

The Impact of the Introduction of Foreign Labor

on the Thai Economy

by

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List of Abbreviations

ADF	Augmented Dickey-Fuller
ARCH	Autoregressive Conditional Heteroscedastic
ARDL	Autoregressive Distributed Lag
ASEAN	Association of Southeast Asian Nations
BOI	Board of Investment
CFI	Comparative Fit Index
CGE	Computable General Equilibrium
CRS	Constant Returns to Scale
CUSUM	Cumulative Sum
CUSUMSQ	Cumulative Sum of Squares
DF-GLS	Dickey-Fuller Generalized Least Squares
DOE	Department of Employment
EEC	Eastern Economic Corridor
ESDA	Exploratory Spatial Data Analysis
FDI	Foreign Direct Investment
FE	Fixed Effects
FWAO	Foreign Workers Administration Office
GDP	Gross Domestic Product
GNI	Gross National Income
GPP	Gross Provincial Product
GRP	Gross Regional Product
HAC	Heteroscedasticity and Autocorrelation
HCR	Headcount Ratio

ILM	International Labor Migration
ILO	International Labor Organization
IOM	International Organization for Migration
LISA	Local Indicators of Spatial Association
LM	Lagrange Multiplier
MOU	Memorandum of Understanding
NCIWA	National Committee on Illegal Worker Administration
NCP	National Competitiveness Plan
NEC	Northern Economic Corridor
NEG	New Economic Geography
NESDB	National Economic and Social Development Board
NESDP	National Economic and Social Development Plan
NIC	Newly Industrialized Country
NSO	National Statistical Office
NV	Nationality Verification
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
OSSC	One Stop Service Center
PP	Phillips-Perron
RE	Random Effects
RESET	Regression Equation Specification Error Test
RMSEA	Root Mean Square Error of Approximation
SBC	Schwartz Bayesian Criterion
SEC	Southern Economic Corridor
SEZ	Special Economic Zone
SLS	Stage Least Square

SRMR	Standardized Root Mean squared Residual
TLI	Tucker-Lewis Index
UK	United Kingdom
UN	United Nations
UNFPA	United Nations Population Fund
US	United States
VAR	Vector Autoregressive
ZA	Zivot and Andrews

CHAPTER 1 INTRODUCTION

1.1 Problem statement

International labor migration (ILM) has become an important phenomenon in the worldwide economy during the past decades, in which immigration flows have generated political and economic concerns over their unavoidable socio-economic impacts in the receiving countries.¹ According to the International Organization for Migration (IOM), globally, the estimated total number of international migrants has increased during the last two decades, from 150 million in 2000 to around 272 million in 2019. The significant increase of this migratory trend has been encouraged by the process of globalization and regional economic integration, which in turn has contributed to proliferating mobility and to diminishing barriers across countries. Income disparities, economic expansion, and a decrease in population growth rate are the major drivers of immigration, while labor market malfunctions, unemployment, and political instability are the push factors for emigration.

In Thailand, although the country itself is regarded as developing country, its fast-growing economy since the mid-1980s due to the country's structural transformation from an agricultural to an industrial based have come hand-in-hand with a rapid increase of immigrants, particularly from its neighboring countries in the Southeast Asian region – Myanmar (from where almost 90% of immigrants are from), Lao PDR, and Cambodia. As a consequence, the majority of immigrant workers from these countries are entering Thailand illegally, and comprised around 2-3 million of the estimated total number of illegal migrants in Thailand in the late 1990s (Manning and Bhatnagar, 2004; Chantavanich and Jayagupta, 2009). This cross-

¹ In this study, the term “labor migration” refers to migration for employment. According to the ILO Convention on Migration for Employment 1949 (No. 97) in its Article 11, “migration for employment means a person who migrates from one country to another with a view to being employed otherwise than on his own account and includes any person regularly admitted as a migrant for employment.”

border immigration influx is mainly based on widening wage disparities between Thailand and its neighbors (Pholphirul, 2012; Pholphirul and Kamlai, 2014).

Regardless of the large-scale immigration, the increase of foreign workers in Thailand, where most are considered low-skilled workers, has led to growing concern over its effects on productivity growth and the native labor market. Recently, Thailand has confronted the new challenge of the so-called “middle-income trap,” an economic development situation in which the country is trapped between the competitive edge of low wages among developing countries and the high value-added markets of more developed economies.² This is mainly due to low private investment and productivity growth rates. In order to avoid this situation, Thailand needs to make a transition from intensive labor-driven growth or resource-based production that mostly relies on cheap and low-skilled labor, to an innovation-driven growth or knowledge-based economy, which places more emphasis on high productivity and innovation from advanced skilled workers (Jitsuchon, 2012). Therefore, the Thai government has recently implemented a long-run economic development plan called “Thailand 4.0” under a 20-year national strategic plan (2018-2037), focusing on improvement of human resources, technologies, and investment in R&D and infrastructure, as well as high productivity and innovative creation from skilled foreign workers.³

Furthermore, in recent years, Thailand has been confronted with the challenges of an ageing population. The declining fertility rates, accompanied by the demographic transitions and their consequences, have led to a reduction in the supply of labor in Thailand, constituting the possible risk of insufficient workforce in the next few years. This will have substantial impacts not only for sustainable economic development but also for the equilibrium of the labor

² For more empirical definitions of the middle-income trap, see, for example, Jitsuchon (2012); Im and Rosenblatt (2013); Kanchoochat (2014); Gill and Kharas (2015); and Glawe and Wagner (2016).

³ For more details regarding Thailand 4.0, see Jones and Pimdee (2017).

market in the country, where employers and industries will need to replace local or native workers with persons of foreign origin. This perception has made Thailand a major immigrant destination in the region, attracting mostly immigrants from less developed economies from its neighboring countries. Nevertheless, the immigrant inflow into Thailand over the past two decades has made labor migration, and policy related to immigration, a major public issue in the country.

Increased immigration in Thailand over the past two decades has affected not only the country's labor market but also, inevitably, the multiple dimensions of immigrant social exclusion. Immigration increases the labor supply in the migrant-receiving economy, preventing labor shortage in the host country due to demographic change or population transition. Meanwhile, the inflow of migrant workers within a short period of time increases public concerns and attitudes towards their existence. The public are concerned that immigrants may compete with native workers for the existing jobs or take jobs away from natives, reduce the employment opportunities of domestic employees, depress wage rates in the host country's labor market, and also financially burden the government from their use of common-pool resources and several other social service programs.

This, therefore, puts Thailand in the dilemma of continuing to capitalize on the surplus of low-skilled labor supply from its neighbors or dramatically changing policies and practices to encourage private investments in new innovation and technology, as well as attract more high-skilled labor from other countries. Also, the decision to invest in new, high-cost technology could be offset by the structural dependence on low-skilled immigrants, together with the availability of those workers from the neighboring countries who often receive wages below the minimum level required by law. In other words, employers tend to exploit cheap immigrant workers rather than invest in expensive equipment and infrastructure to increase more productivity.

Productivity by definition means the effectiveness of productive effort, and is measured in terms of the output per unit of input. It is also a measurement of human capital and the state of economic well-being. The impact of the introduction of foreign labor on productivity in Thailand, however, is still unclear. It could be the case that some groups of native workers could be perfectly substituted by migrant workers; for instance, low-skilled migrants substituting unskilled natives, resulting in a supply shift of labor force and an overall decrease in labor productivity due to a decrease in native wages. In contrast, there may be an increase in overall labor productivity when high-skilled natives are complemented by low-skilled immigrants (for further explanation of this theoretical assumption, see Chapter 6). This assumption has, to varying degrees, led to new attention to understanding the relationship between immigration and productivity in Thailand.

Notwithstanding the prevalent belief that immigration affects productivity, the potential negative impacts of immigration on labor market outcomes, particularly on native employment, remain doubtful. Most empirical studies focusing on the labor market effect of ILM conclude that immigration, with some small exceptions, does indeed reduce the wages and employment opportunities of native workers, even though this effect seems to be very small (Borjas, 1987, 2003; Altonji and Card, 1991; Friedberg and Hunt, 1999; Card, 2001, 2005; Dustmann et al., 2005). However, since such studies were conducted mainly in the US and other developed countries, their applicability to developing countries such as Thailand is questionable. While research on the labor market impact of immigration has been concentrated on the context of developed countries, the systematic evidence in developing countries is very limited and, to some extent, has not yet been measured. Therefore, more studies on the economic impacts of ILM on a developing country are needed in order to fill this gap and enrich our understanding.

While studying the impact of the introduction of foreign labor on the Thai economy as a whole is important, understanding the economic impact of migrant workers across Thai regions should not be ignored, since a widespread perception of Thailand's economic growth

process is the presence of wide income disparity and inequality across Thai regions. Accordingly, the essential argument for the economic growth process in Thailand is that balanced regional development should be a prerequisite for increased competitiveness and social cohesion within the country. Income disparities and convergence in Thailand and its regions therefore remain an important study area, as this knowledge could further support the effective implication and development of Thai regional growth policies, particularly the pilot project (i.e. Eastern Economic Corridor or EEC project) under the Thailand 4.0 plan.

The impacts of the introduction of foreign labor on the Thai economy and society could have been conditioned by the late reaction from the government. The lack of concrete policy, ineffective legal framework, and inefficient migrant management have allowed long-term illegal foreign workers to continually cluster in some productive sectors (Vasuprasart, 2010). For example, even though the Labor Protection Act provides a broad range of coverage for all types of workers regardless of their nationality and status, there are some occupational sectors such as agricultural, fishery, and domestic workers, aside from the purview of the law. In most cases, migrant workers are restricted from forming trade unions, bargaining for their wages, or even changing their employers. The weak law enforcement for employers, at the same time, has further aggravated immigrants' situation. As a result, they have to accept lower wages than the minimum stipulated by law, creating discrimination and widening the wage gap. Without a doubt, these must impact on the labor market.

In recent years, the Thai government has attempted to deal with this problem more rigorously to reduce the number of illegal migrant workers. However, without adequate empirical research and statistical analysis on international labor migration, the government lacks theoretical groundwork and statistical evidence on which to set up its clearly defined policies on international labor management.

1.2 Objectives of the study

According to the above-mentioned problems, there is paramount significance to studying the impacts of the introduction of foreign labor on the Thai economy. Since the vast immigrant-receiving countries are mostly the developed ones, the study of Thailand, which is generally considered a developing country, has represented a distinct case study for rigorously examining the socio-economic roles of migrant workers. The major purpose of this study is to attempt to use the most suitable and available sources of data for Thailand to construct econometric models that can help evaluate the effects of immigration on the Thai economy from a holistic perspective. Moreover, whilst there has been a rise in public debate over the possible negative impacts of immigration, the current study can provide a comprehensive picture of such concerns based on statistical data and empirical evidence rather than opinion. Nevertheless, to achieve this particular objective, a wide range of issues, at both theoretical and empirical levels, need to be addressed.

There are therefore five main objectives to this research. The *first objective* is to indicate the potential trends and characteristics of immigration in Thailand and identify measures to tackle potential problems. The *second objective* aims to examine a causal relationship between immigration and two macroeconomic indicators, i.e. economic growth and unemployment. In other words, this objective will identify whether or not, and to what extent, immigration in Thailand causes economic growth and/or unemployment, or vice versa. To support the second objective, the *third objective* aims to investigate the determinant factors that cause the inflow of migrant workers and the extent to which migrant workers affect the Thai labor market, by explicitly identifying both indirect and reciprocal or feedback effects involved in immigration patterns in Thailand.

The role of national policy initiatives of the 20-year national strategic plan, including the Special Economic Zones (SEZs), Economic Corridors, and Thailand 4.0, can be discerned in the effort to create a knowledge-based economy, reduce economic disparities between

regions in Thailand, and attract both private and foreign investment at the regional level, after the country has been faced with the challenge of the middle-income trap and the significant decline in fertility rate. Owing to a lack of studies on Thailand which recognize the importance and role of space and geography in explaining the country's regional development, the dissertation's *fourth objective* aims to show how regional differences affect migration patterns and regional economic growth in Thailand. Employing the findings of the fourth objective, the *fifth objective* then aims to examine the impact of immigration on economic outcomes in different regions of Thailand. Specifically, I will analyze the effect of labor migration on production inputs (i.e. skilled-classified migrant workers, and the stock of physical capital), and labor productivity (i.e. total factor productivity and skill-specific productivity).

In order to achieve these five objectives, the following five major research questions, with several sub-research questions, are addressed accordingly:

1. What are the current trends and characteristics of immigration in Thailand and what measures might be appropriate to address these?
 - 1.1 How do changing immigration patterns impact on the social and economic structures of Thailand?
 - 1.2 How do current immigration policies affect migration flows?
2. What are the causal relationships between immigration and two macroeconomic indicators, namely economic growth and unemployment, in Thailand?
 - 2.1 Does the foreign labor force have an influence on macroeconomic indicators, measured by unemployment rate and economic growth, in Thailand?
 - 2.2 Do macroeconomic variables have an influence on the inflow of migrant workers?
3. What are the determinant factors that can explain the growth of immigration and the extent to which migrant workers affect the Thai labor market?
 - 3.1 How does immigration affect Thailand's labor market?

- 3.2 What factors cause the inflow of migrant workers to Thailand?
4. How do the characteristics of each region affect migration patterns and regional economic growth in Thailand?
 - 4.1 Is there economic disparity in Thailand and its regions?
 - 4.2 What are the spatial patterns of immigration and how are they related to regional economic outcomes in Thailand?
5. What are the effects of international labor migration on regional economic growth in Thailand?
 - 5.1 Does immigration have an impact on the growth of the regional economy as well as labor productivity?
 - 5.2 How does the level of professional training of migrant workers affect the growth of the regional economy and labor productivity?

1.3 Research methodology

This research employed mixed methodology with a dominance of quantitative research methods to answer the five main research questions.

In order to address the first research question, a literature survey on previous studies related to ILM in the historical, social, and political context of Thailand will be used to document the history, patterns, and challenges of labor movement as well as to identify strengths and weaknesses of the existing laws and regulations concerning migration and immigration policies in Thailand. The study will mainly focus on migration patterns and potential changes in patterns of migrant workers, the direction of Thailand's economic development and the role of immigrants, and their policy challenges which affect the inflow of migrant workers.

