sum of imports and exports, grew even faster than Gross Domestic Product (GDP), as the share of trade relative to GDP increased from 23.2 percent in 1986 to 112.5 percent in 2000 and further increased to 169.6 percent in 2007 (the World Bank). However, the industrial employment share initially remained unchanged at around 12 percent of total employment through the end of the 1990s, suggesting that expansion of trade does not necessarily lead to industrial job creation. In contrast, perhaps at least partly spurred by the expansion of labor-intensive manufacturing exports resulting from the U.S.-Vietnam Bilateral Trade Agreement (BTA) in 2001, Vietnam's industrial employment in total employment grew substantially, rising from 12.4 percent in 2000 to 17.4 percent in 2004 (the World Bank).

Traditional Trade Theory[125] predicts that freer trade would lead a labor-abundant country to specialize in an unskilled-labor intensive sector raising labor demand for and wages of unskilled workers. However, contrary to the prediction of traditional trade theory, many developing countries experienced an *increase* rather than a *decrease* in wage inequality after episodes of trade liberalization (Goldberg and Pavcnik, 2007; Harrison, McLaren and McMillan, 2010). Moreover, most of the empirical research finds little evidence that trade reforms induce labor

[125] By "traditional" or "classical" trade theory", I refer to the Heckscher-Ohlin-Samuelson (H-O-S) theorem. The Heckscher-Ohlin (H-O) theory predicts that, as developing countries are abundant in unskilled labor and scarce in skilled labor, freer trade would lead a developing country to specialize in a sector which uses its unskilled labor intensively, raising labor demand in the latter sector. Its companion theory, the Stolper-Samuelson (S-S) theorem (1941), implies that the increase in the relative output prices of unskilled-labor-intensive goods relative to skilled-labor-intensive goods would translate into a rise in the relative wages of unskilled labor, narrowing the wage gap between skilled and unskilled workers.

reallocation *across* sectors toward unskilled-labor-abundant sectors in developing countries (Goldberg and Pavcnik, 2007).[126] The impact of the U.S.-Vietnam BTA on Vietnam's labor market is an excellent case study to add to the trade liberalization and wage inequality literature. First, the U.S. tariff cut on Vietnam's exports was exogenous,[127] sudden and large. Second, whereas most of the previous studies examined liberalization episodes on the import side, the BTA provides an opportunity to examine, on the export side, how a tariff cut by a country's trading partner influenced job opportunities and wages of workers with different skill levels. Finally, unlike most of the cases in the literature, labor reallocation towards more labor-intensive manufacturing appears to have occurred in the aftermath of the BTA.

Since *doi moi*, Vietnam has undertaken a number of reforms which introduced market forces in determining wages, including labor market reforms, privatization and rationalization of state owned enterprises (SOEs) and a variety of legal, regulatory and institutional reforms. This paper undertakes a strategy of isolating the effects of the BTA on wages from the impacts of the domestic reforms and other factors, exploiting regional variation in exposure to trade (see, for instance, Coello, 2009; Chiquiar, 2008; McCaig, 2009b; Topalova, 2005; Wei and Wu, 2001). I construct an Export Index in order to estimate the changes in labor demand induced by exports at Vietnam's province level, taking account of initial provincial industrial composition and its export- and labor-intensities. Then, using the data on the panel individuals from the *Vietnam Household Living Standards Surveys* (VHLSS) 2002 and 2004, and with a correction for

[126] Examining 25 liberalization episodes, Wacziarg and Wallack (2004) find no systematic evidence that increased trade openness leads to increased labor shifts. A lack of labor reallocation across sectors after trade reforms is also reported for Argentina (Galiani and Sanguinetti, 2003), for Columbia (Attanasio, Goldberg and Pavcnik, 2004), for Mexico (Feliciano, 2001), and for India (Kijima, 2006; Topalova, 2005).

[127] Immediately after the BTA came into force on December 10, 2001, the United States lowered its tariff rates from the U.S. general tariff rates (around 40 percent on average) to the U.S. Most-Favored-Nation (MFN) tariff rates (around 4 percent on average) across all sectors (Parker, Riedel and Phan Vinh Quang, 2007). The U.S. general tariff rates and the U.S. MFN tariff rates were predetermined in the U.S. tariff schedule.

potential endogeneity, I evaluate how the provincial variation in exposure to trade would have influenced the wage levels of skilled and unskilled workers and the skill premium in Vietnam.

Section 2 demonstrates the trends of trade and industrial employment in the 2000s in Vietnam. Section 3 presents a literature review on the impact of trade on skill premium in developing countries. Section 4 specifies and implements a series of regression models which relate changes in the Export Index to changes in wages of workers with different skill levels. Section 5 concludes.

2. Background

2.1. Trends of Vietnam's Trade and the U.S.-Vietnam Bilateral Trade Agreement

In the 2000s, the coming into effect of the U.S.-Vietnam BTA in December 2001 and Vietnam's accession to the World Trade Organization (WTO) in January 2007 were two major events which contributed to the expansion of Vietnam's trade. Figure 4.1 plots the evolution of Vietnam's exports to the United States. After the United States lifted its embargo in 1994, Vietnam's exports to the United States grew steadily. However, Vietnam's access to the U.S. market was quite limited since the United States applied the U.S. general tariff rates[128] against Vietnam's goods which were much higher than the U.S. MFN tariff rates. Prior to the BTA, Vietnam's exports to the U.S. were mainly concentrated in primary products such as coffee, shrimp and petroleum whose general tariff rates are zero or close to zero. However, Vietnam faced almost prohibitive general tariff rates for many manufacturing goods.[129] Immediately after the BTA came into force in December 2001, the United States extended Normal Trade Relations

[128] The general tariff rates are for the most part the statutory rates that were applied to U.S. imports under the Tariff Act of 1930 (also known as the Smoot-Hawley Act). After the trade liberalization of the various General Agreement on Tariffs and Trade (GATT) Rounds beginning in 1947, the United States has applied the MFN rate in the U.S. tariff schedule to almost all of its WTO and non-WTO trading partners. However, the U.S. retained the general rates primarily against communist countries not participating in GATT (Fukase and Martin, 2000).

[129] For instance, the general tariff rates for apparel were as high as 68.9 percent compared to 13.4 percent for MFN rates (Fukase and Martin, 2000).

(NTR) and MFN status to Vietnam. As a result, the United States emerged as Vietnam's top export destination since 2002, with Vietnam's exports to the United States more than doubling from $1,066 million in 2001 to $2,453 million in 2002 and continued to increase to $11,903 million in 2008.

During the same period, Vietnam's exports to destinations other than the U.S. also grew rapidly with Vietnam's total exports to the world rising from $14,483 million in 2000 to $62,685 million in 2008. Figure 4.2 plots the share of the United States in Vietnam's total exports. Vietnam's exports to the U.S., which accounted for 7.1 percent of Vietnam's exports in 2001, jumped to 14.7 percent in 2002, and further increased to 19.6 percent in 2003; since then, the ratio has remained relatively steady at around 19 percent. Thus, it would be reasonable to assume that most of the immediate impacts of the U. S. tariff reduction took effect between 2001 and 2004.

2.2. Composition of Trade

Figures 4.3.a through 4.3.c show the composition of Vietnam's "industrial" exports to the world (Figure 4.3.a), to the U.S. (Figure 4.3.b) and to the rest of the world (Figure 4.3.c) for the period 2000-2007.[130] This paper focuses on the "industrial" sector which in turn is defined as mining (Categories 10-14 in the Vietnam Standard Industrial Classification (VSIC) which in turn is based on the International Standard Industrial Classification (ISIC)), and manufacturing (VSIC 15-41).[131] Whereas statistical analyses are conducted at the 2-digit VSIC level, figures and tables are presented at a more aggregated level to facilitate the presentation.

[130] See Appendix Table 4.A.1 and 4.A.2 for the values of exports to the world and to the U.S. respectively.
[131] In my paper, I needed to exclude the (unprocessed) agriculture/forestry/aquaculture sectors (VSIC 1-5) due to the difficulty in estimating the comparable impacts of exports on labor. For the impact of agricultural trade liberalization by Vietnam's trading partners, see Coello (2009).

Figure 4.3.a demonstrates the importance of export-oriented, labor-intensive[132] manufacturing, such as apparel/textiles, furniture, and footwear/leather, in terms of export values and growth. Figure 4.3.b demonstrates that Vietnam's exports to the United States are predominantly concentrated in labor-intensive sectors. For instance, starting from a negligible level, the U.S. absorbed 38.3 percent of Vietnam's textiles exports (VSIC 17), 56.9 percent of apparel (VSIC 18),[133] 16.6 percent of footwear/leather, and 26.2 percent of furniture and miscellaneous manufacturing (VSIC 36) by the year 2004. Figure 4.3.a also reveals that the electronics, machinery and transport equipment sector has been one of the Vietnam's fastest growing export sectors, perhaps stimulated by the process of Vietnam's WTO accession. Figure 4.3.b suggests that Vietnam's expansion of this sector's exports to the U.S. was relatively modest immediately after the BTA, but appears to be emerging at a later time, perhaps symbolizing Vietnam's changing comparative advantage.[134]

Figure 4.3.a shows that food products have been an important class of Vietnamese export commodities throughout the period, reflecting Vietnam's rich agricultural resources (Athukorala, 2009). However, the export growth of food products to the U.S. was inhibited in 2003 and 2004 by the U.S.'s imposition of antidumping duties against Vietnam's frozen fillets and shrimp

[132] In this paper, manufacturing goods with relatively high "employment coefficients", i.e., the number of workers required to produce one billion VND worth of output, are referred to "labor-intensive" goods. See Appendix Table 4.A.4 for the employment coefficients at the VSIC 2-digit level.

[133] Vietnam's exports to the United States of apparel and textiles expanded more than twenty-fold from $48 million in 2001 to $1,040 million in 2002, and then nearly doubled again to $2,020 million in 2003. However, the surge in these categories of exports came to a halt in mid-2003 as the U.S. applied quantitative restrictions against them. Subsequent to Vietnam's accession to the WTO in 2007, Vietnamese quotas were eliminated as the Agreement on Textiles and Clothing (ATC) under the provisions of the Uruguay Round Agreement expired in 2005, abolishing the quotas against WTO-member exporters (Dimaranan, Duc, and Martin, 2005).

[134] It is worth pointing out that the U.S. emerged as Vietnam's second largest export destination for the electronics, machinery and transport equipment goods (after Japan) in 2006. This may reflect the start of the operations of new FDI enterprises such as Inter Corporation and Taiwanese electronics contract manufacturers (e.g., Hon Hai Precision Industry Co., Foxconn) (Athukorala, 2009).

(Parker *et al.*, 2007; Brambilla, Porto and Tarozzi, 2009). Overall, mining[135] remains one of Vietnam's leading export sectors and its export values increased substantially starting in the mid-2000s, mainly due to an increase in world oil prices.

Figures 4.4.a through 4.4.c demonstrate my estimates of the number of Vietnam's workers embodied in producing exports to the world (Figure 4.4.a), to the U.S. (Figure 4.4.b) and to the rest of the world (Figure 4.4.c). The employment contained in exports is calculated using a similar methodology to the standard factor content analysis which in turn was used to estimate the employment effects of trade in Vietnam (see, for instance, Belser, 2000; Jenkins, 2004; Kien and Heo, 2009). Specifically, I calculate the labor quantities embodied in exports by computing the employment coefficients.[136]

The visual comparison between Figures 4.3.a-4.3.c and Figures 4.4.a-4.4.c reveals that the employment effect of exports is disproportionately larger for labor-intensive industries due to the larger employment creation per unit of dollar exported. In contrast, despite the importance of the mining sector in Vietnam's exports in terms of values, the employment effect on the mining sector is relatively modest due to its low labor-intensity. Since Vietnam's exports to the U.S. consist mainly of labor-intensive goods, if exports are evaluated in terms of labor embodied in exports, the share of the U.S. in Vietnam's "industrial" exports for the year 2004 rises to about 28 percent from 19 percent (in terms of export values). Specifically for the period 2001-2004, exports to the U.S. accounted for about 35 percent and 70 percent of *changes* in Vietnam's total

[135] At the VSIC 2-digit level, crude petroleum (VSIC 11) has been Vietnam's largest single export commodity throughout the period. For instance, it accounted for about 92 percent of Vietnam's mining exports and 21 percent of Vietnam's total exports in 2004.