Although the international movement of labor, which plays a role in both the sending and host economies, is well researched, only a few empirical studies exist in the literature,

particularly in the context of Thailand. The major purpose of most empirical studies in economics and other social sciences is to determine whether a change in a single variable can cause a change in, or help to predict, another variable. Taking a more systematic approach, I adopted an Autoregressive Distributed Lag (ARDL) bounds testing methodology developed by Philips (2018) and ARDL models to explore the causal relation between labor immigration and the two macroeconomic variables of unemployment and economic growth both short- and long-term in Thailand. Additionally, to confirm the existence of such a causal relationship, the Granger causality test was applied to address the second research question (a further explanation for each method is provided in Chapter 3).

Extending from the second research question, this study also takes an interest in the interdependency between immigration and changes in a migrant-receiving country's labor market, raising the third research problem of whether or not, and to what extent, immigrant workers would affect and be affected by Thailand's labor market. Although there are several empirical studies of the impact of immigration on the labor market in both developed and developing economies, most of these have adopted single-equation models and applied single-equation techniques (e.g. linear regression, logistic regression, multiple regression, and factor analysis), whereby a number of explanatory variables are employed to predict a dependent variable, in this case immigration. In general, these models often ignore any possible causal relationships among the variables, thus omitting the indirect effects of those explanatory variables on immigration. Besides, they disregard the possibility of reverse effects or reciprocal relationships between immigration and the constituent variables in the labor market. Therefore, this study develops a path model and a simultaneous equations model by following Cadwallader's (1985) model of migration and using the most recent quarterly Thai data from 2007 to 2019, in order to address these gaps.

For the fourth research question – How do the characteristics of each region affect migration patterns and regional economic growth in Thailand? – the main research question is

divided into two additional sub-questions. These are to study whether there is a presence or absence of income convergence in Thailand and its regions (or whether backward or poor regions are able to catch up with more developed or rich regions within the country), and to identify the spatial patterns of immigration and regional economic outcomes in Thailand. Therefore, to address these questions, I conducted classical convergence (both beta and sigma convergence) and multiple club convergence analysis for 77 Thai provinces covering the 23 years from 1995-2017, in order to identify the regional income convergence both on average and beyond the average. Moreover, since the regional growth process can be influenced by spatial dependence, exploratory spatial data analysis (ESDA) developed by Anselin (1995) and Anselin et al. (2017) was applied to identify the spatial patterns of immigration and regional economic outcomes in Thailand (a further explanation of each analysis is provided in Chapter 5).

After analyzing how the role of location and space affects the patterns of immigration and regional growth process in Thailand, the last research question, addressing the impacts of immigration on regional economic growth, is then explored. To achieve the fifth research objective, I estimated the impact of migrant workers classified by skill types on economic output and productivity, in which the production function was applied using the pooled time-series cross-section (or panel data) estimation for the annual data from 2003 to 2015. The analysis was performed across different regions of Thailand. This regional breakdown further indicates the feasibility of examining the impact of economic growth in regions that are often assumed to be the geographical units of immigration in a regional development study. Therefore, by providing estimates for the regional level in Thailand, this study offers useful input to the Eastern Economic Corridor (EEC) under the national Thailand 4.0 policy as well as other regional development projects in the future.

1.4 Significance of the study

The study aims to enhance understanding of current discussions of the impact of the introduction of foreign labor on destination countries. Although there are fruitful studies in the development and labor economics fields regarding the impact of immigration on the host countries, only a few have been conducted in developing countries, particularly in Southeast Asia. Also, notwithstanding a wealth of relevant studies on the impact of immigrants in terms of social and political issues, few studies from an economic perspective are available. Furthermore, there are some inconsistencies within these previous studies, regarding whether or not immigration actually has a significant impact on the labor market of receiving countries.

By focusing on the receiving country's economy as a whole and using a more systematic approach, this study aims to tackle the overall economic concerns of immigration, and therefore expects to give a better view as well as a statistical examination of the possible impact of the introduction of foreign labor on different economic outcomes. Given that there is a paucity of research on the effect of immigration on economic growth in the long run, and especially in the case of developing countries, this study makes a contribution to addressing this gap by conducting such an investigation. More specifically, the study of how immigration impacts on economic growth at the regional level is important. According to the first law of geography developed by Tobler (1979), which states that "everything is related to everything else, but near things are more related than distant things", interactions among contiguous regions are relevant as no region in an open economy is isolated. Exchanges of information, communication, technology, and products have continuously taken place. Moreover, knowledge transfer, technology diffusion, and labor migration both internally and internationally testify that economies are actually related or spatially dependent on each other. Therefore, this study takes into account the significance of geography and spatial spillover in the process of regional economic growth.

As the existing body of literature on the relationship between the introduction of foreign labor and receiving countries is dominated by studies carried out in developed countries such as the US and other European countries, this study expects to extend the literature and add more evidence to this field. Additionally, by not only carrying out a rigorous quantitative analysis but also by thoroughly reviewing qualitative evidence, this study will provide better understanding of the introduction of a foreign labor force in the context of Thailand.

Finally, as a result of the country's transition from agricultural-based to export-oriented, Thailand's dependence on immigrant workers is structural. It continues to rely heavily on some sectors, such as agriculture, fisheries, manufacturing, and construction. However, although the management of ILM requires an explicit and effective policy response from the government, the attempt to efficiently manage and regulate immigrant workers seems to be ad hoc and reactive. Without adequate evidence from empirical studies and statistical information, the government lacks theoretical groundwork on which to base its immigration policies. Therefore, in addition to the practical contributions, this study aims to provide the government and the public with a comprehensive picture of the ways in which the introduction of a foreign labor force impacts the Thai economy. The study will shed light on immigration and its effects based on the statistical data rather than individual opinion. This information is also useful for policymakers and scholars to take appropriate measurements and results to encourage more positive contributions from labor migration, to deal with its negative impacts, and to make recommendations for the better management of migrant workers, as well as the improvement of immigration legislation and policy.

1.5 Dissertation structure

The dissertation is organized into seven chapters, with four main analytical chapters. The first chapter provides a brief introduction and general background to this study, as well as the research objectives and significance.

Chapter 2 reviews the relevant literature and presents an overview of previous and current studies concerning ILM, the historical context of immigration, and migratory legislation and policies on ILM in Thailand. Relevant studies regarding determinants of or factors in foreign migrants' decision to migrate, their cycle, trends, and the challenges of migration are also discussed in order to understand the whole picture of ILM in Thailand and to identify the relevant economic variables for the analysis of the subsequent chapters.

Chapters 3 and 4 answer the second and third research questions respectively. Chapter 3 provides a preliminary analysis of immigration and its effects in the Thai economy by exploring the causal relationship between the introduction of a foreign labor force and two significant indicators of macroeconomics, unemployment and economic growth in Thailand. Chapter 4 focuses on the determinant factors that attract migrant workers and their effects on the Thai labor market, bearing in mind the major concerns regarding the use of single-equation models in most migration studies. In both chapters, the detailed econometric methods conducted in empirical analyses, and the results, are explained and discussed accordingly.

Chapter 5 recognizes the regional differences in explaining regional development in Thailand, and estimates the spatial characteristics and dynamics of immigration and macroeconomic outcomes across Thai regions using classical convergence, club convergence analysis, and exploratory spatial data analysis (ESDA). The methods of data analysis and construction of variables, as well as the research findings, are also explained in detail.

Given the significant role of geography and space in explaining regional economic growth and immigration in Thailand, Chapter 6 illustrates explicitly the economic structural change and the expansion of ILM in Thai regions. It investigates the regional macroeconomic impact of ILM through an estimation of the production function. Moreover, this chapter measures the effects of migrant workers' skill structure on regional economic growth and productivity, concerning the new economic development policy, the Thailand 4.0 and Eastern

Economic Corridor (EEC) project. Lastly, this chapter provides significant input to policymakers and suggests a useful immigration improvement policy.

By means of conclusion and policy implications, Chapter 7 gives a summary of lessons learned from the past (Chapter 2) along with the key findings and contributions of the study (Chapters 3 to 6) to speculate on the future of ILM in the context of Thailand. More importantly, this chapter also provides policy recommendations to encourage more positive economic outcomes from the impact of ILM, and considers the limitations of the study as well as some suggestions for future research.

CHAPTER 2 CHANGING DYNAMICS AND EMERGING CHALLENGES OF INTERNATIONAL LABOUR MIGRATION IN THAILAND

2.1 Introduction

The admittance of labor force from abroad is considered by some scholars an additional source for addressing imbalances in labor supply and demand necessary for the host economy, but is considered by others a considerable threat to the residents. For over a century, foreign labor force has switched from being just a point of view to a reality in most countries throughout the world, though still not yet all. Nevertheless, in many countries, particularly in the developing world, it has become a new phenomenon and challenge to manage. For those countries that have already faced it, never before has there been such doubt and challenge.

Before moving ahead, it is essential to specify what is meant by migration. So far, there has been no specific universal definition of this term. A previous analytical review of the literature suggested that definitions of migration are usually conflated. The term “migration,” as used by scholars and researchers, is intended to express three main subjects: a human movement, an involvement of two particular areas, and a purpose. The two different examples of the definition of immigration which integrate these subjects are given below:

“Migration is the movement of a person or a group of persons, either across an international border (international migration), or within a State (internal migration). It is a population movement, encompassing any kind of movement of people, whatever its length, composition and causes; it includes migration of refugees, displaced persons, economic migrants and persons moving for other purposes, including family reunification.” (IOM, 2011)⁴

⁴ For other key migration terms, see <https://www.iom.int/key-migration-terms>

“Migration – the physical transition of an individual, or a group of people, from one society to another – is primarily defined by the “push” and “pull” factors which help to explain why people migrate, their destinations of choice, and the reasons behind their decisions.” (Brettell and Hollifield, 2015).

It identifies the process of movement of a person or a group of persons from one place to another (e.g. within or across borders) for fulfilling desired purposes (e.g. political or economic uncertainty).

This chapter aims to present ILM in Thailand in both the economic and policy context, as well as describe how Thailand has consistently received an inflow of immigrant workers. This has been an explicitly economic process. In Thailand, ILM emerged from a dynamic change in economic structure, an expansion of the market, and a change in the population’s age structure. From reviewing and analyzing existing and recent immigration policies, this chapter makes some recommendations for the management of ILM in Thailand. Having realized the considerable benefits of ILM, the chapter concludes with a substantial analysis of how ILM is under challenge in the host country and a discussion about the obstacles caused by the current incoherent immigration policies in Thailand.

The organization of this chapter proceeds as follows. In Section 2.2, a chronological history of ILM in Thailand is offered. In Section 2.3, the profiles of immigrant workers and major migration policies are presented. Section 2.4 evaluates the economic causes of migration to Thailand and examines the current socio-economic situation in order to assess the challenges and threats to economic development in Thailand. Section 2.5 then discusses the implications of changes in Thai development strategies for immigration policies over time. Finally, Section 2.6 concludes and outlines the implications of this chapter.

2.2 A history of immigration in Thailand

The literature on the evolution of immigration in Thailand shows that the admittance of foreign workers had already begun in the 1930s after the Siamese revolution of 1932 (Archavanitkul and Guest, 1999; Chantavanich, 1999; Tsay, 2000). However, the patterns of and purposes for immigration have changed over time. The Great Depression, followed by the Second World War and several wars and civil conflicts throughout the region, resulted in large inflows of migrants seeking refuge in the relatively stable environment of Thailand (Dixon, 1999). At that time, immigrants were expected to fully assimilate, and cultural diversity was not still accepted in Thailand. In 1950, the Thai government first implemented the immigration-related law called the “Immigration Act,” which extended immigrants to economic activities and purposes by implementing various controls and restrictions on immigration (Skinner, 1957).

During the 1960s, the country started to embrace industrialization and the Thai government launched the first National Economic and Social Development Plan (NESDP) (1961-1966). This Plan primarily focused on developing agricultural production and outputs to meet the world’s market demands. It also highlighted the import-substitution and labor-intensive industries where the government played a significant role in promoting private investment and encouraged the private sector to participate in the economy with several investment benefits (e.g. tax holidays, tariff protection, or tax cuts on imported production machinery and raw materials). Nevertheless, Thailand relied heavily on imported products, and the manufacturing industries were geared to produce for the relatively small market within the country. With the limited scope for production, by the middle of the 1970s, the domestic market became saturated, and the country ran a high payments deficit, forcing the Thai government to review its economic development plan.

However, in the late 1960s and 1970s, although the national income level and nominal wage rates had been gradually increasing owing to the government’s economic development strategies, wages in the country were still not as high as in other major labor-importing countries.

Thailand was not only a labor-receiving country from nearby Vietnam, Cambodia, and Laos, but it also sent some Thai professional and technical workers to other regions, especially Western countries such as the United Kingdom and the United States, in search of better career opportunities (Chiengkul, 1986; Manning, 2002). Later, during the oil boom in the 1980s, a massive outflow of Thai workers went to the Middle East, Australia, and North America, and then shifted to other Asian destinations, especially in newly industrialized countries (NICs) such as Japan, Hong Kong, Taiwan, Malaysia, and Singapore (Castles and Miller, 1998; Archavanitkul and Guest, 1999).

Thailand's economy began to boom from the 1980s until the 1990s, after the country underwent the economic structural transformation from agricultural to industrial and manufacturing-based, focusing on export-oriented policy within the fourth NESDP (1977-1981). The government's strategy at this time aimed to revitalize international trade, encourage domestic investment, and attract more FDI through the possession of reliable basic facilities and infrastructure, together with some tax and non-tax incentives (Supachalasai, 1995). This led Thailand to quickly become the fastest-growing economy in the world with a high economic growth of around 8.6 percent per year, as reflected by a rise in national income, GDP per capita, and nominal wages. Owing to the rise in income and wages, the wage differentials between Thailand and the previous destination countries of Thai workers were narrowing, and hence discouraged them from seeking employment opportunities or jobs abroad (Vasuprasat, 1994).