[136] Using the annual *Enterprise Survey* data for the period 2000-2007, the employment coefficients were calculated by calculating the number of workers needed to produce one billion VND worth of goods. The implicit assumption of this exercise is that export products are typical of their industries. One caveat related to this assumption is that Figures 4.4.a-4.4.c may be understating the labor content of exports if the exports were the more labor-intensive products within industries.

industrial exports in terms of export values and (embodied) labor respectively. In the empirical section, I will exploit these large changes to identify the impact of exports on wages.

Appendix Table 4.A.3 reports the evolution of Vietnam's imports by the VSIC sub-categories for the period 2000-2008. Vietnam's imports rose from $15,637 million in 2000 to $31,969 million in 2004, and, after Vietnam's accession to the WTO in 2007, increased at an accelerated pace to $80,714 million in 2008. Since United States goods enjoyed MFN tariff status in Vietnam before the BTA, the share of the U.S. in Vietnam's imports has been relatively unchanged before and after the BTA at around 2.5 percent.[137] The composition of Vietnam's imports is consistent with the prediction of H-O model as Vietnam mainly imports capital goods and raw materials. For instance, three VSIC sub-categories, namely, "basic manufacturing", "chemical, rubber, and plastic products", and "electronics, machinery, and transport equipment" alone accounted for more than three quarters of Vietnam's imports in 2004 (76.2 percent).

2.3. Evolution of Vietnam's Industrial Employment

Vietnam's "formal"[138] industrial employment recorded in the *Enterprise Survey* data (GSO) grew substantially from 1.8 million in 2000 to 3.2 million in 2004 and further increased to 4.1 million in 2007. Figure 4.5 and Appendix Table 4.A.5 show the actual number of workers employed by industrial enterprises for the period 2000-2007. It appears that employment growth is highly influenced by the expansion and the factor intensity of exports. The number of workers employed by export-oriented labor-intensive manufacturing, and in particular, those in the sectors whose exports to the U.S. expanded (namely apparel/textiles, footwear/leather and furniture and miscellaneous manufacturing) increased substantially. Employment growth in the

[137] The rise of the U.S. share in Vietnam's total imports to 4.5 percent in 2003 is attributable to Vietnam's purchase of U.S. aircraft (Boeing 777s) (Parker *et al*., 2007).

[138] Throughout the paper, jobs in "enterprises" as well as those in government are referred to as "formal" employment. The term "enterprise" is defined as "an economic unit that independently keeps business account and acquires its own legal status" under the relevant laws (GSO). "Informal" employment is defined to include wage workers who work in a variety of informal wage sectors as well as those who are self-employed.

electronics, machinery and transport equipment sector has been also strong, perhaps helped by the rise in exports (e.g., electronics). However, despite the high value of Vietnam's crude oil exports, enterprise employment generation has been slowest in the mining sector due to the low labor intensity of oil production of the latter commodity. At the two-digit VSIC level, no industry reveals a systematic employment decline during the same period. These patterns of employment are consistent with Kien and Heo's (2009) study which investigates formally the impacts of trade liberalization on employment in Vietnam using a system generalized method of moments (GMM) model.[139]

Figure 4.6 and Appendix Table 4.A.6 show how Vietnam's industrial employment spreads across Vietnam's two big cities and eight regions. These regions, namely Ho Chi Minh City (HCMC), the Southeast region (excluding HCMC), and the Red River Delta region (excluding Hanoi) have contributed most to the creation of industrial employment in Vietnam (about 62 percent of total industrial employment in 2004). Growth in industrial employment has been faster in the rest of the Southeast region than in HCMC and in the rest of the Red River Delta than in Hanoi, showing some indication that industrial development has spread beyond Vietnam's two big cities. In contrast, the North Central Coast, the Central Highlands, and the Northwest regions are clearly lagging behind in terms of industrial development.

Vietnam's establishment of normal trade relations with the United States appears to have induced a shift of its labor toward sectors that use the abundant factor more intensively. Using

[139] Estimating a labor demand equation derived from the Cobb-Douglas production function for the period 1999-2004, Kien and Heo (2009) find that, holding the output level constant, the rising export intensity (measured by export-output ratio) in an industry increased Vietnam's derived labor demand. This implies that an increase in exports may create more job opportunities per unit of output because export-oriented goods are labor-intensive in Vietnam. In terms of imports, whereas intensified import penetration would have certainly destroyed some jobs, it may also have stimulated labor demand positively when domestic production depends on the importation of raw materials and capital goods or imported inputs are assembled in Vietnam for exports (e.g., electronics). The coefficients of import penetration (measured by import-output ratio) in Kien and Heo's regressions turn out to be positive but statistically insignificant suggesting that the increase in imports did not necessarily negatively impact Vietnam's employment level.

the *Enterprise Survey* data, Figure 4.7.a shows the proportion of workers employed by "labor-intensive" industries in total industrial employment.[140] The ratio rose from 50.7 percent in 2001 to 53.6 percent in 2003 and then remained relatively unchanged, suggesting that Vietnam's labor appears to have shifted toward more labor-intensive industries in the aftermath of the BTA. Alternatively, Figure 4.7.b demonstrates the change in the proportion of *unskilled*-labor-intensive industries in total industrial enterprise employment during the same period.[141] Figure 4.7.b reveals a similar pattern, a shift of labor toward unskilled-labor-intensive industries paralleling the shift toward labor-intensive industries shown in Figure 4.7.a. However, this parallelism is expected since in Vietnam, labor-intensive industries are generally unskilled-labor-intensive industries.

During the same period, "formal" industrial employment as a whole expanded substantially. Thus, besides labor reallocation within the industrial sector (if it occurred), there appear to have been two additional sources of labor supply for the expansion of labor-intensive manufacturing. First, the increase in industrial employment may reflect a shift of labor from agriculture to industry. While industrial employment grew rapidly in the 2000s,[142] agricultural employment declined from 65.3 percent in 2000 to 57.9 percent in 2004 (the World Bank). It is likely that this move was partly induced by trade openness.[143]

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[140] By the "labor-intensive industries", I refer the industries whose employment coefficients in 2004 are above median, which is 6.5 persons per a billion VND of output.

[141] Unfortunately, the *Enterprise Survey* data 2000-2007 do not break down different types of workers either in terms of education or occupation. However, the *Industrial Survey* (GSO, 2000) breaks down employees of 17 provinces into production workers, technicians and administrative workers for the year 1998. The "unskilled-labor intensive industries" here refer to the industries whose proportion of production workers in total labor force is above median (85.7 percent) in 1998.

[142] The slow employment growth in the 1990s may be attributable to the capital-intensive, import-substituting nature of the industries and to increased labor productivity (Belser, 2000).

[143] Applying the Smith-Myint model of "vent for surplus" to China, Fu and Balasubramanyam (2005) find that the expansion of exports from labor-intensive manufacturing has accelerated the transfer of surplus labor from the agricultural to the export sector. Using a panel of 92 developing countries in the period 1960-2000, Dodzin and Vamvakidis (2004) find that an increase in openness to trade leads to an increase in the industrial value added share

Second, the expansion of formal enterprise employment is also likely to reflect a move of labor from the "informal" to the "formal" sector. The implementation of the Enterprise Law (2000) was a major step toward reducing numerous barriers to private businesses and has greatly encouraged the establishment of new enterprises (Ramstetter and Phan, 2007b). It is also likely that this trend was partly accelerated through trade, as the largest expansion of industrial enterprise employment occurred in export-oriented sectors.[144] As labor reallocation appears to occur across broad economic sectors, analyses which focus only on the formal industrial sector seems to be incomplete in capturing the whole impact of trade shock. The VHLSSs 2002 and 2004 used in this study have an advantage relative to the firm-level data as they allow extending the analysis to all of Vietnam's economic sectors.

3. Trade and Skill Premium in Developing Countries

Contrary to the prediction of standard Heckscher-Ohlin-Samuelson (H-O-S) trade theory, many developing countries experienced a rise in skill premium in the wake of trade liberalization. On the one hand, this "paradox" spurred the development of rich new theories which predict that trade may lead to a rise in wage inequality.[145] These theories include outsourcing, increase in capital flows and complementarity of capital and skilled labor, trade-induced Skill-Biased Technological Change (SBTC) and firm heterogeneity models (Goldberg and Pavcnik, 2007). For instance, firm heterogeneity models pioneered by Melitz (2003)[146] tend to predict that an increase in export opportunities may increase demand for skilled labor. This is because the production of exporters may be more skill-intensive than production for non-exporters (Goldberg

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of production at the expense of the agricultural share suggesting that trade leads developing countries to industrialization.

[144] For instance, Anderson and Dimon (1999) report evidence that export oriented production in *maquiladoras* (across-border export processing plants) created "formal" sector job opportunities for single women in Mexico.

[145] See, for instance, Goldberg and Pavcnik (2007) and Harrison *et al.* (2010) for excellent reviews.

[146] Melitz (2003) develops a model with heterogeneous firms which predicts that the decrease in trade cost would shift resources from non-exporters to exporters *within* industries. In his model, only "productive" firms self-select into the export market as they can overcome the sunk costs to entering export markets.

and Pavcnik, 2007); because trade may induce an upgrading of the "product quality" in exporting plants *within* industries (Verhoogen, 2008); and because reduction in trade costs may induce some firms to switch to more advanced technologies (Yeaple, 2005). In their extensive review on the distributional consequence of globalization, Goldberg and Pavcnik (2007) view that the H-O-S theory is generally inconsistent with the empirical evidence and conclude that the direction of research on international trade tends to be shifting from the traditional focus on countries and industries to a new focus on firms and products.

On the other hand, there exist a number of papers which demonstrate that traditional trade theory (or modified versions of it) is consistent with specific episodes of trade liberalization or that the theory can provide at least partial explanations of wage movements.

In the 1980s and 1990s, many Latin American countries drastically lowered their tariff and non-tariff barriers (NTBs) to trade under the obligations of the General Agreement on Trade and Tariffs (GATT). However, contrary to the prediction of the H-O-S theory, most Latin American countries experienced an *increase* rather than a decrease in the skill premium after episodes of trade liberalization (Goldberg and Pavcnik, 2007). In search for the causes of this "puzzle," several studies point out that the initial protection patterns of these economies seem to be consistent with the S-S theorem as their most protected sectors prior to trade liberalizations were those with higher shares of unskilled workers. (See Attanasio, Goldberg and Pavcnik, 2004 for Colombia; Beyer, Rojas and Vergara, 1999 for Chile; Galiani and Sanguinetti for Argentina; Feliciano, 2001, Hanson and Harrison, 1999 and Revenga, 1997 for Mexico). However, most of the papers find little evidence that trade liberalization caused a move of labor across sectors, perhaps due to labor market rigidity (Goldberg and Pavcnik, 2007). The lack of employment reallocation in the wake of trade liberalization led many authors to conclude that the impacts of trade reform on labor are limited.

Some authors explore the "Second Puzzle" (Robertson, 2007) after Mexico's entry into the North American Free Trade Area (NAFTA) in 1994, i.e., why skill premium and other measures of inequality in Mexico began to fall or at least remained stable in the post-NAFTA period.[147] A potential explanation is that Mexico's further economic integration with the United States and Canada after NAFTA might have strengthened the H-O-S type effects (Chiquiar, 2008; Robertson, 2004, 2007). For instance, investigating the direct link between changes in relative product prices and changes in relative wages, Robertson (2004) shows that the changes in the structure of wages are consistent with the prediction of the Stolper-Samuelson (S-S) theorem. However, there is no agreement in the literature in terms of explaining wage movement after NAFTA. For instance, using a sample of the largest plants from the annual industrial survey, Verhoogen (2008) demonstrates that the increase in the incentive to exports created by the Mexican peso crisis (1994) induced a "product up-grading" in exporting plants raising demand for skilled workers; and Esquivel and Rodríguez-López (2003) argue that the SBTC rather than the S-S effect has been the dominant force which increased wage inequality in both the before- and after-NAFTA periods.

In contrast to the Latin American countries, East Asian developing countries are generally viewed to have achieved both openness and relatively equitable development (e.g., World Bank, 1993). Some studies suggest that the experiences of East Asian Newly Industrializing Countries (NICs) are broadly consistent with the hypothesis that export-oriented industrialization reduces income inequality (Wood, 1999). For instance, based on time-series evidence, Wood (1999) observes that, following a switch to export-oriented industrialization in Korea and Taiwan in the 1960s and in Singapore in the 1970s, the wage gap between skilled and unskilled workers of these economies declined. However, there exist few studies based on detailed micro data for East

[147] See Goldberg and Pavcnik (2007, Table 1, p.48).

Asian NICs.[148] For East Asian NICs, it would therefore be fair to say that, whereas the positive association between openness and equality is consistent with the H-O-S theorem, a question remains whether the equalizing development in these economies was a consequence of trade liberalization or an outcome of national policies such as broad based education.

A number of studies report a rising wage inequality in China since the introduction of the market-oriented reforms in 1978 (e.g., Benjamin, Brandt, Giles, and Wang, 2008; Knight and Song, 2003). Many of them report that the Chinese wage structure was initially compressed under China's centrally-planned system, but that the return on education rose sharply under the reforms. As China progressively liberalized its trade and FDI policies during the same period, one challenge of empirical studies for China and other transition economies is to disentangle the impacts of trade on inequality from other market-oriented reforms. Turning to firm-level variation for a sample of 1,500 firms in China, Xu and Li (2008) find both a Heckscher-Ohlin type effect (a negative association between the change in export intensity and the change in skill demand) and an evidence of export-induced skill-biased technical change. Exploiting regional variation, Wei and Wu (2001) find that Chinese cities (urban areas and adjacent rural counties) that experienced a greater increase in the export-to-GDP ratio tend to demonstrate a greater decline in urban-rural income inequality. As a potential explanation, Wei and Wu suggest that export-oriented activities by the Township and Village Enterprises (the TVEs), which in turn were permitted to industrialize under the policy of "Li Tu Bu Li Xiang" ("leaving the-farm-work-but-not-the-farmland"), might have contributed to the rise in income in the rural areas.

[148] This is perhaps due to data limitations (Goldberg and Pavcnik, 2007). In addition, it may be more difficult to disentangle the impacts of trade on wages for these economies due to potential endogeneity of their trade policies. With a combination of export subsidy and import protection, governments in East Asian countries intervened in trade and industrial policy in order to bring about "dynamic" comparative advantage. See Amsden (1989) for Korea and Wade (1990) for Taiwan.

In summary, there are a number of mechanisms through which trade may affect wages, and one cannot say *a priori* which theory is superior. The validity of the theories appears to depend on largely the nature of trade reforms, the scope of the data and the channels through which trade influences wages. Whereas the traditional trade theory and "new" theories tend to have opposite predictions, they are not necessarily mutually exclusive. Different effects might be occurring simultaneously in a fast growing transition economy like Vietnam's.

4. The Impacts of the U.S.-Vietnam BTA on Wages and the Skill Premium

4.1. Estimation Strategy

This section investigates empirically how the exogenous trade shock resulting from the U.S.-Vietnam BTA translated into changes in wages for skilled and unskilled workers. Whereas this study is inspired by the basic insights from the H-O-S model, it is not the approach of this paper to follow the strict version of the H-O-S theory. Instead, I relax some of its assumptions so that the conceptual framework is consistent with Vietnam's "real world" data and my empirical design. First, whereas the Stolper-Samuelson theorem links changes in relative output prices to changes in relative wages, it is difficult to model this linkage directly since price data are not readily available. Thus, I take an indirect approach assuming that the impacts of changes in product prices induced by trade are "revealed" in changes in labor demand.

Second, this paper extends the idea of the H-O-S theory to Vietnam's provinces; i.e., it is assumed that Vietnam's provinces have different specialization patterns given heterogeneity in endowments and difference in initial industrial development, and that the impacts of trade shocks translate differently at the province level. Whereas labor is assumed to be mobile across sectors within each province, it is modeled to be sufficiently immobile across provinces as province-

specific labor-demand shocks influence the wages of workers living in that province.[149] Overall, the empirical framework is similar to the model employed by Chiquiar (2008) who finds responses of the "Stolper-Samuelson (S-S) type" following NAFTA, by exploiting the regional variations in exposure to international markets.[150]

Third, the S-S results may become less definitive if unskilled labor is the elastically supplied factor. Winters (2002) presents a useful way of thinking about the impacts of trade on wages for unskilled workers by considering two polar forms of labor markets in developing countries. The first is that assumed by traditional trade theory in which factor supplies are exogenously fixed and wages are perfectly flexible (Winters, 2002, p.1348-1350). In this case, the Stolper-Samuelson Theorem, under particular conditions, generates the powerful result that an increase in the price of the unskilled labor-intensive good in production will increase the unskilled real wage and decrease that of skilled workers. The polar opposite view of labor markets for unskilled workers is one suggested in development theory that considers factor supplies to be infinitely elastic (Lewis, 1954; Winters, 2002, p.1350-1352). In the latter case, the formal sector can draw infinite amounts of labor from the informal sector or subsistence agriculture at a subsistence wage, such that the wage for unskilled workers is unaffected by the trade shock. Winters views that neither of the polar extremes is likely to be precisely true and suggests the importance of determining the elasticity of labor supply in evaluating the supply response of unskilled workers. Thus, theoretical predictions with regard to the effects of trade on wages of

[149] It would be reasonable to assume that Vietnam's labor is partially mobile across provinces. On the one hand, globalization appears to have induced some substantial rural-urban migration (see Chapter 3). On the other hand, according to the 1999 *Population and Housing Census*, only 6.5 percent of the population over five years of age in Vietnam changed their place of residence during the period of 1994-1999 (GSO/UNDP, 2001).

[150] Chiquiar (2008) used one percent samples of male individuals taken from Mexico's 1990 and 2000 population censuses and complemented them with site-specific data for globalization-related variables. Specifically, "globalization" is measured in Chiquiar's study by the shares of state employment in agriculture and industry, the distance from the U.S., the share of FDI in the state GDP, the shares of *maquiladora* employment and imports, and migration rates. Controlling for personal characteristics in his cross section data, Chiquiar (2008) finds that Mexican states more exposed to globalization experienced a decrease in the skill premium relative to the other states.

unskilled workers are ambiguous, and the existence of S-S effects becomes an empirical question.

4.2. Data

The VHLSS 2002 and 2004, which are the third and the fourth rounds of Vietnam's Living Standard Measurement Survey, were conducted by the General Statistics Office (GSO) of Vietnam with the technical support of the World Bank. The surveys' data are generally recognized to be of high quality and are representative of all of Vietnam. The VHLSS 2002 and 2004 consist of 30,000 households and 9,188 households respectively, and about half of the households interviewed for the VHLSS 2004 came from the sample of the VHLSS 2002. The timeframe of the VHLSS 2002 and 2004 coincides with the aftermath of the BTA (see Figure 4.2), since they reflect information for the years 2001/2002 and 2003/2004 respectively. During the same period, protection appears to have been still in place for import-competing production.[151] Thus, the focus of the paper is to evaluate the impacts of trade on wages on the export side.

In order to trace the wage changes during the period 2002 and 2004, I focus on the panel individuals interviewed both in the VHLSS 2002 and 2004.[152] Out of 12,331 persons who are matched as the same individuals, I restrict the sample to the individuals who were 15-59 years of age in 2004 and had wage jobs as the most time consuming job in both years. As a result, my sample consists of 1,746 individuals.

[151] For instance, the trade weighted Nominal Rate of Protection (NRP) for manufacturing was relatively high at 29.2 percent in 2003 (Athukorala, 2006, Table 3). Although the estimated Effective Rate of Protection (ERP) for manufacturing decreased from 95.9 percent in 2001 to 43.9 percent in 2003, the decline came from an increase in input tariff introduced to protect State Owned Enterprises (SOE)s engaged in intermediate production rather than from the decrease in tariff rates for final goods (Athukorala, 2006, p.174).

[152] Since there exist some errors in the panel identifiers in the original dataset, I used the revised identifier codes provided by McCaig (2009a) to match the individuals between 2002 and 2004. Then, I eliminated some observations whose information on gender, age and education are inconsistent. In order to mitigate further the measurement error, I dropped one percent of individuals who experienced the largest wage changes. However, the results are not sensitive to these adjustments.

Relative to using the cross sectional data, there exist advantages in analyzing the panel data component of the VHLSS in identifying the effect of trade on wages. First, since the panel data model traces the changes in wages of the same individuals between 2002 and 2004, it controls for any impacts on wages resulting from the time-invariant observable and unobservable personal characteristics. Second, the panel data approach adjusts for the "composition effect", i.e., any impacts resulting from the difference in the composition of wage workers between two years. For instance, there is some evidence that the individuals who moved from a non-wage job in 2002 to a wage job in 2004 are less skilled than those who had a wage job in both years.[153] If the unobservable component of the selection process to wage employment and the trade variable are correlated, the coefficient for the trade variable using cross-sectional data may be biased.

Finally, one limitation of using the VHLSS is that the data are likely to exclude some substantial number of migrants who hold a temporary status since the sampling of the surveys is limited to persons who had permanent registration status. Self-employed individuals in the VHLSS are also excluded from my regressions since they do not have wage information.

The employment and output data are taken from the *Annual Enterprise Surveys* conducted by the GSO. The surveys cover all the registered "enterprises" in Vietnam but exclude household enterprises[154] and agriculture and forestry cooperatives. I aggregate the employment and output figures by industry at the VISC 2-digit level (VSIC 10-41) and by Vietnam's 61 provinces.[155]

The import and export data for Vietnam were extracted from the U.N. Comtrade system at the Harmonized System (HS) (1996) 6-digit level. The data were aggregated at the International

[153] The data on panel individuals reveal that those who had a wage job in both years tend to be more educated (with 9.4 years of education on average) than those who moved from a non-wage job in 2002 to a wage job in 2004 (with 7.3 years of education) (the VHLSS 2002, 2004).
[154] Out of 4326 households who reported non-farm household activities in the VHLSS 2004, 50 households (about 1.2 percent) responded to "have sold goods/services on international market".
[155] Between 2002 and 2004, some provinces were subdivided creating three new provinces, namely Dien Bien, Dac Nong and Han Giang. For the purpose of consistency, the definition of provinces is based on that in 2002.

Standard Industrial Classification (ISIC) 2-digit level using the correspondence file between HS 96 and ISIC (Rev. 3) which in turn was downloaded from the U.N. Statistics Division website.

It is common in the literature to classify skilled and unskilled workers either by educational attainment or by occupation (white- vs. blue-collar). In the context of this paper, there is some difficulty in differentiating Vietnamese individuals into a skilled and unskilled worker dichotomy by educational attainment, since it is actually the intermediately educated who are most likely to be engaged in the export-oriented production.[156] I therefore use the occupation codes available in the VHLSS which in turn are similar to the International Standard Classification of Occupations (ISCO) by the International Labour Organization (ILO) to categorize individuals into skilled and unskilled workers.[157] The summary statistics of demographic characteristics for skilled and unskilled workers are reported in Appendix Table 4.A.7 along with all the other variables used in my regressions. For my sample of the panel individuals for the period 2002-2004, the average wage growth rate of 27 percent for skilled workers was larger than that for unskilled workers (20 percent), suggesting that the skill premium increased as Vietnam's economy as a whole.