On the other hand, immigration has been fostered by the relatively high income and economic boom in Thailand, together with political instabilities in neighboring countries (Chantavanich and Bunnag, 1997; Huguet and Punpuing, 2005; Paitoonpong and Chalamwong, 2012). The major turning point of ILM in Thailand was in the 1990s when the country became a net migrant-receiving country. The greater demand for more laborers put pressure on the Thai government to consider more open approaches to labor migration. According to Chalamwong (2001), the largest group of foreign workers were low-skilled and originated from neighboring

countries – Cambodia, Laos, and Myanmar – whose economic development progressed at a slower rate than that of Thailand. From that time, these three countries sent the most migrant workers to Thailand.

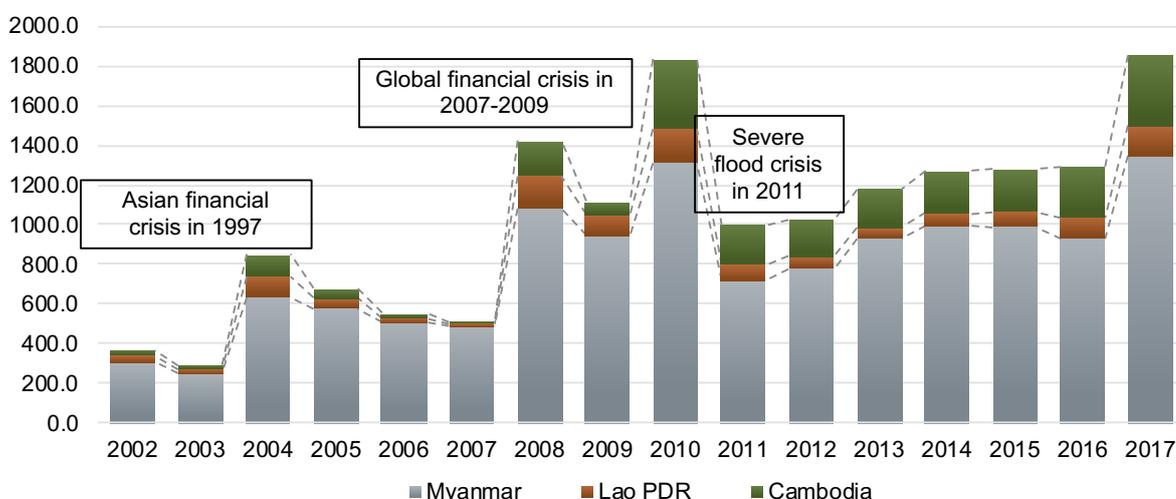
After the Asian financial crisis in 1997, the country witnessed a continuously increasing number of migrant workers, particularly those registered low-skilled ones who have been notably steered by various special immigration-related employment policies and schemes. According to the low-skilled migrant workers' arrival data in Figure 2.1, the significant changes in the number of low-skilled immigrants over the fifteen-year period could also be seen as a result of two major incidents. One was the global financial crisis, which began from the US sub-prime crisis during 2007-2009, and another was the severe flood crisis in Thailand at the end of 2011. Although the global financial crisis did not impact the country's financial sector directly, it deteriorated the stock market, foreign direct investment, commodity prices, and international trade, as well as the country's export performance, leading to a decrease in employment in several industrial and business sectors (Cheewatrakoolpong and Manprasert, 2015).

The number of low-skilled migrant workers began to recover by 2010 after the international economy had become more stable, together with loosening immigration restrictions and policy by the government at that time. However, in 2011, Thailand experienced its most severe flooding for 40 years, causing extensive damage and loss across several regions of the country. The manufacturing sector felt the strongest impact as flooding forced at least seven large industrial estates in the central region to close. According to Poapongsakorn and Meethom (2012), damage and loss to the industrial sector in Thailand were estimated at approximately \$32.87 billion. Consequently, the demand for labor drastically dropped in 2011, before slowly rising in the following years as many major industries gradually recovered.

In more recent years, the attempt of the current Thai government to address the problems of labor exploitation and human trafficking, as well as labor shortages, led to the phenomenal

increase in low-skilled immigrants in 2017. Under the leadership of Prime Minister Prayut Chan-ocha, the Ministry of Labor of Thailand has been more active in regulating the undocumented and irregular low-skilled immigrants and generating social awareness about low-skilled immigrants' human rights. One of the major influences behind this attempt was the undesirable assessment of the US State Department's Trafficking in Persons Report in which Thailand was placed in the lowest ranking on the list, or Tier 3.⁵ This strongly affected the international image and export performance of the country, especially in the fishery sector and seafood processing industries.

Figure 2.1 Registered low-skilled migrant workers' arrival in Thailand, in thousands



Source: Computed by the author based on OFWA, Ministry of Labor (2017)

⁵ The Trafficking in Persons (TIP) Report published by the US State Department has developed a ranking system to indicate how well other governments comply with the minimum standards for the elimination of trafficking laid out in the law. A list of countries whose governments fully comply with the minimum standards for eliminating severe forms of trafficking in persons, TIP Report describes this list as Tier 1. Tier 2 is a list of countries whose governments do not fully comply with the minimum standards but are making significant efforts to become compliant. Tier 3 is a list of countries whose governments do not fully comply and are not making significant efforts to become compliant.

Nevertheless, the economic structural dependence on low-skilled immigrant workers has contributed to the country's recent challenge of the so-called "middle-income trap" (Jitsuchon, 2012). According to Sussangkarn (1996) and Chalamwong (1998), the shortage of skilled labor, particularly in the fields of engineering, electronics, and information technology, as well as a lack of experts and professionals in other spheres, may affect the long-term growth of the Thai economy. The country's current twelfth NESDP (2017-2021), together with the first 20-year national strategy (2018-2037) have encouraged more competitiveness through knowledge-based development and an innovation-driven economy. Since the Thai government has formulated a national development strategy to shift the country from a labor-intensive to a value-based economy, there is, and will be, greater demand for highly educated and skill-qualified workers from other countries which cannot yet be met by the domestic workforce.

Another focus of the study is the government's immigration policies. Based on previous studies, there has been significant consensus regarding the efficiency of government policies in managing foreign-born workers and dealing with several ILM-related issues. Chantavanich (1999) and Chalamwong (2001) suggested that immigration policies in Thailand have been vague and reactive, consistently fluctuating between prohibiting, permitting, and restricting the entry of foreign workers. Immigration policy in Thailand is still ambiguous, and therefore, the next section of this chapter aims to investigate this further.

2.3 Thailand's recent immigration profiles and policies

2.3.1 Thailand's migrant worker profiles

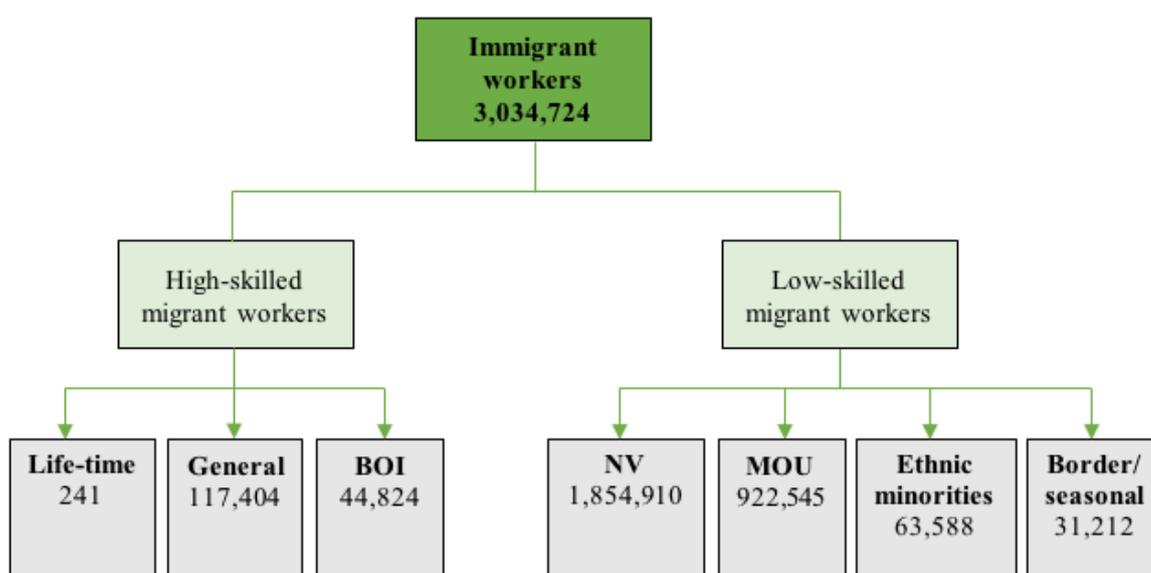
Low-skilled foreign workers from neighboring countries – Myanmar, Cambodia, and Lao PDR – usually move to Thailand as their major destination country. Over the past 20-year period, both political and economic factors, such as civil wars and conflicts in their countries of origin, together with the fast-growing economy in Thailand and large economic differences between these countries and Thailand, have been the key determinants of this migration. The

high inflows of these low-skilled immigrants have been driven by the greater demand for labor in Thailand on the one hand and the search for employment opportunities and better lives on the other. However, it can be said that the absence of a clear-cut policy to allow these low-skilled immigrants to enter and work legally in the country before 2003 resulted in a large pool of undocumented and irregular immigrants residing in Thailand. These irregular migrant workers tend to take up jobs that are mostly low-paid and are known to be employed in the so-called “3Ds (or 3Ks)” jobs – Dirty (Kitanai), Dangerous (Kiken), and Demanding (Kitsui) in the agricultural, construction, and manufacturing sectors. According to Huguet et al. (2012), there were approximately 2.5 million migrant workers from neighboring countries residing in Thailand in 2011, of whom around 1.5 million were undocumented. In an effort to solve the problem caused by the higher number of undocumented and irregular immigrants while addressing industries’ and employers’ greater demands for foreign labor, the Thai government implemented legislations and measures for migrant workers.

According to Thai legislation, various types of legal migrant workers are allowed to enter and work in the country. In accordance with immigration laws, a legal migrant worker is an alien who enters the country legally and temporarily (under the Immigration Act 1979) and must obtain a work permit (under the Foreigners’ Working Management Emergency Decree 2017, which repealed the Alien Employment Act 2008 and the 2016 Emergency Decree on the bringing of foreigners for working with their employers in the country). Migrant workers can generally be categorized into seven types based on the permits stipulated by legislation (Figure 2.2). Figure 2.2 shows that Thailand recently had 3,034,724 registered migrant workers by March 2019 (OFWA, 2019). Approximately 94.65 percent of them (or 2,872,255 migrant workers) were low-skilled migrant workers under different employment schemes, while the high-skilled workers made up only 5.35 percent (or 162,469 migrant workers) of the total foreign labor force. This indicates a significant imbalance between the number of low-skilled and high-skilled migrants.

Following the data and information given by the Office of Foreign Workers Administration (OFWA), the Ministry of Labor, high-skilled migrant workers consist of three groups, which are life-time and general permit migrant workers and migrant workers under the Board of Investment (BOI). These types of migrant workers often possess high education and skill levels and/or hold senior positions, and they are commonly sent from corporate headquarters abroad by means of investment.

Figure 2.2 Migrant workers in Thailand by type of permit, March 2019



Note: BOI = under Board of Investment; NV = Nationality Verification; MOU = Memorandum of Understanding

Source: Computed by the author based on OFWA (2019)

On the other hand, the predominantly low-skilled migrant workers comprise the remaining four groups, i.e. migrant workers with Nationality Verification (NV) permit, under the Memorandum of Understanding (MOU), ethnic minorities, and seasonal or border migrant workers. Each type of worker can be defined as follows:

1. Life-time permit migrant worker or permanent resident: a migrant worker who was allowed to reside in the country and received a work permit issued under the Revolutionary Order No. 322 dated 13 December 1972. As of March 2019, there were 241 immigrant workers with a life-time permit or permanent resident status.

2. General or temporary permit immigrant: a migrant worker who is granted a permit for working in occupations specified by regulations under Section 59 of the Foreigners' Working Management Emergency Decree 2017. By March 2019, there were 117,404 migrant workers with general work permits.

3. Nationality Verification (NV) permit immigrant: a migrant worker from a neighboring country who has completed the NV process and received a valid work permit and a temporary passport. As of March 2019, this was the largest category of migrant workers, with 1,854,910 workers.

4. An immigrant worker under the Memorandum of Understanding (MOU): a worker who is employed under the MOU between Thailand and neighboring countries. The MOU on the employment of workers' cooperation was first signed bilaterally with Lao PDR in 2002, and with both Myanmar and Cambodia in 2003, but their implementations were underperformed. According to Laws et al. (2017), the new MOUs were again signed with Cambodia in 2015 and then with both Myanmar and Lao PDR in 2016. As of March 2019, there were 922,545 immigrant workers under the MOU.

5. Immigrant under Section 62 or Board of Investment (BOI): a migrant worker who has been granted permission to work in the country by the promotion of BOI under the law on investment promotion, the law on petroleum, or any other law. In March 2019, there were 44,824 immigrants in this category.

6. Immigrant under Section 63 or ethnic minorities: a migrant worker who is in the process of repatriation, or awaiting deportation, a migrant worker who has been born in the Kingdom without receiving Thai citizenship, or a migrant worker from ethnic minorities in the Kingdom who has not yet acquired Thai nationality. As of March 2019, there were 63,588 immigrants in this category.

7. Immigrant under Section 64 or border/seasonal worker: a migrant worker who has a nationality and residence in a country with a border adjacent to Thailand and enters the

Kingdom with a border pass or an official document which has been issued by the country of origin and is granted permission to work temporarily for a period or a season in the border areas. As of March 2019, there were 31,212 border/seasonal workers.

Also, it should be noted that migrant workers from 2 to 4 are under Section 59 of the Foreigners' Working Management Emergency Decree 2017 and its 2018 amendment.