4.3. Regression Analyses

(1) Export Index

I first develop an index to represent the province-specific labor demand induced by exports as a mechanism through which trade affects wages. The increase in production for exports may

[156] The information on whether or not individuals work for exporting firms is not available in the VHLSS. If I look at production workers who work for formal firms in export-oriented sectors (namely apparel and textiles, footwear and leather, furniture and miscellaneous manufacturing and electronics) in 2004 as a proxy for those working for exports, a large majority of these workers are intermediately educated, as 28 percent, 39 percent and 26 percent of them have upper-secondary, lower-secondary and primary education respectively. The production workers who have tertiary education and those who have no school degree are relatively small at 2 percent and 5 percent respectively.

[157] "Skilled" workers include leaders (11-19), top- and mid-level professionals (21-34), staff and other white-collar occupations (41-52), and skilled workers in agriculture, sylviculture, and aquaculture (61). "Unskilled" workers consist of production workers (71-83) and those generally classified as "unskilled workers" (91-93). Between parentheses are the occupation codes available in the VHLSS 2004.

increase wage levels in the location where export firms operate by raising the demand for labor in that location. In addition, they may influence the wage levels indirectly, for instance, by increasing the demand for inputs; by raising the demand for trade related services (e.g., transport); and through a multiplier effect if workers employed by those firms increase consumption in the area.

The data on the number of workers engaged in exports are not available directly at each province level. I construct a province-specific export index ($Export_{kt}$), using the exports data at the national level as well as the employment and output data at the firm level. The Export Index is the sum of the workers over each industry j aggregated at the province level k, scaled by the export intensity of each industry, relative to the total economically active population in each province k at time t. Specifically,

$$Export_{kt} = \frac{\sum_j XS_{jt} \cdot Employment_{jkt}}{Employment_{kt}} \quad (1)$$

where XS_{jt} is the export intensity computed as the proportion of exports in gross output for industry j at time t[158]; $Employment_{jkt}$ is the number of workers employed by industry j in province k at time t; and $Employment_{kt}$ is the number of economically active population in province k at time t. j consists of Vietnam's industries at the 2-digit VSIC level (VSIC 10-41), k represents Vietnam's 61 provinces, and t = 2002, 2004 in my regressions. Thus, the impact of exports on labor demand is likely to be larger, the higher is the export-intensity in the composition of industries, and the larger is the share of workers employed by industries relative to total employment in province k.

[158] For some industries for some years, the export values from the Comtrade data exceed the production values from the *Enterprise Survey* data. As a potential source of this incompatibility, Jenkins (2004) points out that the gross output reported in the *Enterprise Survey* data may refer not to the value of the products produced, but to the processing cost. This is particularly the case of the garment and footwear industries, where exports are commonly contracted on a cut-make-trim (CMT) basis. Following Jenkins (2004), the reported figures for output in the garment and footwear industries are multiplied by 2.5 and 2.0 respectively.

Equation (1) can be re-written as:

$$Export_{kt} = \frac{\sum_j XS_{jt} \cdot LaborCoeff_{jkt} \cdot Output_{jkt}}{Employment_{kt}} \quad (1)'$$

where $LaborCoeff_{jkt} = \frac{Employment_{jkt}}{Output_{jkt}}$

is the employment coefficient, i.e., the number of workers required to produce one unit of output. Thus, given industrial output, the impacts of exports on labor demand are likely to be larger, the higher is the labor-intensity of the industrial composition in province *k*. Overall, the Export Index is roughly interpreted as the proportion of workers affected by exports in each province.

(2) Impact of a Change in Exports on Wage Growth

This section investigates the effects of exports on *absolute* wages for skilled and unskilled workers running regressions separately by skill levels. The analysis is motivated by the fact that the change in absolute wages directly affects individuals' well being and that the separate regressions would help in identifying the source of the change in skill premium.

I specify a model which relates wage growth rates to changes in the province-specific Exports Index.

$$\Delta Ln\ W_{ik} = \beta_0 + \beta_1 \Delta Export_k + \beta_2 \Delta X_{ik} + \beta_3\ Y_{ik} + e_{ik} \quad (2)$$

where $\Delta Ln\ W_{ik}$ is an individual *i*'s monthly[159] wage growth rate between 2002 and 2004 who lives in province *k*, $\Delta Export_k$ is the change in Export Index for province *k* between 2002 and 2004, ΔX_{ik} is a vector of differenced control variables, and Y_{ik} is a vector of other control variables which may affect wage growth rates. An advantage of using a difference-difference

[159] The monthly wage calculations are based on the annual wages and the hours worked during the twelve months prior to the survey. The wages include bonus/award, social allowances, and trip subsidy. The wages are converted to January 2002 constant prices using the deflators available in the VHLSS. Throughout the paper, I report the results based on monthly wages rather than hourly wages since, in addition to the changes in the compensation per unit of time, longer hours worked in a trade-oriented sector may be an important component of income changes.

specification relative to a model which relates the *level* of wage to the *level* of Export Index is that it controls for time invariant characteristics which are correlated both with wage levels and Export Index levels. For instance, there exist a number of variables which are likely to affect positively both wage levels and export levels such as better infrastructure, conducive business and investment climate, and favorable geographical conditions such as better access to seaports.[160] Thus, one might find a spurious relationship between Export Index and wage levels in a level-level model. However, by differencing, all time-invariant province- and personal specific characteristics are controlled for.[161]

The first three columns in Table 4.1 report the OLS regression results of a model which relates the wage growth rate to the change in Export Index and other time-variant variables. (Model A). Since there are both individual and province level variables in equation (2), the standard errors are adjusted for within province correlation (clustering). Columns 1, 2 and 3 report the results for the full sample, for the subset of unskilled workers, and for the subset of skilled workers respectively. The distinction between skilled/unskilled categories is based on individual workers' status in 2004. Between 2002 and 2004, some workers changed their skilled/unskilled status due to the changes in their occupations. Thus, a variable reflecting their changes in skilled/unskilled status (=1 if he/she moved from unskilled to skilled occupation; =0 if his/her skilled/unskilled status remained unchanged; and =-1 if he/she moved from skilled to unskilled occupation) is included. Similarly, a variable to indicate the change in marital status (=1 if his/her marital status changed from non-married to married; =0 if marital status remained unchanged; and =-1 if his/her marital status changed from married to non-married) is added. Since education levels do

[160] Vietnam is an S-shaped country with a long coastline of 3,260 kilometers. Transport by water is important for both domestic and international trade. For instance, Vietnam's major seaports handled 74.6 million MT of cargo in 2004 of which 28.8 million, 24.7 million and 21.1 million were imports, exports and domestic respectively (Vietnam Seaports Association, http://www.vpa.org.vn/english/information/info_static2004.htm).

[161] Whereas the differencing process controls for any time invariant characteristics that affect the *level* of wage, it does not rule out a possibility that these variables influence wage *growth* rates.

not change much for adults and everybody is two years older in 2004, human capital variables such as education and potential experience are not included. In order to capture potential trends of wage convergence or divergence, the lagged log of monthly wage is included.

For the full sample, the coefficient for the Export Index is found to be positive but statistically insignificant. The results of regressions run separately by the subsets of skilled and unskilled workers reveal differential impacts of exports by skill levels. The coefficient for the change in the Export Index for unskilled workers turns out to be positively significant at the one percent level implying that unskilled individuals who reside in a province which experienced more export expansion tend to experience higher wage growth rates. In contrast, the coefficient for the change in Export Index for skilled workers turns out to be insignificant. The coefficients for the lagged wages turn out to be negatively significant implying that Vietnam's workers appear to have experienced wage convergence, i.e., the individuals who had higher wages in 2002 experienced on average lower growth in wages.

Columns 4 though 6 in Table 4.1 report the results of alternative specification (Model B) including additional control variables which potentially affect wage growth. Whereas many personal characteristics variables do not change between 2002 and 2004, the *level* of these variables may influence the wage growth rates, e.g., when the dynamics in a labor market favor certain kinds of workers. Thus, a series of personal characteristics, namely, gender, ethnicity,[162] education levels (measured by total education years) and potential experience,[163] are included. The wage growth may also differ between urban and rural areas and across Vietnam's regions. Thus, the regression model also includes a set of location dummy variables which consist of

[162] The minority is defined to represent all ethnic groups other than the Kinh majority and Hoa (the Chinese).
[163] Potential experience is calculated as age minus six minus education years.

regional dummy variables[164] and a dummy variable for whether or not the worker lives in an urban area.[165]

Relative to the results obtained by Model A, the inclusion of the additional control variables led to the increase in R^2. Some of these variables are found to have affected wage growth. For instance, a higher education level is associated with higher wage growth; and female workers experienced slower wage growth for the subset of unskilled workers. However, the coefficients for the changes in Export Index are reasonably stable between Model A and Model B.

(3) Instrumental Variables (IV) Approach

The change in Export Index ($\Delta Export_k$) in Equation (2) may be endogenous and the endogeneity of explanatory variable may cause a bias in the parameter estimates obtained by OLS. For instance, many empirical studies focusing on firm heterogeneity find that exporting firms are systematically different from non-exporting firms as they tend to be larger and more productive and tend to pay higher wages than those who do not export (e.g., Bernard, Jensen, Redding and Schott, 2007). Thus, firms that achieve a higher level of productivity and that have other advantages tend to self-select into export markets since such firms are better able to overcome the sunk costs to entering international markets.[166] Productivity and wages may be correlated as productive firms may pay higher wages to attract better workers or firms may have invested in human capital among their workers and therefore pay higher wages to protect their investment. As greater productivity is associated with higher wages and with the likelihood of exporting, this may in turn cause a positive correlation between the change in Export Index and the error term.

[164] The regional dummies consist of: Red River Delta, Northeast, Northwest, North Central Coast, South Central Coast, Central Highlands, Southeast and Mekong River Delta.

[165] The households who moved out between 2002 and 2004 are not usually interviewed in the VHLSS 2004. It is not known to what lengths interviewers went in order to track down panel households who in 2004 were no longer residing at their 2002 address. A check of the VHLSS 2002 and 2004 data indicated that panel individuals did not change their provinces except those whose provinces were divided between the two years.

[166] See, for instance, Greenaway and Kneller (2007) for a review of exporting and firm heterogeneity.

In this case, the coefficient estimate for the change in Export Index is biased upward. Another potential source of endogeneity is that the wage growth may influence the change in exports, as a rise in wages may hamper export expansion. In the latter case, the Export Index and the error term are negatively correlated, causing a downward bias in the coefficient estimate for the Export Index.

Whatever the source of endogeneity may be, I address the potential endogeneity problem using the province-specific measure of the U.S. tariff cut as the instrumental variable. Whereas Vietnam's provinces face the same tariffs abroad, the impacts of tariff cuts differ across provinces due to differences in initial industrial development and industrial composition. The U.S. tariff cuts that each province faces are calculated using a methodology similar to the one proposed by Topalova (2005) and applied to Vietnam by McCaig (2009b) and Coello (2009).

The provincial measure of the U.S. tariff cuts is the tariff drop rate aggregated at the province level using the structure of employment prior to the BTA (t = 2000) as weight, and being scaled by the proportion of industrial employment relative to total economically active population in province k. Specifically,

$$TariffCut_k = \frac{\sum_j XS_{j,2000} \cdot Employment_{jk,2000} \cdot \Delta\tau_j}{Employment_{k,2000}} \quad (3)$$

where $\Delta\iota_j$ is the U.S. tariff drop at the 2-digit VSIC level, which is taken from McCaig (2009b, Figure 1); $XS_{j,2000}$ is the export intensity[167] calculated as the share of exports in gross output for industry j in 2000; $Employment_{jk,2000}$ is the number of workers employed by industry j in

[167] The inclusion of the export intensity is consistent with Gonzaga, Filho, and Terra (2006)'s study which shows that the pass-through from tariffs to prices in each sector depends on the sector's import penetration. For instance, the pass-through, measured by the share of trade relative to production, is obviously zero in sectors with no trade whereas the pass-through coefficient is one in sectors where all goods are traded. Investigating the impacts of trade liberalization implemented in Brazil from 1988 to 1995, Gonzaga *et al*. (2006) show that only after an adjustment of tariff changes for import penetration was the trade liberalization pattern with respect to skill intensity consistent with that of relative price changes.

province k in 2000; and $Employment_{k,2000}$ is the number of economically active population in province k in 2000. The rationale of using the provincial measure of the U.S. tariff cut as an instrument is that the U.S. tariff reduction (Δt_j) is likely to influence the change in Exports Index, but the change in wages does not influence the U.S. tariff reduction. The U.S. tariff reduction is also unlikely to affect the change in wages other than via trade. In addition, the lagged *level* of industry mix is likely to affect the *change* in Export Index by influencing the impacts of the U.S. tariff cut at the province level, but the *change* in wages is unlikely to affect the past *level* of industry composition. At the first stage, I regress the change in Export Index ($\Delta Export_k$) on the measure of the U.S. tariff cut ($TariffCut_k$) (excluding instrument) and on all the other exogenous variables included in the second stage. Then, I insert the predicted value of the change in Export Index into Equation (2).

Table 4.2 shows the results of the second-stage regressions estimated by a two-stage least square (2SLS) approach.[168] The coefficients for the change in Export Index for unskilled workers estimated by the 2SLS remain positively significant for both Model A and Model B confirming that the unskilled individuals residing in a province which experienced larger increase in exports tended to gain a larger wage growth. In contrast, the coefficients for the change in Export Index obtained by the 2SLS turn out to be statistically insignificant for the full sample and for the subset of skilled workers. The results of the first stage F statistic for the excluded instrument (Bound, Jaeger and Baker, 1995) suggest that the U.S. tariff cut explains reasonably well the variation in the change in Export Index variable. The last row in Table 4.2 reports the Wu-Hausman test statistics to test for potential endogeneity. The test results reject the hypothesis that OLS estimates are consistent for the full sample (model A) and for the subset of unskilled workers (for Model A and B) suggesting potential endogeneity in these specifications. Compared

[168] I used STATA's ivreg2 command with the robust and cluster options (Baum, Schaffer and Stillman, 2007).

to the results estimated by OLS in Table 4.1, the 2SLS estimates increased the magnitudes of the coefficients for the change in Export Index, suggesting that the coefficient estimates obtained by OLS may be biased downward.[169]

(4) Impacts on Skill Premium

Finally, I implement the regressions which relate changes in exports to changes in the skill premium. Since skill premiums are not available at the individual level, I turn to a model aggregated at the province level which in turn is similar to the one used by Wei and Wu (2001). The regression takes the form,

$$\Delta SP_k = \alpha\, \Delta Export_k + \beta\, SP_{k,2002} + v_k \qquad (4)$$

where ΔSP_k denotes the difference in the log of average "skill premium" (relative wage of skilled to unskilled workers) at province k[170] and $\Delta Export_k$ is the change in the Export Index between 2002 and 2004 in province k. Following Wei and Wu (2001), the log of the skill premium in 2002 ($SP_{k,2002}$) is added to capture a possible mean reversion.

Table 4.3 reports the results of the OLS regressions investigating the relationship between changes in the Export Index and changes in the skill premium. The coefficients for the change in Export Index turn out to be negatively significant, suggesting that those provinces that experienced a greater increase in exports are associated with a larger reduction (or smaller increase) in the skill premium relative to other provinces.[171] The coefficient for the lagged log of the skill premium is found to be negative implying a general trend of mean reversion. The results of the Wu-Hausman test can not reject the hypothesis that OLS estimates are consistent.

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169 If I choose Model B to be my basic model, the result of 2SLS model implies that one unit increase in the change in Export Index is associated with about 4.7 percentage point higher wage growth for unskilled workers for the period 2002-2004. The magnitude of the 2SLS estimate is slightly larger than that obtained by the OLS model (3.1 percentage point).

170 I compute province-specific skill premiums aggregating the data on panel individuals at the province level.

171 The result in Model (3) implies that one unit increase in the change in Export Index is associated with 3.9 percentage point lower increase in the growth rate of the skilled/unskilled wage ratio.

5. Conclusions

This paper explored how the expansion of labor-intensive manufacturing exports resulting from the U.S.-Vietnam BTA in 2001 translated into wages of skilled and unskilled workers in Vietnam through the channel of labor demand. The results demonstrate the existence of a "Stolper-Samuelson (S-S) type" effect: those provinces which are more exposed to the increase in export opportunities experienced a larger wage growth for unskilled workers and a decline of (or smaller rate of increase in) the relative wage of skilled and unskilled workers relative to the other provinces.

Vietnam's experience in the aftermath of the BTA suggests the importance of economic integration of a developing country with developed countries, in particular, in terms of creating formal job opportunities for its abundant unskilled workers and its positive impacts on their wages relative to counterfactual comparison conditions (without exports). The rise in wages for unskilled workers in the process of export-oriented industrialization is consistent with the East Asian experience, in particular, its historical shift of production locations to lower wage countries as wages increase; and the recent rise of wages for production workers in China.[172]

One caveat of this paper is that it does not claim that the increased export opportunities would have positive impacts on employment and wages for the *least* skilled workers. In fact, the "unskilled" workers who are the most intensively employed for export-oriented production in Vietnam are most likely to be intermediately educated. Thus, while the wages of workers with primary education may increase, those without any schooling may be left behind (Winters, 2002). Further study would be required to assess properly the impacts of trade on the most disadvantaged segment of population.

[172] Several articles in *The New York Times* (e.g., June 7, 2010; June 8, 2010; September 16, 2010) and *the Economist* (July 31, 2010) report the rising wages of production workers in coastal industrial areas in China. As labor costs have risen in China, some production of labor-intensive goods may be moving to lower-wage countries like Bangladesh, Vietnam and Cambodia (*The New York Times*, July 16, 2010; January 31, 2011).

Another limitation of this paper is that, whereas it focuses on identifying the S-S type effects exploiting regional variation, it does not analyze other factors which affected the wage structure. In fact, for the period 2002-2004, the skill premium increased at the aggregate level for my sample of panel individuals.[173] Thus, the results imply that the S-S type effects mitigated, but did not outweigh the impacts of other factors which contributed to the rise in skill premium. In conclusion, this paper suggests that the insights from the H-O-S theory remain valid as an important *component* of globalization and that the traditional trade theory or a variation of thereof should be considered as complementary to the other theories which predict a rise in wage inequality.

[173] Several factors may have contributed to the rise in skill premium such as: the impacts of domestic reforms which were partly accelerated by the BTA and Vietnam's accession process to the WTO (Parker *et al.,* 2007); SBTC, and other impacts of trade which might have occurred concurrently during the period studied.

Table 4.1. OLS Regression Results: Explaining Wage Growth

	Model A			Model B		
	Total	Unskilled	Skilled	Total	Unskilled	Skilled
ΔExport Index	.014	.034***	.0012	.017**	.031***	.0055
	(.0093)	(.012)	(.0086)	(.0085)	(.010)	(.010)
ΔSkilled/unskilled status	-.056	-.24***	-.14	-.076	-.18***	-.095
	(.063)	(.059)	(.089)	(.065)	(.065)	(.100)
ΔMarital status	-.12*	-.14*	-.047	-.10	-.12	-.051
	(.071)	(.083)	(.087)	(.063)	(.075)	(.089)
Initial wage in log	-.25***	-.37***	-.25***	-.40***	-.51***	-.31***
	(.021)	(.028)	(.040)	(.030)	(.033)	(.047)
Female				-.10***	-.25***	.0080
				(.024)	(.037)	(.033)
Minority				-.020	-.13	.067
				(.086)	(.12)	(.070)
Education				.041***	.023***	.028***
				(.0035)	(.0051)	(.0070)
Potential Experience				.0014	-.00038	.00014
				(.0015)	(.0017)	(.0021)
Urban				.063**	.084*	.043
				(.027)	(.043)	(.043)
Constant	3.51***	5.04***	3.61***			
	(.28)	(.36)	(.54)			
Regional Dummies				X	X	X
Number of Obs.	1718	1036	662	1718	1036	662
R^2	.12	.20	.13	.21	.29	.17

Notes: The dependent variable is the log difference of monthly wage ($\Delta Ln\ W$ in Equation (2)).
The classification between skilled and unskilled workers is based on the status in 2004.
*, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level respectively.
The standard errors in parentheses are based on heteroskedasticity-consistent estimates of the variance-covariance matrix and corrected for within province correlation (clustering).

Table 4.2. 2SLS Regression Results: Explaining Wage Growth

	Model A			Model B		
	Total	Unskilled	Skilled	Total	Unskilled	Skilled
ΔExport Index	.028	.051*	.011	.024	.047**	.0073
	(.022)	(.027)	(.022)	(.016)	(.022)	(.017)
ΔSkilled/unskilled status	-.059	-.24***	-.15*	-.078	-.18***	-.096
	(.062)	(.058)	(.087)	(.063)	(.064)	(.097)
ΔMarital status	-.13*	-.15*	-.052	-.11*	-.13*	-.051
	(.069)	(.082)	(.085)	(.062)	(.074)	(.086)
Initial wage in log	-.25***	-.39***	-.25***	-.40***	-.51***	-.31***
	(.023)	(.030)	(.044)	(.031)	(.034)	(.048)
Female				-.10***	-.25***	.0081
				(.024)	(.037)	(.033)
Minority				-.018	-.13	.068
				(.085)	(.12)	(.069)
Education				.041***	.022***	.029***
				(.0036)	(.0050)	(.0075)
Potential Experience				.0013	-.00059	.00015
				(.0015)	(.0016)	(.0021)
Urban				.065**	.087**	.043
				(.026)	(.043)	(.041)
Constant	3.58***	5.17***	3.66***			
	(.31)	(.39)	(.58)			
Regional Dummies				X	X	X
Number of Obs.	1718	1036	662	1718	1036	662
R^2	.12	.20	.12	.21	.28	.17
F test of excluded instrument[*1]	5.28	7.07	3.95	5.06	6.55	3.81
[*p*-value]	[.025]	[.010]	[.051]	[.028]	[.013]	[.056]
Wu-Hausman F test	3.39	7.78	.83	.56	4.36	.020
[p-value]	[.071]	[.0071]	[.366]	[.456]	[.041]	[.899]

Notes:

[*1] At the first stage, the change in Export Index is regressed on the measure of the U.S. tariff cut (excluding instrument) and all the other exogenous variables included in the second stage.

The dependent variable is the log difference of monthly wage ($\Delta Ln\ W$ in Equation (2)).

The classification between skilled and unskilled workers is based on the status in 2004.

*, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level respectively.

The standard errors in parentheses are based on heteroskedasticity-consistent estimates of the variance-covariance matrix and corrected for within province correlation (clustering).

Table 4.3. Impact of Change in Exports on Skill Premium

	(1)	(2)	(3)
ΔExport Index	-.027**	-.033***	-.039***
	(.013)	(.010)	(.010)
Initial skill premium in log		-.20**	-.31***
		(.079)	(.088)
Regional dummies			X
Constant	.12***	.22***	
	(.030)	(.045)	
Number of Obs.	59	59	59
R^2	.033	.15	.35
Wu-Hausman F test	.25	.35	.33
[p-value]	[.619]	[.557]	[.567]

Notes: The dependent variable is the log difference of skilled/unskilled wage ratio (ΔSP in Equation (4)).
The heteroskedasticity-consistent standard errors are between parentheses.
*, **, *** indicate that the coefficients are significant at the 10, 5, and 1 percent level respectively.