However, there are other categories of migrant workers who are ineligible under the Foreigners' Working Management Emergency Decree 2017 owing to diplomatic privileges. Section 4 of this emergency decree states that "this Emergency Decree shall not apply to the performance of duties in the Kingdom by foreigners only in the capacity as the following:

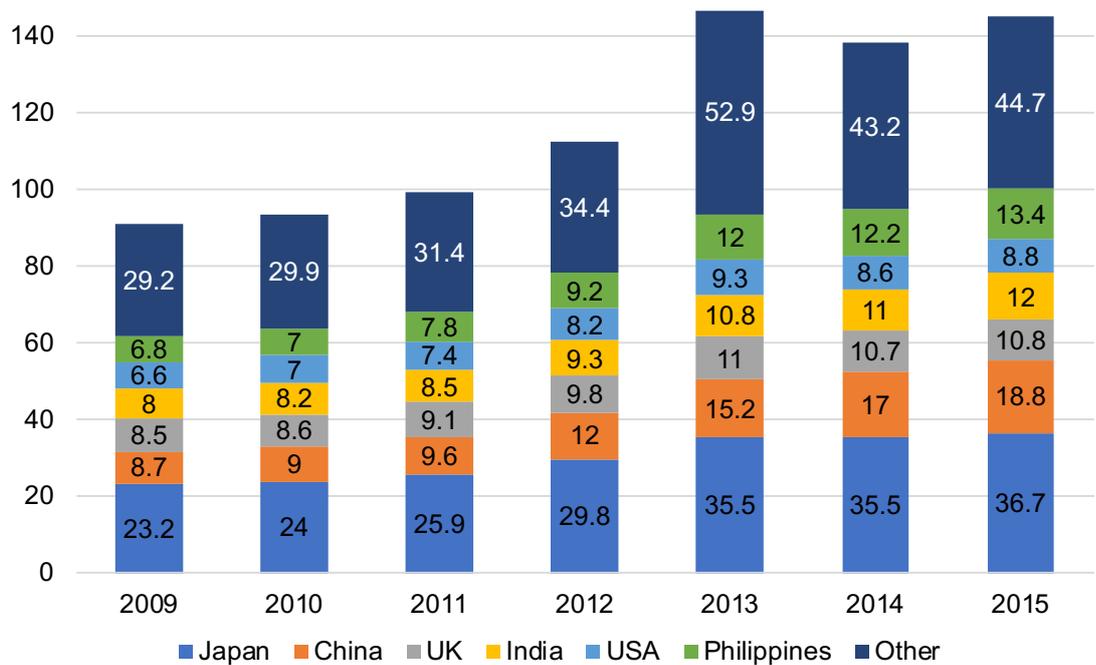
- (1) members of a diplomatic mission;
- (2) members of a consular mission;
- (3) representatives of a Member State to, and personnel of, the United Nations and specialized agencies;
- (4) private servants traveling from a foreign country to be in the ordinary service to the persons under (1), (2) or (3);
- (5) persons performing duties or missions under an agreement concluded by the Government of Thailand with a foreign government or an international organization;
- (6) persons performing duties or missions for educational, cultural, artistic, sportive or other purposes as prescribed in the Ministerial Regulation;
- (7) persons granted entry upon permission by the Council for performing a particular duty or mission, with or without condition;
- (8) representatives of foreign juristic persons obtaining a license to operate a business under the law on foreign business operation."⁶

⁶ For more details regarding the Foreigners' Working Management Emergency Decree 2017, see https://www.doe.go.th/prd/assets/upload/files/bkk_th/3c35c06309c7e8942a8f6ea363b8b916.pdf.

Excluding immigrants from neighboring countries, the trend of legal migrant workers in Thailand during 2009-2015 is represented in Figure 2.3. The composition of these legal migrant workers significantly reflects the origin countries of corporate headquarters or enterprises that invest in Thailand. The major long-term foreign investor with the biggest share, at about 25 percent, was Japan, followed by 13 percent from China, 8 percent from India, and 7 percent from the UK in 2015.⁷ Most of the migrant workers in this group were employed as senior managers, technicians, professionals, and executives, especially in the manufacturing sector. Of this group, the fastest-growing share of migrant workers was from the Philippines, which accounted for around 9 percent in 2015. Although they were not sent by means of foreign direct investment, they came to work in Thailand as school teachers, lecturers, and researchers (OFWA 2015).

⁷ According to the Board of Investment (BOI), Japan has been the largest foreign investor in Thailand for more than half a century and has contributed significantly to the Thai industrial development. In 2017, investments from Japan in Thailand reached approximately US\$4 billion, which accounted for 47 percent of the total foreign direct investments (FDI).

**Figure 2.3 Legal migrant workers in Thailand (excluding neighboring countries),
in thousands**



Source: Computed by the author based on OFWA (2015)

2.3.2 Thailand's migrant workers receiving measures

As in other countries, the various ILM pathways in Thailand are administered and governed by different organizational bodies and different laws and legislations. Foreign workers migrating into the country are governed by immigration law or the Immigration Act 1979, under the jurisdiction of the Royal Thai Embassies and consulates within the Ministry of Foreign Affairs and the Immigration Bureau of the Royal Thai police within the Ministry of Interior. Likewise, employment and other economic activities of foreign workers are controlled by the Foreigners' Working Management Emergency Decree 2017 (which repealed the Alien Employment Act 2008 and the Emergency Decree on the bringing of foreigners for working with their employers in the country 2016), the Foreign Business Act 1999, and some special investment promotion laws (e.g. the Investment Promotion Act 1977 and its 2017 (No. 4) amendment, the Petroleum Act 1971 and its 2017 (No. 7) amendment, and the Industrial Estate Authority of Thailand Act 1979 and its 2007 (No. 4) amendment) under the jurisdiction of the

Ministry of Commerce and the Department of Employment within the Ministry of Labor. In addition, standard protection and basic rights and freedom of foreign workers are protected through a series of laws and regulations, namely the Social Security Act 1990, the Labor Protection Act 2008, the Compensation Act 1994, the Labor Relations Act 1975, the State Enterprise Labor Relations Act 2000, and the Penal or Criminal Code, which fall under the administration of the Ministry of Labor.

This sub-section explains the conditions of, and main restrictions imposed by, these laws, divided into two different immigration stages – from the period of entry and stay to the period of employment. The circumstances and loopholes of these regulations that create room for violation and illegality are then explored.

2.3.2.1 Conditions for the period of entry and stay

Under the Thai Immigration Act 1979, foreigners requiring formal procedures based on Section 12 are permitted to enter the country at designated immigration checkpoints. Currently there are 48 immigration checkpoints, according to the Office of Immigration Bureau. Foreigners entering the country without valid visas or entry permits are therefore illegal and may be sent back to their countries. However, Section 17 of the same act has provided room for exempting and permitting irregular foreign workers to enter and remain in the country.

In general, there are two main types of visas in Thailand: tourist or visitor transit visa and non-immigrant visa. The distinction of visas is important as each type of visa consists of various categories, and each category has specific conditions and a particular purpose (see Table 2.1). For instance, foreigners who wish to enter the country for tourism purposes and hold a tourist visa are prohibited from working or conducting any business activities, whereas foreigners who intend to operate their jobs within the country require a non-immigrant visa. Normally, foreigners are allowed to stay and travel in the country only within the period designated in their visas, and their visas are subject to extension or renewal. Any foreigners

who does not extend their period of stay by renewing their visa but overstays, becomes an illegal immigrant and would be subject to deportation and punishment.

Table 2.1 Types of visa and categories

I. Tourist or Visitor Transit Visa	
Category	Purpose
TR	For tourism
TS	For transit purpose
TR 15	For tourism (issued “on arrival”)
II. Non-immigrant Visa	
Category	Purpose
F	For those who wish to perform official duties
B	For those who wish to conduct business, to work, to study teaching course, to work as an English teacher, to work as a sport coach, to do an internship, to work as a film-producer, journalist or reporter for a short period, for internship (non-curricular)
IM	For those who wish to invest with the concurrence of the Thai Ministries and Government Departments concerned
IB	For those who wish to invest or perform other activities relating to investment, subject to the provision of the established laws on investment promotion
ED	For those who wish to study, to come on a work study tour or observation tour, to participate in projects or seminar, to attend a conference or training course, to study as a foreign Buddhist monk For those who wish to perform missionary work or other religious activities with the concurrence of the Thai Ministries or Government Departments concerned For internship as part of curricular program
M	For those who wish to work as a film-producer, journalist or reporter
D / F	For diplomatic officers to be posted overseas / on official missions
RS	For those who wish to conduct scientific research or training or teaching in a research institute
EX	For those who wish to undertake skilled work or to work as an expert or specialist
O	For those who wish to visit family or friends in Thailand, voluntary job, retirement, medical treatment, to attend judicial process, to work as diplomat’s housekeeper
O-A	For applicants aged 50 and over who wish to stay in Thailand for an extended period without the intention of working
O-X	For applicants aged 50 and over who wish to stay in Thailand for an extended period without the intention of working, and who are nationals of (1) Japan (2) Australia (3) Denmark (4) Finland (5) France (6) Germany (7) Italy (8) Netherlands (9) Norway (10) Sweden (11) Switzerland (12) United Kingdom (13) Canada (14) United States of America

Source: Computed by the author based on the Ministry of Foreign Affairs (2019)

Nevertheless, foreigners from the neighboring countries of Cambodia, Lao PDR, and Myanmar who make a temporary journey across the designated areas and border, do not require entry visas according to the bilateral agreements between Thailand and these countries. They only need a day pass or temporary border pass issued at the immigration checkpoint. This is

owing to the long traditional relationship and connection among people who live along with the country's border areas. This special protocol, however, has opened a window of opportunity for many undocumented and irregular migrant workers crossing the borders for employment purposes in Thailand.

2.3.2.2 Conditions for the period of employment

Once foreigners reside in the country, their business activities are regulated by two collections of laws. The first collection of laws deals directly with the employment and other economic activities of foreign workers and includes the Foreigners' Working Management Emergency Decree 2017, the Foreign Business Act 1999, and other special laws that promote business activities and foreign investment (e.g. the Investment Promotion Act 1977, the Petroleum Act 1971, and the Industrial Estate Authority of Thailand Act 1979). The second collection of laws provides basic rights and freedom and protection to foreign workers, in accordance with international labor standards. It comprises the Social Security Act 1990, the Labor Protection Act 2008, the Compensation Act 1994, the Labor Relations Act 1975, the State Enterprise Labor Relations Act 2000, and the Penal or Criminal Code.

In 2017, the 2008 Alien Employment Act and the 2016 Emergency Decree on the bringing of foreigners for working with their employers in the country were repealed and then replaced by the Foreigners' Working Management Emergency Decree 2017. Yamada (2012) suggested that the migrant-receiving measures in the old law did not work well as the registration was complicated and heavily dependent on employers, the benefits of immigrant registration were unclear, and the penalties for violation were perceived as too soft. The Thai government therefore took another step toward creating a clear and comprehensive legal basis and measures for managing foreign workers in a more effective way. The new legal commandments are clear for both employers and employees, and the penalties for violations are more severe. For instance, Section 102 of the new law indicates that "any person who takes a foreigner into any work when the foreigner has no work permit shall be liable to a fine of four

hundred thousand to eight hundred thousand Baht for each foreigner employed”, whilst the old law imposed a fine of two thousand to ten thousand Baht for any foreigners employed. Again, the major triggers behind this law were the undesirable evaluation by the US State Department’s Trafficking in Person report, as well as the large influx of irregular and undocumented migrant workers into the country.

Under the Foreign Business Act 1999 and the Foreigners’ Working Management Emergency Decree 2017, foreign workers are prohibited from performing any type of job other than that specified in the valid work permit and/or operate any business without having an operating license issued by the Ministry of Commerce. Nonetheless, the government has implemented special legislation and provided some exemptions to ease the higher demand for immigrants in the Thai economy. To illustrate, the three special laws – the Investment Promotion Act 1977, the Petroleum Act 1971, and the Industrial Estate Authority of Thailand Act 1979 – have given special privileges to both foreign workers and their businesses promoted by the Board of Investment of Thailand (BOI). Under these special laws, the foreign workers can receive an IB category of non-immigrant visas which the authorities deem necessary for their stay, and there is no specific cap on their period of stay. Foreign workers are allowed to bring their families with them.

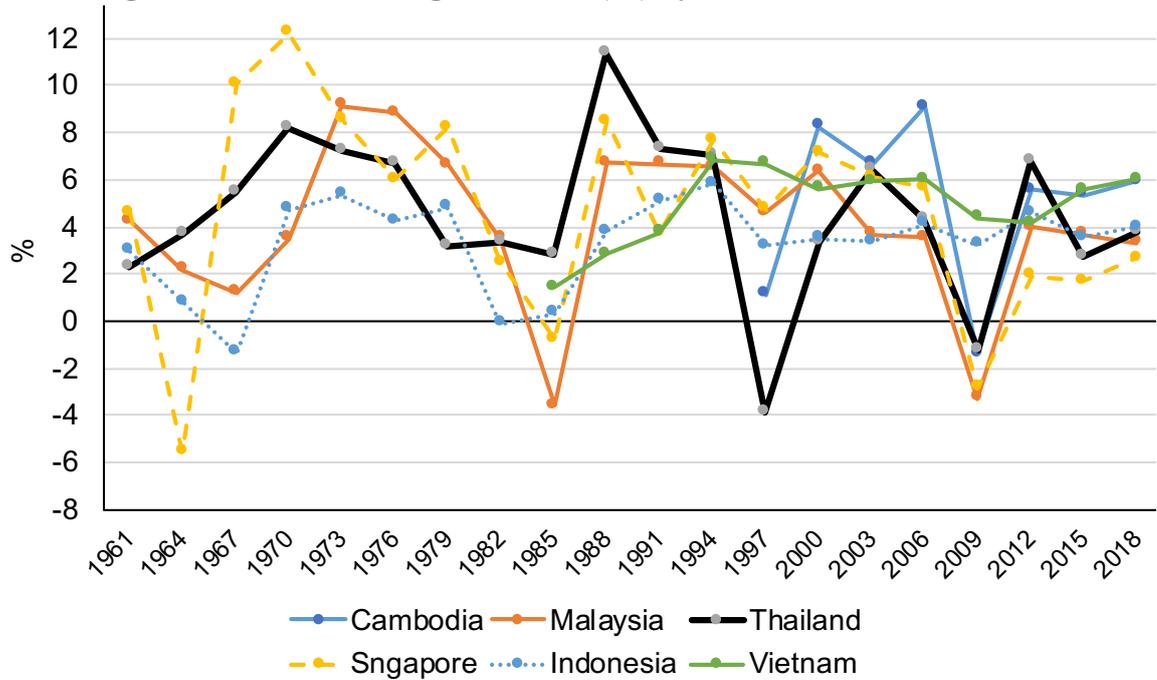
Likewise, under the Foreigners’ Working Management Emergency Decree 2017, the exception for bringing in foreign workers who are commonly not allowed to work or receive a work permit is given in Section 14 of this law, which states that “in a special case for a necessary matter for the purpose of maintaining national security or the country’s economy, or prevention of public disaster, the Minister, upon the approval of the Council of Ministers, may permit a foreigner to enter into the Kingdom to work under any conditions or may exempt without complying with this Emergency Decree in any case”. This suggests that an exemption can also be provided to foreign workers who perform work considered to be of a necessary and urgent subject for the country’s security, economy, and capacity for disaster prevention.