Appendix Table 4.A.1. Vietnam's Exports to the World by the VSIC Sub-categories ($ million)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Industry									
Apparel, textiles (17, 18)	2104	2186	3045	3933	4890	5392	6547	8608	10163
Footwear, leather products (19)	1647	1829	2115	2562	3030	3437	4049	4623	5689
Furniture, wood, manufact. n.e.s. (20, 36, 37)	580	670	848	1115	1596	2117	2713	3574	4232
Food products (15, 16)	2463	2900	3066	2874	3620	4559	5352	6255	8634
Electronics, machinery, transport equipment (29-35)	1299	1366	1339	1832	2687	3274	4350	5892	7835
Metal, non-metallic mineral products (26, 28)	201	267	338	427	556	725	998	1279	1533
Basic manufacturing (21, 22, 23, 27, 40, 41)	360	351	300	349	537	739	1077	1505	3826
Chemical, rubber, plastic products (24, 25)	256	379	439	550	771	979	1414	1797	2547
Mining (10, 11, 13, 14)	3628	3309	3485	4086	6179	8172	9403	9714	12046
Agriculture, forestry, fishery (1-5)	1479	1407	1556	2255	2499	2915	3772	4972	5753
Others	464	365	174	166	119	139	151	343	429
Total	14483	15029	16706	20149	26485	32447	39826	48561	62685

Appendix Table 4.A.2. Vietnam's Exports to the U.S. by the VSIC Sub-categories ($ million)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Industry									
Apparel, textiles (17, 18)	50	48	1040	2020	2550	2691	3148	4576	5241
Footwear, leather products (19)	92	117	236	352	502	702	893	1003	1208
Furniture, wood, manufact. n.e.s. (20, 36, 37)	11	22	81	173	381	672	927	1276	1448
Food products (15, 16)	304	488	678	617	560	588	682	771	801
Electronics, machinery, transport equipment (29-35)	5	8	33	88	117	240	484	740	983
Metal, non-metallic mineral products (26, 28)	9	11	30	36	62	82	117	146	186
Basic manufacturing (21, 22, 23, 27, 40, 41)	1	5	12	9	8	16	34	71	156
Chemical, rubber, plastic products (24, 25)	1	3	10	17	36	63	88	178	243
Mining (10, 11, 13, 14)	92	234	148	201	407	468	1030	798	1017
Agriculture, forestry, fishery (1-5)	151	129	182	422	403	404	446	542	617
Others	16	0	2	3	1	1	0	11	2
Total	733	1066	2453	3940	5027	5927	7850	10111	11903

Appendix Table 4.A.3. Vietnam's Imports from the World by the VSIC Sub-categories ($ million)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Industry									
Apparel, textiles (17, 18)	1676	1620	2215	2582	3111	3509	3943	4998	5628
Footwear, leather products (19)	500	562	656	784	950	978	947	1107	1165
Furniture, wood, manufact. n.e.s. (20, 36, 37)	161	211	376	478	634	788	1027	1298	1382
Food products (15, 16)	629	795	922	1224	1487	1765	2065	3027	4347
Electronics, machinery, transport equipment (29-35)	4844	5025	5913	8102	9030	9621	11406	18545	23431
Metal, non-metallic mineral products (26, 28)	314	448	595	851	881	1065	1310	1921	2321
Basic manufacturing (21, 22, 23, 27, 40, 41)	3571	3739	4476	5848	8793	10966	14485	19216	26571
Chemical, rubber, plastic products (24, 25)	2879	3041	3610	4426	5717	6469	7720	10220	12597
Mining (10, 11, 13, 14)	142	130	183	166	280	300	330	415	541
Agriculture, forestry, fishery (1-5)	412	456	575	688	941	1152	1470	1785	2333
Others	508	192	224	109	145	147	188	233	398
Total	15637	16218	19746	25256	31969	36761	44891	62765	80714

Source: the U.N. Comtrade System

Note: Between parentheses are the VSIC codes at the two digit level.

Appendix Table 4.A.4. Exports, Employment Coefficients and Proportion of Production Workers By VSIC 2-digit Level

VSIC categories [*1]	Exports Value 2004	Share in Total Exports 2004	Employment coefficient 2004 [*2]	Share of production workers 1998
	($ million)	(%)	(person /bn VND)	(%)
Crude petroleum (11)	5671	21.4	.1	88.9
Apparel (18)	3633	13.7	6.7	88.5
Food and beverages (15)	3492	13.2	2.8	81.7
Footwear and leather products (19)	3030	11.4	7.9	92.3
Furniture and manufacturing n.e.c. (36)	1276	4.8	9.1	88.7
Textiles (17)	1257	4.7	6.8	89.7
Electronics (31)	771	2.9	2.3	79.3
Office machinery (30)	655	2.5	.6	79.8
Radio, TV and communication machinery (32)	537	2.0	1.8	74.7
Rubber and plastics products (25)	454	1.7	3.5	81.0
Mining of hard coal lignite and peat (10)	354	1.3	6.5	86.9
Wood products (20)	320	1.2	10.4	85.7
Chemical products (24)	317	1.2	1.9	73.2
Non-metallic mineral products (26)	291	1.1	5.0	84.8
Transport equip. other than motor vehicle (35)	289	1.1	2.1	75.7
Metal products (28)	265	1.0	4.1	78.6
Machinery and equipment (29)	237	.9	4.1	74.3
Basic metals (27)	212	.8	1.4	85.6
Coke and refined petroleum products (23)	209	.8	.6	30.8
Tobacco products (16)	128	.5	1.1	85.3
Mining of metal ores (13)	120	.5	9.4	81.4
Motor vehicles (34)	102	.4	1.3	70.3
Medical, optical instruments, watches and clocks (33)	98	.4	4.8	78.1
Paper and paper products (21)	80	.3	4.2	81.7
Publishing and printing (22)	36	.1	4.0	72.2
Other mining and quarrying (14)	34	.1	11.8	92.7
Recycling (37)	0	.0	5.1	89.4
Electricity, gas, steam and hot water (40)	0	.0	2.4	54.3
Collection, purification and distribution of water (41)	0	.0	7.5	78.0
Exports other than industrial exports	2618	9.9		
Total	26485	100.0		

Sources: the *Enterprise Survey* Data 2004; Jenkins (2004); the UN Comtrade System
Notes: [*1] Between parenththeses are the VSIC codes at the two digit level.
[*2] Employment coefficient reflects the number of workers needed to produce one billion VND worth of goods. Follwing Jenkins (2004), output for apparel (18) and Footwear and leather products (19) are multiplied by 2.5 and by 2 respectively, assuming that the gross output recorded in the *Enterprise Survey* data refers not to the value of the products but to the processing costs. Without this adjustment, the employment coefficients for apparel (18) and footwear and leather products (19) are 13.7 and 11.4 respectively.

Appendix Table 4.A.5. Evolution of Industrial Employment by the VSIC Sub-sectors (1,000s)

	2000	2001	2002	2003	2004	2005	2006	2007
Apparel, textiles (17, 18)	355	394	509	602	666	700	789	901
Footwear, leather products (19)	297	332	397	472	518	551	582	615
Furniture, wood, manufact. n.e.s. (20, 36, 37)	129	157	203	257	329	376	435	483
Food products (15, 16)	280	311	358	392	425	442	454	478
Electronics, machinery, transport equipment (29-35)	153	183	221	253	287	319	370	440
Metal, non-metallic mineral products (26, 28)	179	206	248	287	332	350	378	418
Basic manufacturing (21, 22, 23, 27, 40, 41)	161	175	195	211	245	250	297	316
Chemical, rubber, plastic products (24, 25)	117	127	153	170	195	204	227	253
Mining (10, 11, 13, 14)	153	129	155	163	166	178	180	186
Total	1823	2014	2441	2807	3162	3370	3711	4091

Appendix Table 4.A.6. Evolution of Industrial Employment by Regions (1,000s)

	2000	2001	2002	2003	2004	2005	2006	2007
HCMC	485	547	672	742	836	869	879	918
Southeast[*1]	300	359	478	586	702	782	916	1041
Hanoi	163	178	210	235	248	267	275	291
Red River Delta[*2]	248	255	305	381	427	466	545	637
Northeast	171	173	200	214	238	244	265	298
Northwest	7	8	10	14	14	15	17	19
North Central Coast	58	66	75	85	91	93	103	114
South Central Coast	122	137	160	183	207	215	234	253
Central Highlands	26	31	35	40	43	46	47	51
Mekong River Delta	127	139	170	199	224	249	290	332
Others	115	122	126	128	131	125	140	138
Total	1823	2014	2441	2807	3162	3370	3711	4091

Source: the *Enterprise Survey* Data 2000-2007 (GSO)
Notes: *[1]The Southeast region excludes HCMC.
*[2]The Red River Delta region excludes Hanoi.

Appendix Table 4.A.7. Summary Statistics

	Total			Unskilled			Skilled		
	2002	2004	Change 2002-2004	2002	2004	Change 2002-200	2002	2004	Change 2002-2004
Personal Characteristics									
Number of Obs.	1746	1746		1049	1049		669	669	
Female (%)	.36	.36		.30	.30		.47	.47	
	(.48)	(.48)		(.46)	(.46)		(.50)	(.50)	
Minority (%)	.073	.073		.064	.064		.090	.090	
	(.26)	(.26)		(.24)	(.24)		(.29)	(.29)	
Education (years)	9.25	9.38		7.12	7.18		12.45	12.68	
	(4.23)	(4.26)		(3.56)	(3.55)		(2.90)	(2.85)	
Potential Experience (years)	18.63	20.45		18.08	19.96		19.43	21.16	
	(10.26)	(10.32)		(10.62)	(10.68)		(9.75)	(9.83)	
Married (%)	.68	.71	.024	.61	.64	.028	.79	.81	.019
	(.47)	(.45)	(.20)	(.49)	(.48)	(.21)	(.41)	(.39)	(.19)
Urban (%)	.40	.40		.29	.29		.56	.56	
	(.49)	(.49)		(.45)	(.45)		(.50)	(.50)	
Monthly wage (VND 1,000)	729.80	922.30		570.14	694.35		964.73	1249.99	
	(583.09)	(715.22)		(409.13)	(503.25)		(720.01)	(846.15)	
Log monthly wage	13.26	13.49	.23	13.04	13.24	.20	13.58	13.85	.27
	(.70)	(.72)	(.51)	(.67)	(.67)	(.56)	(.63)	(.63)	(.43)
Province-specific Characteristics									
Number of Obs.	61	61	61						
Export Index	2.35	2.93	.59						
	(4.76)	(6.10)	(1.44)						
US tariff cut measure			.45						
			(.87)						
Skilled/unskilled ratio	1.74	1.94							
	(.72)	(.88)							
Log of skilled/unskilled ratio	.48	.59	.10						
	(.37)	(.37)	(.22)						

Notes: Between parentheses are the standard deviations.

Figure 4.1. Evolution of Vietnam's Exports to the United States ($ million)