2.4 Socio-economic conditions and challenges of Thailand

Like other countries in the Southeast Asia region, Thailand's economic situation has been volatile from time to time (Figure 2.4). Thailand once experienced a relatively high economic growth rate at around 8-9 percent annually during the late 1980s, after the country underwent the economic structural transformation from agricultural to industrial and manufacturing-based, focusing on export-oriented policy. However, the Asian financial crisis that originated in Thailand in 1997 seriously affected the country's economy. Because of this crisis, the country experienced the first negative GDP growth rate in many decades at -2.75 and -7.63 percent in 1997 and 1998, respectively. The sharp fall in the economic growth rate also resulted in a significant rise in the unemployment rate, from 0.87 percent in 1997 to 3.4 percent in the following year, together with an increase in the poverty level in every part of the country. Nevertheless, in the following years, the economy gradually returned to a stable phase with an average GDP growth of approximately 5.2 percent from 1999 to 2017, leading to the reduction of unemployment and poverty.

In more recent years, Thailand again witnessed a few more periods of relatively low economic growth rates as a result of the global financial crisis, with a -0.69 percent in 2009 and 0.84 percent in 2011 owing to the severe flooding in the country. According to the World Bank (2016), more than 70 percent of Thailand's GDP comes from export values, which highly depend on labor-intensive manufacturing. Without a doubt, any situations that have an impact on exports may also contribute to the economic growth performance of Thailand.

Figure 2.4 Annual GDP growth rate (%) by selected countries in Southeast Asia

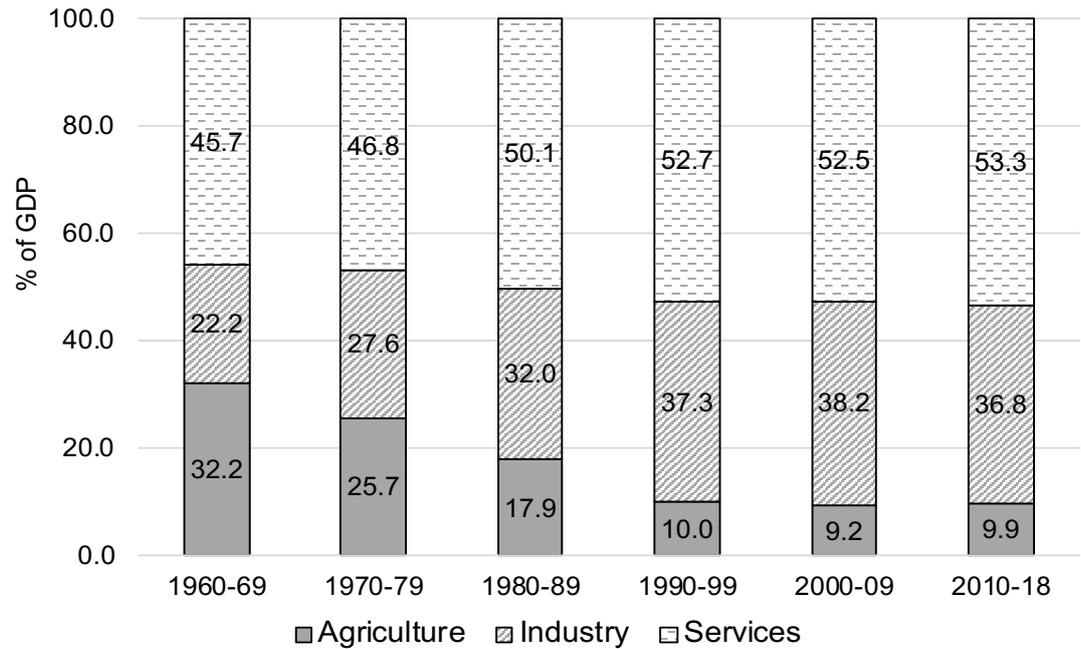


Source: Computed by the author based on the World Bank (2019), <https://data.worldbank.org/indicator/>

It can be said that the most significant engine behind the success of the Thai economy is the growth in the industrial or manufacturing sector. By the late 1980s, the devaluation of its currency (Thai baht) made the country more attractive for foreign investment and its export products more competitive, thus supporting the growth of industries and manufacturing. The average ten-year value added by the economic sector in Figure 2.5 shows that the contribution to the industry sector's GDP significantly increased from 22.2 percent in 1960 to 36.8 percent in 2018. Also, while the largest share of GDP in the services sector somewhat increased, the value-added in agriculture declined from 32.2 percent of GDP in the 1960s to less than 10 percent in the last few years (Figure 2.5).

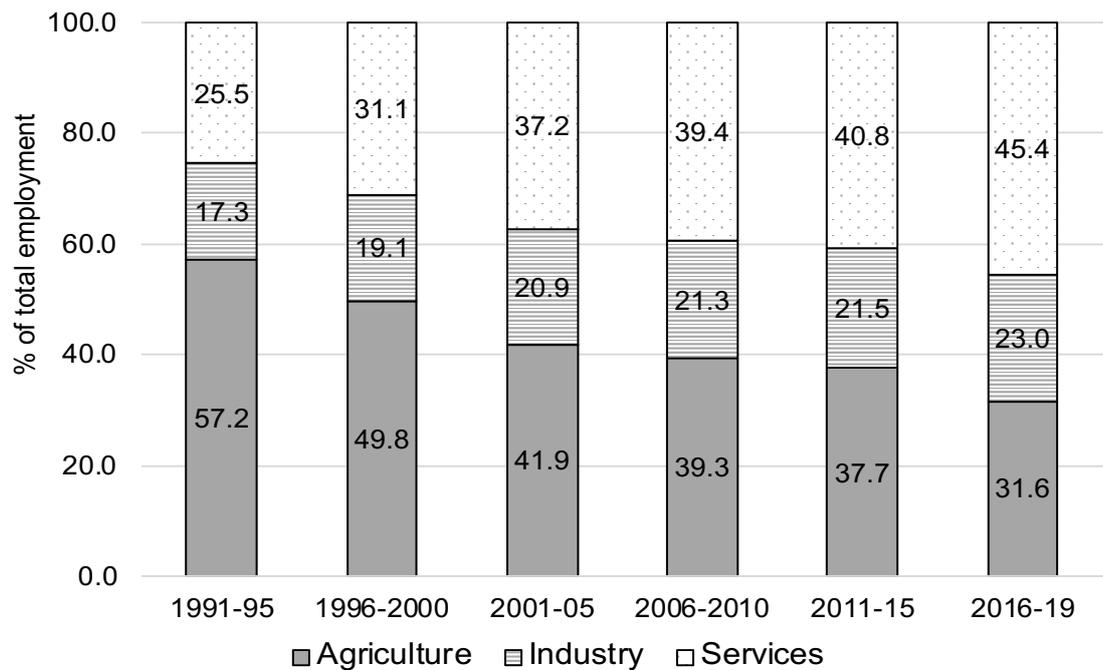
Nevertheless, although the role of the agricultural sector in terms of economic performance has diminished over the past decades, this sector still captures a large share of employed workers, which accounted for almost 32 percent of total employment in recent years. The industry or manufacturing sector, in contrast, employed only 23 percent of workers during the same period (Figure 2.6).

Figure 2.5 Average ten-year value added by economic sector, % of GDP



Source: Computed by the author based on the World Bank (2019), <https://data.worldbank.org/indicator/>

Figure 2.6 Average five-year employment by economic sector, % of total employment

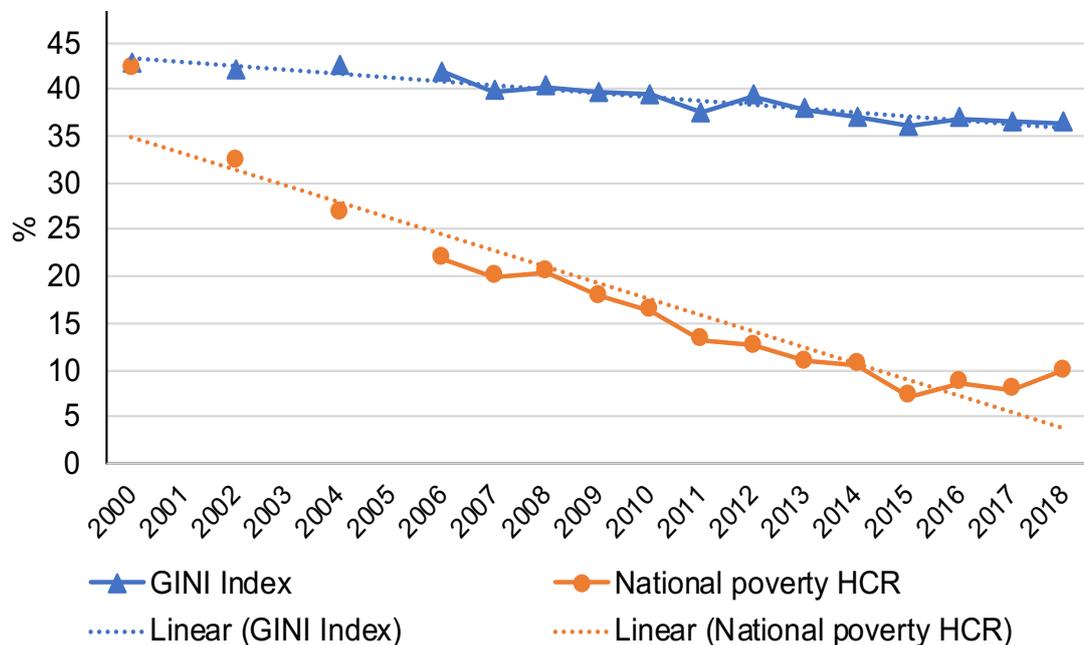


Source: Computed by the author based on the World Bank (2019), <https://data.worldbank.org/indicator/>

Economic progress in Thailand, especially in the industry and services sectors, has inevitably had an effect on poverty reduction. The national poverty headcount ratio, which

refers to the percentage of the population living below the national poverty line, has diminished over time, from approximately 43 percent in 2000 to 10 percent in 2018 (Figure 2.7). According to the World Bank (2011), Thailand was upgraded from a lower-middle income to an upper-middle income economy in 2011 when the country had an average income or gross national income (GNI) per capita of \$4,210, together with a reduction in poverty at that time. However, although the poverty rate has been significantly reduced, the GINI index, which is a measure of income inequality among the population, is relatively high and has not exhibited many changes between 2000 and 2018 (Figure 2.7). This suggests that the income distribution within the country still exists.

Figure 2.7 GINI index (%) and national poverty headcount ratio (% of the population)



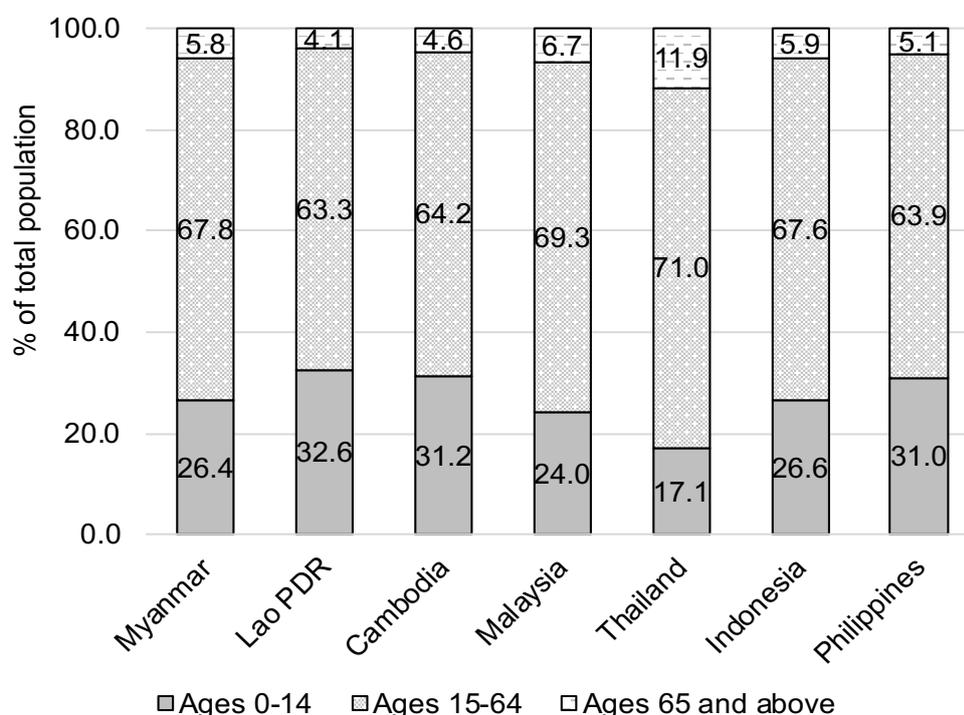
Source: Computed by the author based on the World Bank (2019), <https://data.worldbank.org/indicator/>

Furthermore, Thailand is currently encountering not only the challenges of sustaining its economy but also those of the aging population. The aging population, as defined by the declining birth rates and rising life expectancy, is a condition throughout many countries in the world, and particularly in Thailand. The rapid change in the age structure of the Thai population

due to the declining birth rates and the decreasing share of the young population has become a major concern for policymakers during the past decades (Knodel and Chayovan, 2008).

In comparison to other countries in Southeast Asia, in 2018 Thailand had the highest percentage of population over 65 years old, together with the lowest percentage of population under 15 years old. With a large percentage of the population between 15 and 64 years old, it is notable that in the near future, the number of elderly people in Thailand will increase (Figure 2.8). According to UNFPA (2006), the demographic transition owing to low levels of both fertility and mortality results in an aging population. Subsequently, the decrease in birth rates and the increase in life expectancy are the key drivers of the aging population in Thailand.

Figure 2.8 Percentage of the population classified by age group of selected countries in Southeast Asia in 2018

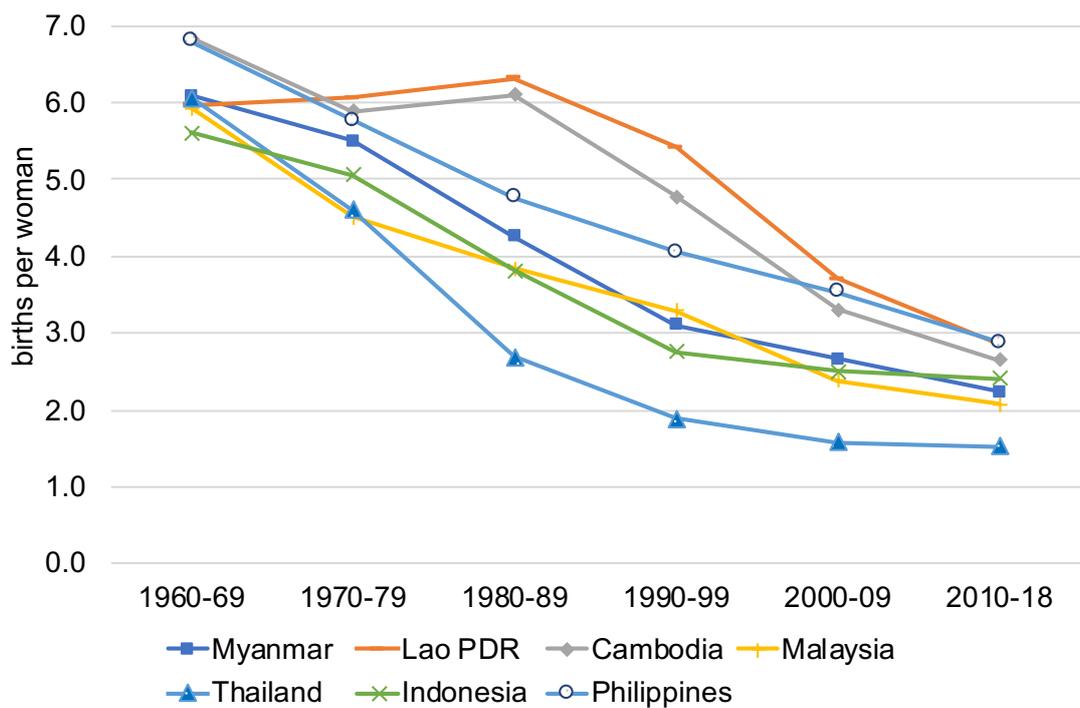


Source: Computed by the author based on the World Bank (2019), <https://data.worldbank.org/indicator/>

To further illustrate, the fertility rate in Thailand has declined over time and is likely to continue to do so in the future. In the past, the average birth rate in Thailand was relatively high, at around six births per woman. However, it has dropped rapidly to less than two births per

woman in recent years. Meanwhile, other Southeast Asian countries have average birth rates of two to three births per woman (Figure 2.9). These demographic trends will have an impact on the overall economy, including consumption patterns, labor supply, production of goods and services, and economic growth (Mankiw, 1992; An and Jeon, 2006; Hock and Weil, 2012). Undoubtedly, migrant workers play an important role in changing the age structure of the Thai population and filling occupational gaps as well as labor shortages.

Figure 2.9 Average ten-year fertility rate by selected countries in Southeast Asia



Source: Computed by the author based on the World Bank (2019), <https://data.worldbank.org/indicator/>

Given the challenges of demographic transition and economic slowdown in Thailand over the past few years, more concerns have been directed towards the so-called “middle-income trap” – the situation in which the economy has been trapped between the competitive edge of low wages among developing countries and the high value-added markets of more developed economies. In order to escape this situation, Thailand would need to make a transition from intensive labor-driven growth or resource-based production that mostly relies on cheap and low-skilled labor and imported technologies to an innovation-driven growth or

knowledge-based economy which places more emphasis on infrastructure development, R&D investment, high productivity and innovation from advanced skilled workers (Tipayalai, 2020). Based on this idea, the Thai government approved the Thailand Transport Infrastructure Development plan (2015-2022), which aims to improve quality of life and enhance competitiveness and potential benefits through the development of transport infrastructure and logistics networks in the country. Moreover, policies aimed at achieving long-term development and economic growth, such as Thailand 4.0, have been implemented under the 20-year national strategic plan (2018-2037), aiming to move the country towards a high-income status and a sustainable future.

2.5 Migrant workers in Thailand's social and economic development strategy

It could be said that ILM management policy in Thailand has been part of the government's economic restructuring policy and development strategy. In the early 2000s in particular, Prime Minister Thaksin Shinawatra's administration focused on the economic development strategy, which was known as the *Thaksinomics* or "dual-track policy". This policy classified the Thai economy into two different areas: the grassroots economy in rural areas on the one hand, and the export-oriented and private industrial sector in urban areas and the capital city on the other. As part of this policy, the government emphasized the promotion of the grassroots economy by giving rural people necessary funds and marketing opportunities, and it also encouraged the private industrial sector by providing investment incentives to domestic and foreign investors (Suehiro, 2010).

At that time Thailand was facing several problems, especially in the decline of productivity in the industrial sector. Also, the Thai economy was losing its competitive performance as it was trapped between the high-technology countries and the low-cost economies. Therefore the Thai government introduced the National Competitiveness Plan (NCP) in 2002, in which five industries (food processing, automotive, software, fashion, and

tourism) were strategically selected to promote their productivity in order to aid the country's competitive advantage. Additionally, the NCP also proposed promoting the creation of an investment in industry clusters at the country's regional level, upgrading human resources and infrastructure in these clusters, as well as leading regional (Southeast Asia-level) cooperation through exchanging information and resources (Suehiro, 2010). Accordingly, Thailand established special economic development zones (SEZs) located in border areas connected to neighboring countries – Myanmar, Lao PDR, and Cambodia (NESDB, 2003). This was because these countries contained suitable supplies of raw materials and labor for Thai industries. The neighboring countries therefore played an important role as material and labor suppliers to these strategic industrial clusters. As a result of this plan, the large inflow of migrant workers from these three neighboring countries was attracted and fostered by these labor-intensive industries, and hence migrated into Thailand.

It has been agreed by previous studies that the Thaksin administration in the early 2000s marked a watershed in an ILM management policy in Thailand (Huguet and Punpuing, 2005; Martin, 2007; Rukumnuaykit, 2009). According to Martin (2007), this was due to the Cabinet's decision to issue work permits for irregular immigrants employed in all sectors in Thailand and the establishment of the National Committee on Illegal Worker Administration (NCIWA). Rukumnuaykit (2009) pointed out that migration policies before 2001 were often short-term and unclear, based on inconsistent and inexperienced decisions by the Cabinet, and there was no host authority that managed undocumented or irregular migrant workers. The Office of Foreign Workers Administration under the Department of Employment (DOE) of the Ministry of Labor, together with the Provincial Office within the Ministry of the Interior, were the major agencies responsible for the registration of immigrant workers and the issuance of work permits, while the Immigration Bureau of the Royal Thai police within the Ministry of the Interior detected irregular migrant workers and deported them back to their countries (Rukumnuaykit, 2009).

Under the administration of Thaksin's government, the NCIWA was established by the Prime Minister's Office in 2001, which signified a milestone for irregular immigrant issues. Their major responsibility was to formulate necessary guidelines, policies, and several other measures to manage and regularize undocumented and irregular migrant workers. The NCIWA approved the national migrant worker management plan in 2004, which adopted three strategic policies (Rukumnuaykit, 2009; IOM, 2014):

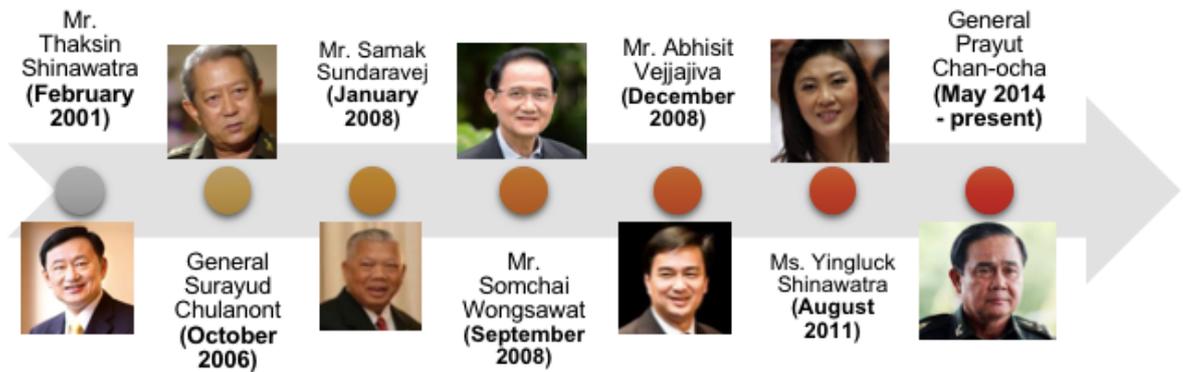
1. Implementing memoranda of understandings (MOUs) between Thailand and the three neighboring countries (Myanmar, Cambodia, and Lao PDR) regarding the legal recruitment and repatriation of foreign workers;

2. Establishing a process of nationality verification (NV) which allows government officials from migrant-sending countries to conduct verification in order to legalize all migrant workers in Thailand;

3. Establishing an open regularization process for irregular migrant workers from neighboring countries by issuing work permits to those already employed in Thailand, along with a temporary stay for their dependents.

These three strategic policies were implemented in the following years. However, it can be concluded that these NCIWA policies did not achieve a reduction in the number of irregular migrant workers. The main obstacles were the complex and costly registration procedure, and the lack of restrictive measures and punishment for violation adopted by the NCIWA in the fear that it would adversely impact employers (Rukumnuaykit, 2009; Paitoonpong, 2011). Even so, it should be noted that the attempts of Thaksin's government to manage illegal migrant workers and enhance the immigrant registration system have at least helped the country to measure the status and movement of immigrant workers.

Figure 2.10 Timeline of Prime Ministers in Thailand (2001 – present)



Source: Created by author

Since the end of the Thaksin administration, the country has lost the NCP as its backbone and has struggled with its migrant management policies. One of the major reasons for this was that the country had been faced with several political transitions and many new governments, which constrained it from having a long-term, proactive, and consistent migration policy (Figure 2.10). In particular, during the tenth National Economic and Social Development Plan (NESDP) (2007-2011), the policies related to migrant workers were not coherent with the national development strategy, according to Rukumuaykit (2009). The national plan, which aimed to achieve competitiveness in global markets through economic restructuring and free movement of capital and labor, did not foresee the shortage of labor supply as a result of the demographic transition. Therefore, the promotion of both the domestic and foreign investment under this plan led to an increase in labor demand and inflow of workers from other countries, yet immigration policies at that time still focused on restricting and limiting the number of immigrant workers.

Until 2015, the new government led by Prime Minister Prayut Chan-ocha clearly specified the new economic development plan regarding the cluster-based Special Economic Development Zones (SEZs) and Economic Corridors. It outlined some migrant workers' promotion measures; for example, the employment of migrant workers, both professional and unskilled, for businesses invested in as part of the SEZs, and the provision of training for

migrant workers (BOI, 2018).⁸ Moreover, Thailand's present and twelfth NESDP (2017-2021) has also highlighted the necessity of developing physical infrastructure on a regional basis to narrow the economic disparities among Thai regions and the importance of improving labor skills to achieve a value-based economy (OECD, 2018).⁹ The introduction of foreign labor, both skilled and unskilled, should be sufficiently regulated and managed. This includes maintaining the measurement of migrant workers' database and providing adequate social protection for those foreign workers.

Subsequently, the regularization process was further facilitated in 2014 through the establishment of One Stop Service Centers (OSSCs) located in many provinces throughout the country, where migrant workers or employers could collect temporary passports or identification cards for migrants and their children permitting them to work and stay temporarily whilst the Nationality Verification (NV) was being proceeded. Therefore, migrant workers could complete all the requirements of the regularization process in one location

⁸ According to the Thailand Board of Investment, the Special Economic Development Zones (SEZs) policy was first launched in 2015 based on the Thai government's belief in the strong potential of the ten provinces around Thailand (i.e., Chiang Rai, Kanchanaburi, Mukdahan, Nakorn Phanom, Narathiwat, Nong Khai, Sa Kaeo, Songkhla, Tak, and Trat) to connect with the neighboring countries in terms of trade, economy, and investment. Like other investment packages offered to investors, the government offers both tax and non-tax incentives. Tax incentives for those investing in SEZs include an up to 8-year corporate tax exemption plus a 50% tax holiday for another five years. In addition, entrepreneurs will enjoy double deduction for transportation, electricity, and water utility cost, up to 25 percent deduction for utility construction costs, import duty exemption for machinery, import duty exemption for raw materials used for export, permission to use no-skilled labor and others like foreign ownership of land and foreign expert employment.