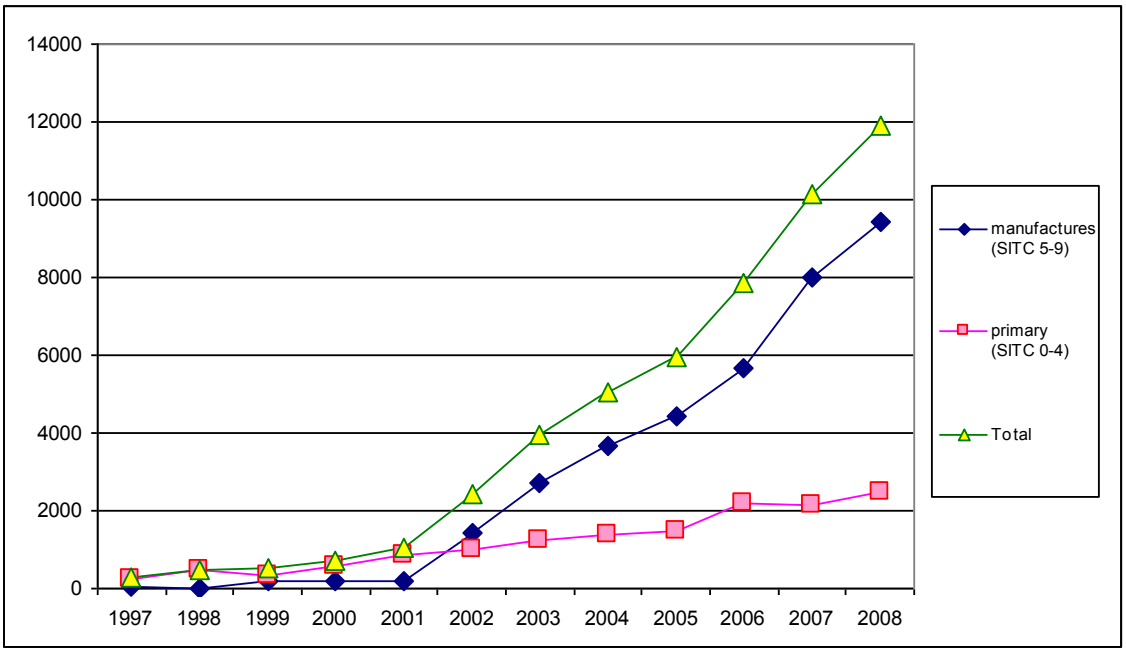
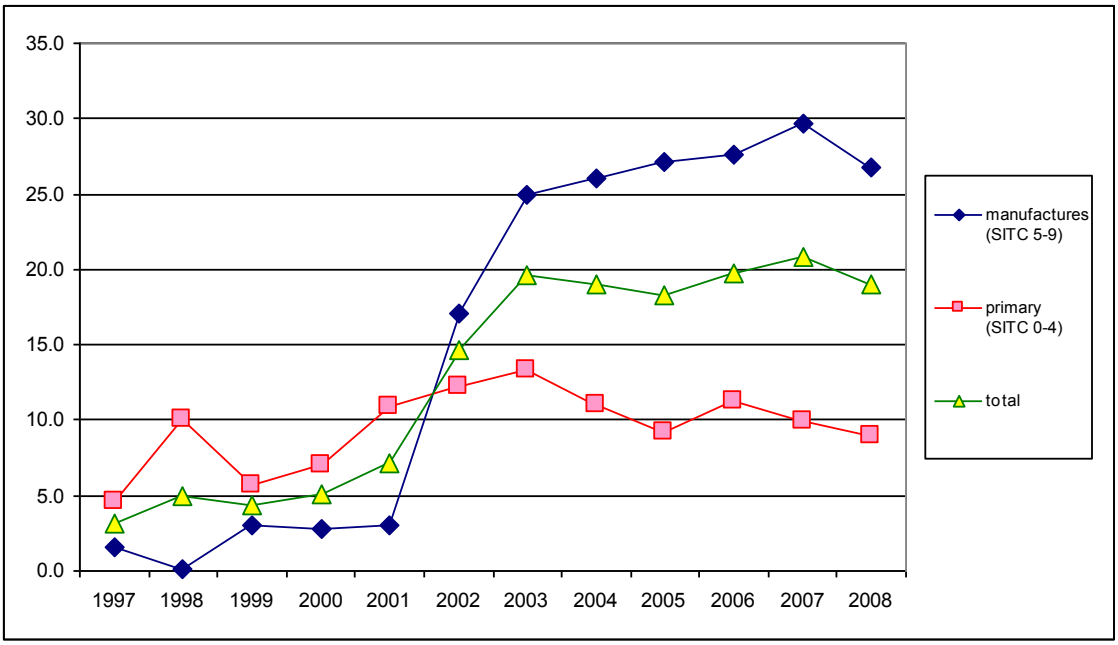
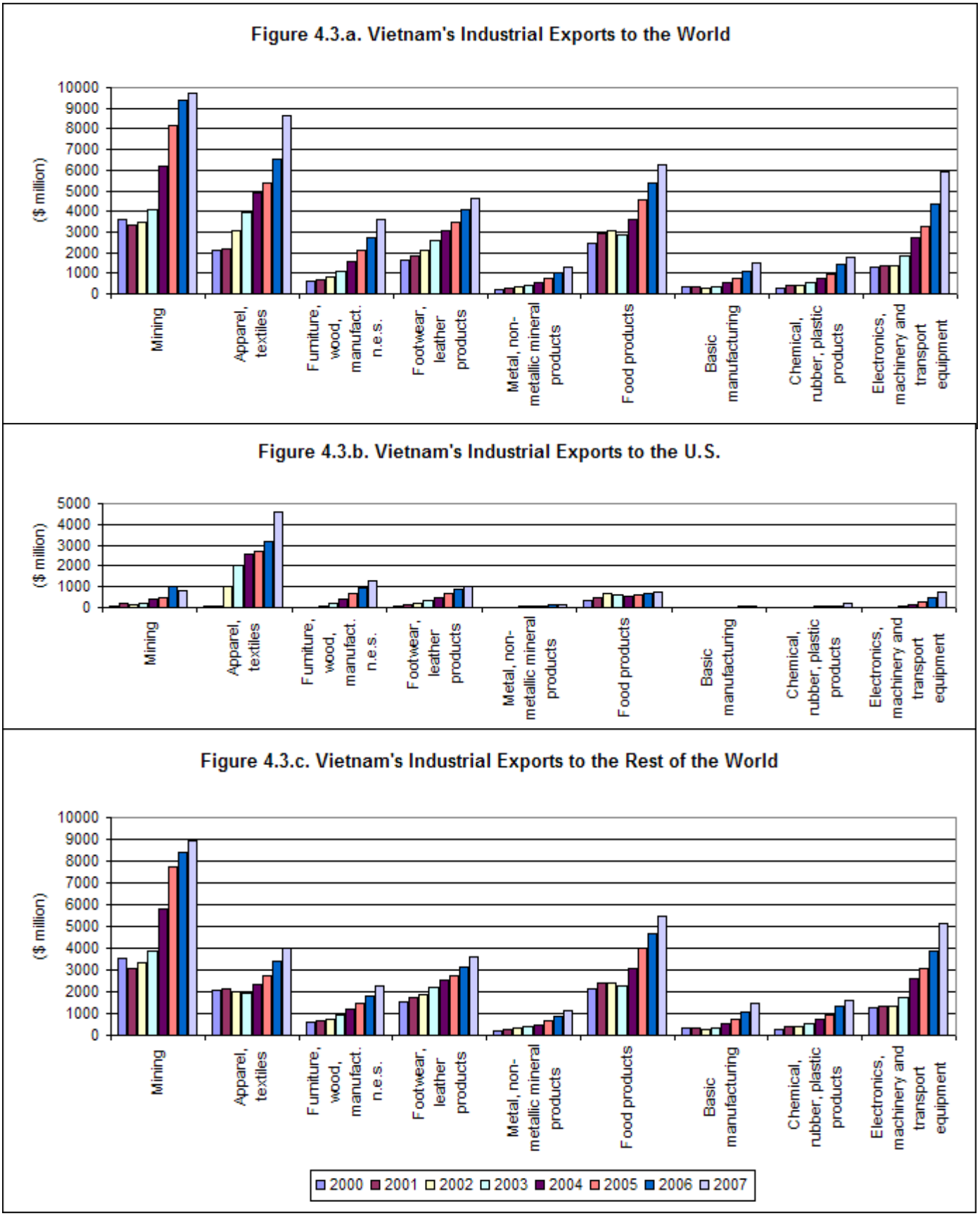


Figure 4.2. Share of the United States in Vietnam's Total Exports (%)



Source: the U.N. Comtrade System



Source: Author's calculation based on the U.N. Comtrade System and the *Enterprise Survey* data.

Figure 4.4.a. Employment Embodied in Vietnam's Industrial Exports to the World

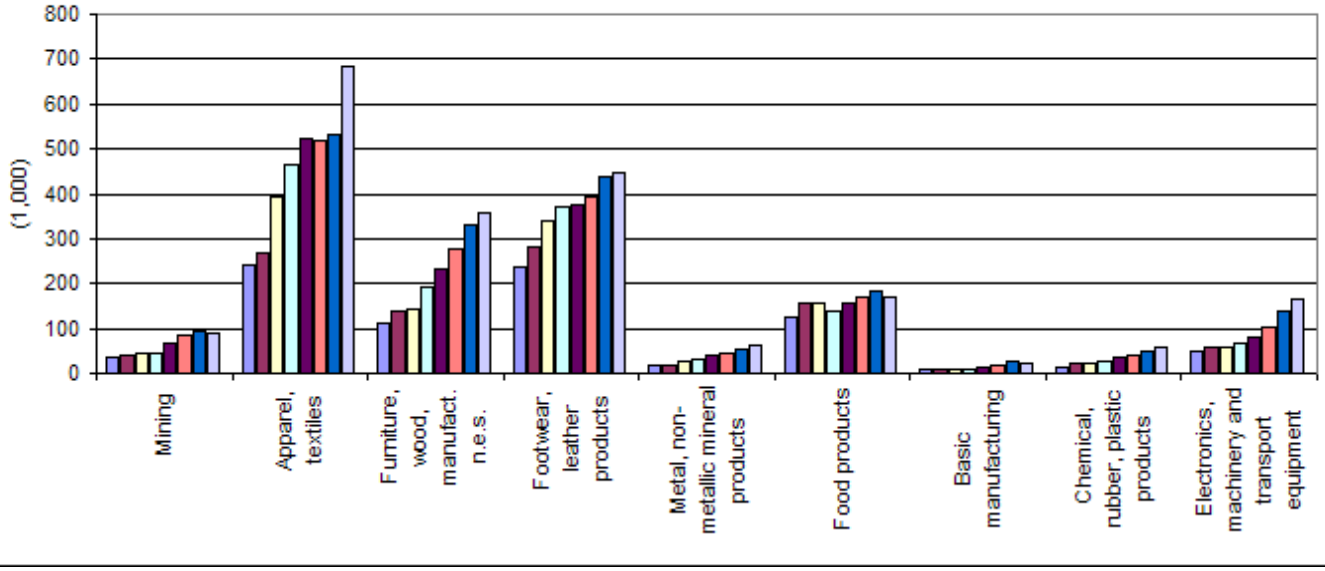


Figure 4.4.b. Employment Embodied in Vietnam's Industrial Exports to the U.S.

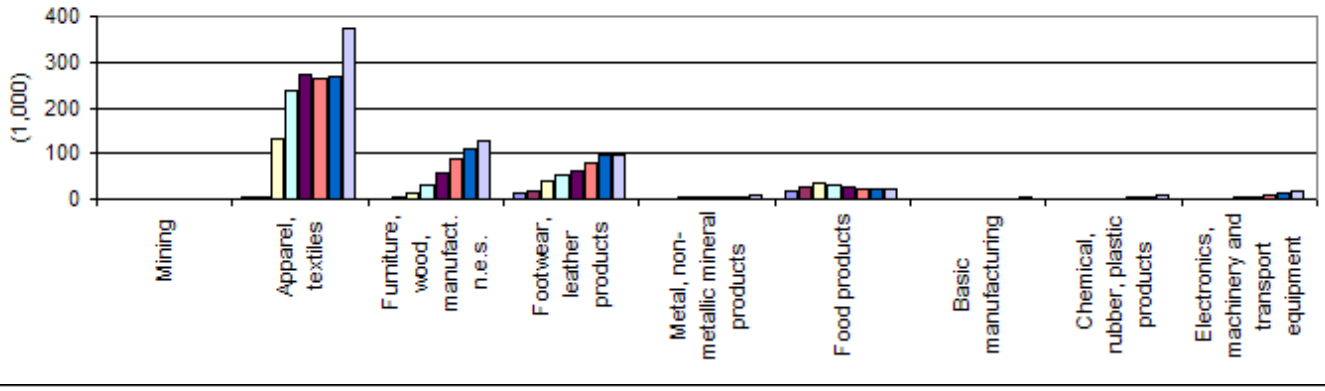
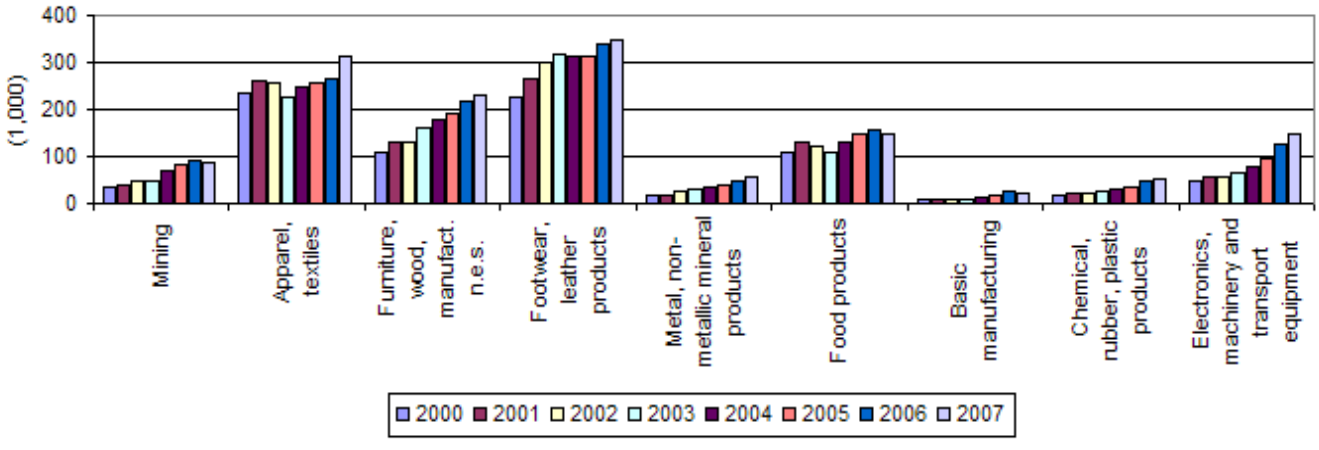


Figure 4.4.c. Employment Embodied in Vietnam's Industrial Exports to the Rest of the World



Source: Author's calculation based on the U.N. Comtrade System and the *Enterprise Survey* data.
Notes: the employment coefficient was calculated dividing the number of workers by gross output.

Figure 4.5. Evolution of Vietnam's Industrial Employment (1,000s)

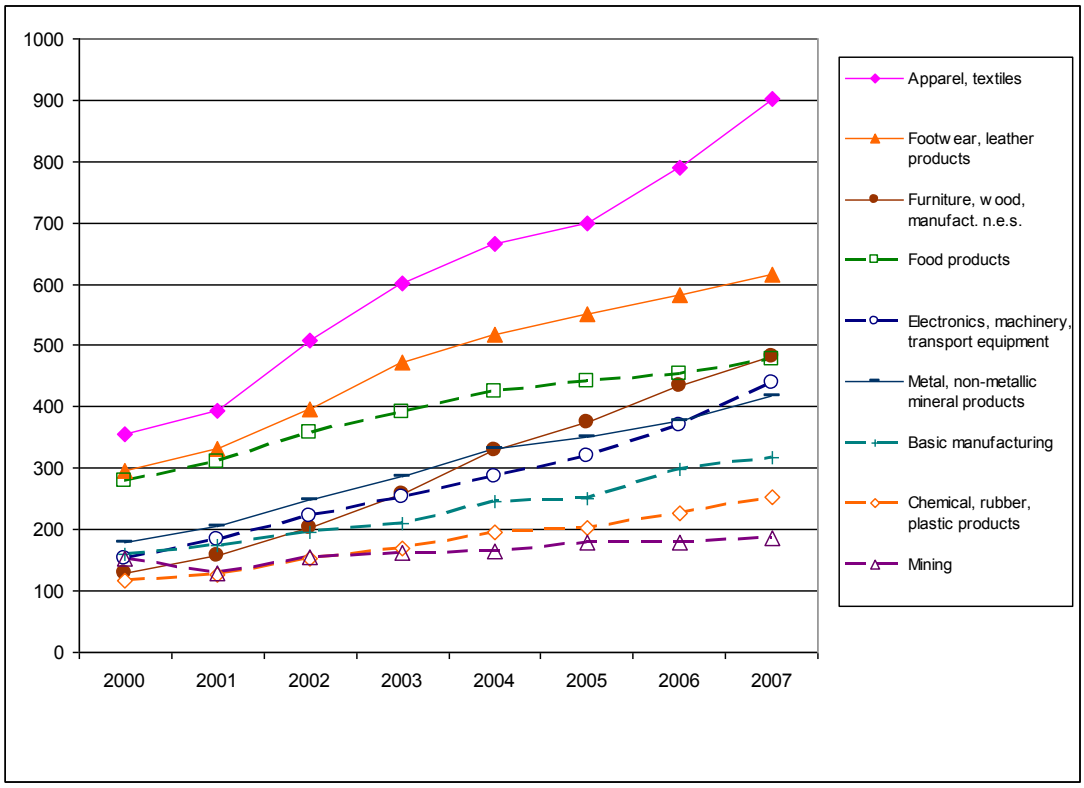
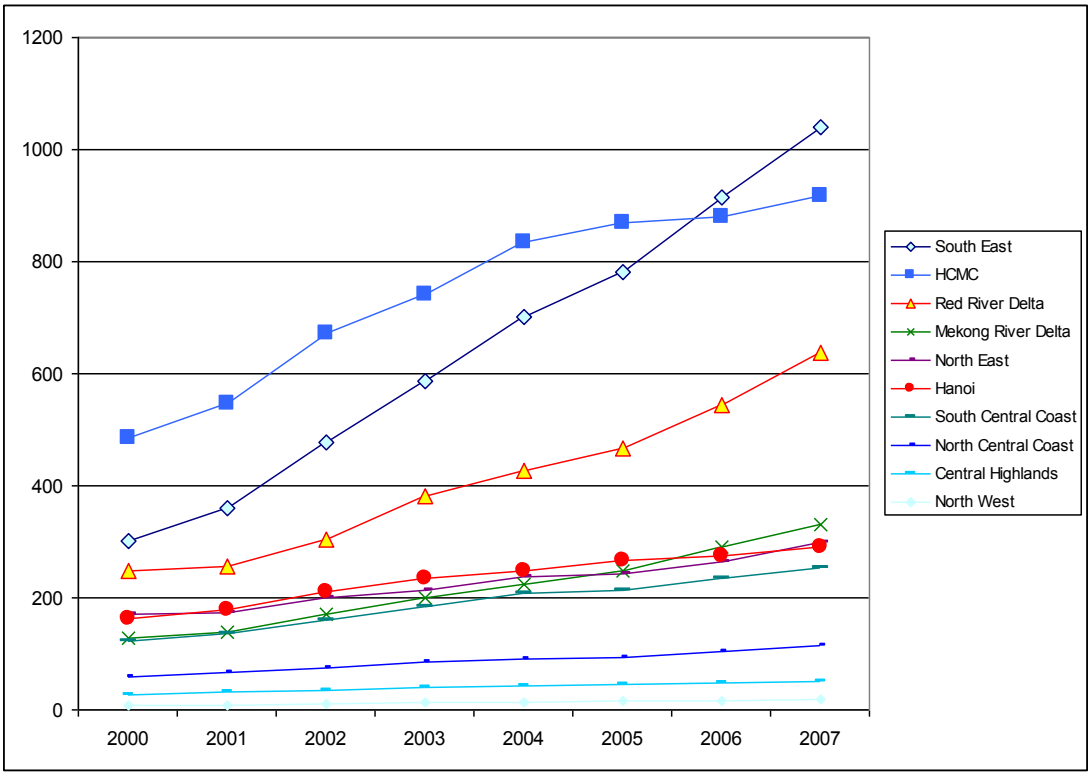


Figure 4.6. Vietnam's Industrial Employment by Regions (1,000s)



Source: the *Enterprise Survey* Data

Figure 4.7.a. Proportion of Workers Employed in Labor-intensive Industries in Total Industrial Employment[*1] (%)

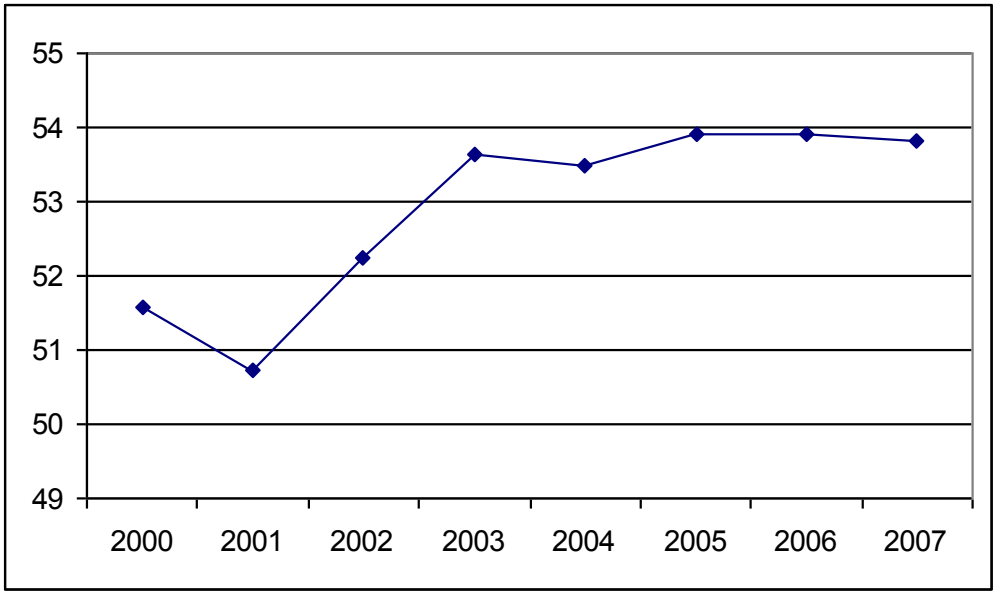
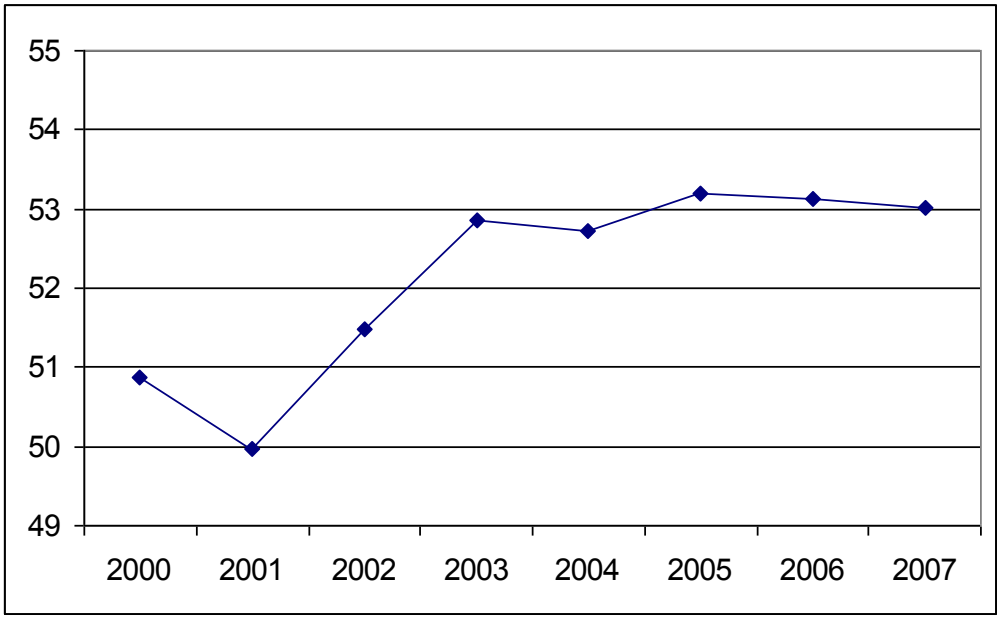


Figure 4.7.b. Proportion of Workers Employed in Unskilled-labor-intensive Industries in Total Industrial Employment[*2] (%)



Source: the *Enterprise Survey* Data (GSO); GSO, 2000.
Notes: [*1] The industries whose employment coefficients are 6.5 or above in 2004 are classified as labor-intensive industries (see Appendix Table 4.A.4 for the employment coefficients).
[*2] The industries whose proportion of production workers is 85.7 or above in 1998 in the *Industrial Survey* (GSO, 2000) are referred to unskilled-labor-intensive industries (see Appendix Table 4.A.4 for the proportion of production workers.

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