⁹ The summary of the twelfth National Economic and Social Development Plan (NESDP) 2017-2021 is available at: https://www.nesdc.go.th/ewt_w3c//ewt_dl_link.php?nid=9640.

without returning to their home countries. The development of OSSCs was good practice provided by the Thai government to help both employers and migrant workers to reduce their recruitment expenses and other costs. Furthermore, as the 2008 Alien Employment Act was outdated and weak in its enforcement and punishment, the government abolished it and replaced it with the Alien Employment Act by the Foreigners' Working Management Emergency Decree in 2017, later amended in 2018 (Table 2.2).

Table 2.2 Major foreign worker receiving measures in Thailand from 2001 to 2018

Year	Foreign worker receiving policy
Since 1988	Due to Thailand's policy of <i>turning battlefields to market places</i> , the labor migration policies were relaxed to allow irregular migrants to work temporarily under Article 17 of the Immigration Act 1978.
2001	- The Cabinet decision for six-month permits for all jobs renewable for another six-month until September-October 2002 - National Committee on Illegal Migrant Workers Administration (NCIWA) was established.
2002	- The Cabinet decision for six-month permit renewal - Thailand signed bilateral MOU with Lao PDR (October 2002)
2003	- Thailand signed bilateral MOU with Cambodia (May 2003) and with Myanmar (June 2003) - National verification (NV) procedure started
2004	- Six-month work permit renewal - NCIWA approved the national migrant worker management plan
2005	Employment of newly and legally entered workers from Lao PDR and Cambodia under MOUs started
2006	NV of workers from Lao PDR and Cambodia started
2008	Alien Employment Act and Labor Protection Act enacted
2009	- Registration process of irregular migrant workers started - NV of workers from Myanmar started
2010	Employment of newly and legally entered workers from Myanmar under MOU started
2011	- Second registration of undocumented migrant workers started - The Cabinet decision to extend the NV deadline
2013	- Establishment of One Stop Service Centers (OSSCs) through the country - Extension of the NV deadline until November 2014
2016	Emergency Decree on the bringing of foreigners for working with their employers in the country 2016 enacted
2017	The Foreigners' Working Management Emergency Decree 2017 enacted which repealed the Alien Employment Act 2008 and the Emergency Decree on the bringing of foreigners for working with their employers in the country 2016
2018	The Foreigners' Working Management Emergency Decree 2017 amended and enacted

Source: Computed by the author based on the Office of Foreign Workers Administration, Minister of Labor

Nevertheless, Thailand's development under its 12th Plan has constituted the first four years of the implementation of the 20-year National Strategic Plan (2018-2037) with the aim of turning Thailand into a knowledge-based economy and a developed country under *Thailand 4.0*.¹⁰ It can be considered a long-term national development master plan for steering the country towards prosperity, security, and sustainability, identifying the targets and major directions for Thailand over the next twenty years. The 12th Plan, therefore, must be a key tool to stimulate the implementation of the 20-year National Strategic Plan, along with other supporting mechanisms and instruments. Even though the 12th Plan has outlined immigration policies and the situation of immigrants in Thailand has improved in some areas – for example, the country was upgraded from the Tier 3 to Tier 2 Watch List in 2016 to Tier 2 in 2018 – it has been argued that many challenges still remain the same (IOM, 2019). Major immigration policies over the past few years continue to lie between the regularization of irregular immigration, the prevention of undocumented and irregular migrant workers, and the promotion of legal worker employment.

2.6 Concluding remarks

The implementation of immigration policies and their gradual reforms have been an integral part of Thailand's modern development and economic structure for more than three decades. In the context of this study, this chapter seeks to deepen understanding of the implementation of immigration policies in Thailand with some reference to historical background. It can be concluded that ILM has significantly grown in its scope and scale, and its pattern has altered over time. The process of movement has altered from forced migration to

¹⁰ The 20-year National Strategic Plan (2018-2037) is Thailand's first national long-term strategy developed under Section 65 of the Constitution of the Kingdom of Thailand and the National Strategy Act B.E. 2560 (2017). Available at: <http://nscr.nesdb.go.th/wp-content/uploads/2019/10/National-Strategy-Eng-Final-25-OCT-2019.pdf>.

voluntary permanent migration to a temporary form of movement. It has become evident that the purpose of migration in the past was not merely guided by economic development disparities or employment opportunities. Political and social phenomena, along with limitations in immigration policy and legislation in both migrant-sending and receiving countries, play a crucial role in either encouraging or preventing flows of international labor movement.

This chapter also demonstrates that Thailand attracts both highly qualified and unskilled foreign workers, but more of the latter. The largest group of registered unskilled migrants is constituted by the three neighboring countries – Myanmar, Lao PDR, and Cambodia. Since the 1990s, the influx of these low-skilled migrants has become one of the most debatable issues in terms of costs and benefits, especially in irregular migrant workers. The existence of registered and regular migrants seems to be stimulated by legislation and policies on immigration, while such immigration policies and legislation are also driven by the government's economic development plan and strategy. It can be seen that the Thai government has been making progress in tackling the difficulties from the labor demand and supply side and also regarding a number of principles and aspects such as human rights, national security, and social protection and welfare. This is evident in many actions and policies to govern irregular and undocumented foreign workers, such as a wide range of regulations, MOUs with neighboring countries, NV and regularization processes including the establishment of OSSCs, and the substitution of the Alien Employment Act 2008 with the Foreigners' Working Management Emergency Decree 2017. Yet in practice, gaps still remain, as the issue of ILM in Thailand is a complex and multifaceted one which cannot be addressed by a single solution, or from the government's side alone. Cooperation from other sectors and international collaboration from migrant-sending countries is needed.

All in all, Thailand's immigration policies and regulations seem to be ad hoc and inconsistent. The political transitions and several changes of government within a short period have restricted a pleasant climate of policy implementation to some extent. In addition, even

though the regulations on migrant workers have become stricter with more severe punishment for contravention, the effective enforcement of those laws is still questionable.

Chapters 3 to 6 will provide further empirical research on the economic determinants, outcomes, and economic impact of migrant workers. These are substantial components for a greater understanding of the impact of the introduction of foreign labor on the Thai economy.

CHAPTER 3 IMMIGRATION, ECONOMIC GROWTH, AND UNEMPLOYMENT IN THAILAND

3.1 Introduction

Like in some countries, Thailand is considered to be one of the newly emerging and developing economies and has been faced with the big challenges of a population aging in recent years. Declining fertility rates accompanied by demographic transitions have led to a reduction in the workforce in Thailand, resulting in a risk of labor shortage in the forthcoming years. This will have significant impacts for not only the sustainable economic development, but also for labor market equilibrium, where employers in different industries will have to replace local or native workers with persons of foreign origin. This perception has made Thailand become a major immigrant destination in Southeast Asia. Appendix 3.1 shows the number of immigrants from major countries in Thailand. Nowadays, more than two million people are low-skilled immigrants, mainly from neighboring countries in the Southeast Asia region, such as Myanmar, Lao PDR, and Cambodia. This cross-border immigration influx is mainly based on the growing economy with labor demand from the expanding industrial sector, the relatively high income, and widening wage disparities between Thailand and its neighbors (Paitoonpong and Chalamwong 2012; Pholphirul and Kamlai 2014).

In Thailand, the value of particularly low-skilled immigrants – both regular and irregular – is often viewed as a flexible and cheap labor, taking up jobs that are shunned by natives who have turned to jobs offering higher wages and better working conditions. According to Athukorala, Manning and Wickramsekara (2000), a labor shortage has been predicted in various industries in Thailand in the next few years. It has been argued that immigrant workers have, in some cases, prolonged the Thai industries' life which were previously under the threat of extinction owing to labor shortages and/or high labor costs. There has been particular need for migrant workers in the sectors of agriculture, fishery and seafood processing, construction, and

household services/domestic work. Lathapipat (2010) also suggested that low-skilled immigrants, particularly in the border areas, reduces wage rates of less-skilled natives, but increases wage rates of highly-skilled natives in Thailand.

Nevertheless, the immigrant inflows into Thailand over the past two decades has created labor migration and policy related to immigration a major public issue within this country (Martin 2003). The increase in immigration since the 2000s has been increasingly accompanied by public attitudes towards immigrants as a threat to Thai economic and social well-being. Even though the employers in many regions in Thailand accepted that immigrants worked more diligently than native workers (Martin 2007), their attitudes towards immigrants still reflected that migrant workers did not deserve equal rights as native workers (Paitoonpong 2012). According to a survey carried out by ILO in 2011, unemployment was the main disadvantage of immigration. This was mainly owing to the period of global economic downturn experienced as a result of the sub-prime crisis during 2007-2008, which was accompanied by a high unemployment rate (Jitsuchon and Sussangkarn 2009). The ILO study also showed that approximately 80 percent of Thai people felt that immigrants are more likely to commit a large number of crimes (ILO 2011). However, a study carried out between 1998 and 2001 by Sirikarnjana (cited in Paitoonpong 2012) found that immigrants were actually unlikely to commit different crimes than natives. In a more empirical study, Pholphirul and Kamlai (2014) found that the presence of migrant workers in the agricultural sector depresses wage rates and decreases total employment in the same sector by around 4.34% and 0.67% respectively. Additionally, the inflow of migrant workers, particularly low-skilled ones, was found to have negative but insignificant impact on both regional economic growth and labor productivity in Thailand (Tipayalai 2020).

Accordingly, it is necessary to investigate the impact of the inflow of migrant workers on the host country to provide the information and evidence that assists policymakers in designing appropriate immigration policies. Although the international movement of labor

which plays a role in both the sending and host economies is well researched, only a few empirical studies exist in the literature, particularly in the context of Thailand. To determine whether a change in a single variable can also cause a change in, or can help to predict, another variable is the purpose of most empirical studies in economics and other social sciences. This chapter thus aims to address this gap through examining the dynamic links between the variables of immigration and the two macroeconomic variables, economic growth and unemployment, by adopting an Autoregressive Distributed Lag (ARDL) bounds cointegration test and Granger causality tests based on Thai time series data in the quarterly period 2007–2018.

The remainder of this chapter is structured as follows. Section 3.2 presents an underlying theoretical framework for immigration and its effects towards the host country labor market. Section 3.3 reviews some of the literatures regarding the impacts of immigration on the migrant-receiving economies. Data, methodology, and the obtained findings are explained in Section 3.4, while the last section (Section 3.5) provides discussion and emerging policy implications.

3.2 Theoretical framework

The impacts of migrant workers on labor market in the host economy can be considered from two different angles: migrant and native workers as substitute inputs and complementary inputs.

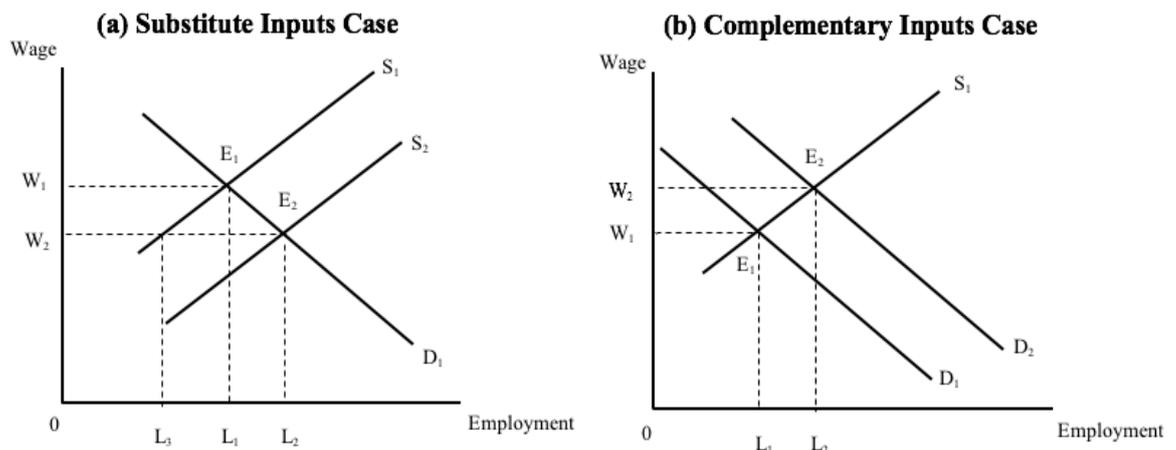
3.2.1 Migrant and native workers as substitute inputs

When migrant workers and natives are perfect substitute inputs, or in other words, when they acquire the same kinds of skills, they compete for the same kinds of jobs. Figure 3.1 (a) illustrates the effects of migrant workers on this labor market. Assume that the curve of labor supply (S_1) for native workers is in upward-sloping, and when migrant workers enter the labor market, the line shifts rightward to S_2 , increasing total employment from L_1 to L_2 . Further

assume that the demand for labor as shown by the line D_1 is fixed: whether or not there is an entry of migrant workers, the market wage at W_1 level will then shift to W_2 and the new equilibrium point is at E_2 . Note that natives are not eager to perform their jobs at this lower market wage, and the employment rate will fall from L_1 to L_3 and be displaced by immigrants. In a sense, migrant workers “take jobs away” from some natives by depressing the market income and convincing them that it is no longer profitable to work.

However, it is clearly an empirical concern that the magnitude of wage reduction and job displacement impact depends on the magnitude of the slope of the relative demand and supply for labor as well as immigration flows. As long as the capital is fixed and the demand curve is downward-sloping, an increase in immigrants will move the supply curve down, reducing the market wage and native employment.

Figure 3.1 Labor Market Effects of Migrant workers



Source: Adopted from Borjas (2016).¹¹

3.2.2 Migrant and native workers as complementary inputs

On the other side, it is possible that migrant and native workers have different kinds of skills and perform in different types of jobs. To illustrate, migrant workers may be employed in particular sectors such as labor-intensive agricultural production and manufacturing. This

¹¹ See Borjas (2016), pp. 164-165 for more details.

frees up the more skilled domestic employees to work in different jobs or perform tasks that allow immigrants to make better use of their human capital and skills. The overall productivity of native workers may increase owing to the presence of immigrants because they can now work in specialized jobs that better suit to their skills. Thus, immigrants and natives are complementary to each other in the labor market.

In the case that the labor inputs are complements, the flow of immigration can increase earnings for native-born workers. Immigration can enhance job opportunities in general if there are shortages of skills in the migrant-receiving country and migrant workers help to relieve these bottlenecks, leading to a greater demand for labor and eventually resulting in an increase in native wages. In this case, migrant workers and natives are complements in production, and they are separately engaged in two distinct labor markets. When two inputs are complements, an immigration flow causes the demand curve for its complement given by native workers to shift up from D_1 to D_2 , increasing the native workers' productivity, as shown in Figure 3.1(b). This will lead to an increased market wage rate from W_1 to W_2 . Also, some native workers who previously did not find it worthwhile to work now see the higher wage rate as an incentive to re-enter the labor market, and therefore the employment of natives rises from L_1 to L_2 .

3.2.3 Immigration and unemployment

When discussing the causal link between immigration and unemployment, one must take into consideration two important questions. The first question is: does an increasing number of immigrants cause an increase in unemployment rate in the host country? The answer is ambiguous but can be explained by the labor market effects of immigration as discussed in the above framework. At one extreme is the claim that there is a specific number of job positions in the labor market, and if one of those jobs is taken by a migrant worker, then that work is no longer available for a native worker. Therefore, the employment of immigrants reduces the employment opportunities of natives on a one-for-one basis. This demonstrates the way in which some people see immigrants and native workers as substitute inputs. However, at the

other extreme, some people see immigrants and natives as complementary inputs. They contend that migrant workers only accept the jobs that natives are unwilling or reluctant to perform and therefore do not take job opportunities away from natives. The second question is: does a decrease in the unemployment rate in the migrant-receiving country lead to an increase in the inflow of migrant workers? Two researchers, conducting survey studies from different countries in different periods of time, found that the labor force market and economic circumstances in the country of destination affect the intentional inflow of migration, unless other factors intervene; for example, a lower unemployment rate in the receiving country may cause higher migration inflow (Pope and Withers 1993). Moreover, it is possible that the causal relationship between immigration and unemployment can be either uni- or bi-directional, and therefore there is a need to study for their causality.

3.3 Literature review

A summary of empirical findings in the previous literature, highlighting the impact of immigration and the relation between the variables of immigration, unemployment, and economic growth, are provided in this section. In many existing studies of migration, one of the key interests has been its costs and benefits for migrant-receiving economies. For instance, Altonji and Card (1991) investigated the U.S. cities' data for the period 1970-1980 to investigate the impact of immigrants on low-skilled native employment. Only little evidence that migrant workers led to a large effect on the unemployment rate of less skilled natives can be found. Gross (1998) tested the ability to absorb the increasing immigrant inflows of a regional labor market in British Columbia. Using Canadian data, he found that there was a positive relation between immigration and unemployment in the short run, and a negative relationship in the long run. He also found that increasing flows of immigrants were associated with declining skill levels in times of high unemployment, and in the short run, migrant workers who had higher than average levels of skill tended to be more competitive.

Konya (2000) used quarterly Australian data from 1983 to 1998 and analyzed the Granger causality test between immigrants and unemployment rate. She found that immigration negatively and uni-directional caused unemployment in the long run, both with seasonally adjusted and unadjusted data. The nature of causal relation between the variables of immigration, unemployment, and GDP per capita in Finland was studied using annual data between 1981 and 2001 (Feridun 2004). By applying Johansen cointegration and Granger causality tests, the researcher found that immigration leads to unemployment and GDP per capita, and not vice-versa. Feridun (2005) repeatedly applied the same techniques for the annual Norwegian data in the period from 1983 to 2003. The results suggested that immigration caused GDP per capita, but did not cause unemployment rate.

Several researchers have studied the nature of the causal relations between immigration, unemployment, and economic growth in the different migrant-receiving countries emphasizing ARDL bounds model for cointegration approach and obtained important, yet inconsistent results for the short- and long-term analyses of the immigration impacts on the host country.¹² To illustrate, Morley (2006) studied the relation between immigration and economic growth in the United States, Canada, and Australia, using a bounds cointegration testing and ARDL models. The results show the presence of long-term one-way directional causality from GDP per capita to immigration, still there is no evidence in the opposite direction. Similarly, Feridun (2008) examined the causal effects of immigration, and two economic indicators (i.e., unemployment and income) in Sweden, which were measured through autoregressive distributed lag (ARDL) bounds model for cointegration approach and Granger causality test. The results of both tests suggest that there is a presence of long-term bi-directional causality between per capita GDP and immigration. Moreover, the estimated results reveal that

¹² For studies on the causal relationships between immigration, unemployment, and economic growth in the host economy, see Morley (2006); Feridun (2008); Tzougas (2013); and Panthamit (2017).

immigration does not cause unemployment rate; however, the unemployment rate causes immigration.

In a similar study, Tzougas (2013) applied this idea to Greece. Using annual data from 1980 to 2007, evidence suggested that there are structural breaks in the data series, which derived from the sudden influx of irregular migrant workers and the restrictive monetary and fiscal policy in Greece. He incorporated these breaks into the ARDL bounds test and Granger causality test. The results of the ARDL bounds models suggest that the macroeconomic variables are in the long run relationship. Also, the results of the Granger causality tests suggest that there is a bidirectional causality between GDP per capita and immigration in the long run, whilst unemployment only granger-causes immigration in the short run with no reverse causation. In Thailand, the only study can be found in the past literature that has investigated the impact of immigrants on unemployment which contributes to the short- and long-term impacts of immigration on the host economy. By applying an ARDL approach, Panthamit (2017) adopted time-series data for the quarterly period from 1999 to 2013, and found that immigration caused the unemployment only in the short-term, but in the long-term, it reduced the unemployment rate in the country.

From the above review of literature, it is clear that the recent trend of the empirical studies has mainly focused on explaining the short- and long-term effects of immigration on various macroeconomic indicators. Number of previous studies has shown many significant findings but the results have varied from study to study. Furthermore, although there are several studies on immigration in Thailand, very few studies attempt to explore the association and long- and short-run effects between immigration and macroeconomic variables in Thailand. The present study thus aims to contribute to the debate on immigration impacts by applying the ARDL bounds testing approach. This approach allows us to examine the causal relationship and to obtain the short- and long-term dynamic impacts of immigration.

3.4 Data, methodology, and empirical results

In the present study, 12-year quarterly time series data from Thailand spanning the period 2007-2018 has been used. All data are converted into logarithmic form in order to validate econometric testing approaches, and to achieve mean-reverting relationships. Data on immigration, denoted by $\ln\text{IMM}$, was obtained from the Foreign Workers Administration Office and calculated by the percentage of the overall migrant workers by the total population. Data on unemployment, denoted by $\ln\text{UNEMP}$, was obtained from the Thai Labor Force Survey of the National Statistical Office of Thailand and calculated as the percentage of the total labor force that is working part- or full-time, or not working but available and actively seeking employment, at ages 15-60. GDP per capita, denoted by $\ln\text{GDP}$, refers to GDP divided by midyear population, and was obtained from the Office of the National Economic and Social Development Board of Thailand.¹³

The descriptive statistics of the logarithmic forms of the three main indicators are illustrated in Appendix 3.2. The skewness and kurtosis measures were examined for the distribution of the data sets and evidence of a normal distribution among all variables was found. In addition, Appendix 3.3 presents the correlation matrices for the first differences of all data series. The estimations of simple correlations indicate no evidence of correlation.

This chapter uses the ARDL-bounds method of cointegration, which has not been previously employed in examining the causal relation between immigration and the variables of unemployment and economic growth in Thailand.

3.4.1 Unit root test

To perform the ARDL-bounds cointegration testing, the first necessary condition is to examine that the selected indicators are stationary at level, as the estimated result might be

¹³ The value of GDP per capita was calculated in Millions of Thai Baht by using Gross Domestic Product (GDP) in chain volume measures at the 2002 reference year.

spurious when the data series have non-stationary status. Even though the ARDL bounds cointegration testing is applicable regardless of whether all data series are integrated at an order of purely I(0), purely I(1), or mutually cointegrated (Pesaran et al. 2001), it is indispensable for this study to ensure that the integration degree of each data series is not integrated at an order of I(2) or more. Therefore, the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Dickey-Fuller GLS (DF-GLS) unit root tests are employed in order to identify the degree of integration or the stationary status. Table 3.1 displays the results of unit root test for stationarity, where these three tests are conducted on the level of each variable at first, and then on its first difference.

Table 3.1 Unit Root Test for Stationarity

Variables	lag	ADF		PP		DF-GLS	
		Trend	No Trend	Trend	No Trend	Trend	No Trend
lnIMM	1	-3.938 (0.01)**	-2.057 (0.26)	-5.189 (0.00)***	-3.460 (0.01)**	-1.959 (lag 2)	0.942 (lag 3)
Δ lnIMM	1	-7.103 (0.00)***	-7.192 (0.00)***	-8.156 (0.00)***	-8.295 (0.00)***	-2.278 (lag 3)	-1.020 (lag 3)
lnUNEMP	3	-0.877 (0.96)	-1.244 (0.65)	-2.383 (0.39)	-2.516 (0.11)	-1.160 (lag 2)	-0.988 (lag 2)
Δ lnUNEMP	3	-3.637 (0.03)**	-3.407 (0.01)**	-8.723 (0.00)***	-8.563 (0.00)***	-7.824*** (lag 1)	-7.718*** (lag 1)
lnGDP	4	-3.776 (0.02)**	-0.062 (0.95)	-5.675 (0.00)***	-1.368 (0.60)	-2.518 (lag 4)	0.422 (lag 4)
Δ lnGDP	4	-3.117 (0.10)	-3.108 (0.03)**	-8.199 (0.00)***	-8.386 (0.00)***	-2.237 (lag 3)	-0.916 (lag 3)

Note: *, **, *** indicate significance at critical value of 10%, 5%, and 1% level.
Source: Author's Calculation.

The findings of the DF-GLS, PP, and ADF unit root tests in Table 3.1 demonstrate that all the variables are stationary and found to be integrated at an order of I(0) and purely I(1), where the order of integration on unemployment is I(1) while the immigration and GDP per

capita are either I(0) or I(1). However, Perron (1989) suggested that these three tests are considered to have low ability or power in examining the time series data with the existence of structural breaks. To circumvent this concern, the Zivot and Andrews (ZA) unit root test for one structural break was then employed.

3.4.2 Zivot and Andrews (ZA) test for unit root with one structural break

Following the ZA unit root test methodology, all three models from equations (1) to (3) were estimated for each series and compute the t-statistics for testing. The ZA test for unit root with structural breaks results are presented in Table 3.2.

Table 3.2 Zivot and Andrews Test for Unit Root

Variables	ZA (One Structural Break)			Results
	lag	SBC	T _b	I(0)/I(1)
lnIMM	0	-6.653***	2012q2	I(0)/I(1)
ΔlnIMM	1	-7.579***	2012q2	
lnUNEMP	2	-4.155	2011q1	I(1)
ΔlnUNEMP	1	-9.211***	2012q1	
lnGDP	2	-4.759	2009q4	I(1)
ΔlnGDP	2	-9.966***	2009q3	

Note: Critical values for ZA Unit Root Test for 10%, 5%, and 1% are -4.82, -5.08, and -5.57.

*, **, *** indicate significance at critical value of 10%, 5%, and 1%.

Source: Author's calculation.

The corresponding structural break-dates for each data series (T_b) is illustrated in the fourth column of Table 3.2. It can be noticed that the structural breaks for each variable have some noteworthy meanings. First, the break-dates for the variables lnIMM and lnUNEMP were found in the period 2011–2012, which covers the period in which Thailand faced sudden severe floods in several regions, leading to economic stagnation in the country. In addition, the break-date for the variable lnGDP occurred in the year 2009, which is related to the consequence of the world financial crisis or subprime mortgage crisis during 2007-2008.

3.4.3 ARDL bounds testing approach

The ARDL bounds cointegration testing approach is employed in this study to measure the evidence of a long-run relation among the variables of immigration, unemployment, and GDP per capita. Following Philips (2018), there are three possible outcomes of the ARDL-bounds test: (i) all variables are I(1) and cointegrating, suggesting that there is a long-run causation among variables; (ii) all variables are I(0) and stationary, and there is no cointegrating relationship; and (iii) the results are inconclusive, where it could be a mix of I(0) and I(1) variables, and further testing is required. The charts of ARDL-Bounds Test Statistics are given in Appendix 3.4.

Table 3.3 ARDL-Bounds Cointegration Testing

	Model 1: F(lnIMM/lnUNEMP, lnGDP)	Model 2: F(lnUNEMP/lnIMM, lnGDP)	Model 3: F(lnGDP/lnIMM, lnUNEMP)
Breakpoint	2011/2012 (DU_flood)	2011/2012 (DU_flood)	2009 (DU_financial crisis)
Bounds Test (F-test)	6.355 ^a	8.457 ^a	0.458 ^b
Conclusion	Cointegration	Cointegration	No cointegration
Critical Values			
Significance level	Lower Bounds I(0)	Upper Bounds I(1)	
1%	4.29	5.61	
5%	3.23	4.35	
10%	2.72	3.77	

Note: ^a Cointegrating relationship exists at critical value of 1%.

^b Stationary at critical value of 10%.

Source: Author's calculation.

As can be noticed in Table 3.3, the ARDL bounds testing statistics reveal that the null hypothesis of no cointegration in both models 1 and 2 is significantly rejected as the F-statistic values exceed the upper critical bound of I(1) at the 1% level of significance, suggesting that there is a long-term relation among variables. Nevertheless, in model 3, the value of F-statistic is under the lower critical bound of I(0) at the 10% significance level, suggesting that there is no evidence of cointegration.

Once the valid existence of the long-term causation among immigration and the variables of unemployment, and GDP per capita was established, the ARDL method could be applied to estimate both short-term and long-term coefficients. Based on the cointegration tests results (Table 3.3) among the variables $\ln IMM$, $\ln UNEMP$, and $\ln GDP$, the coefficients of models 1 and 2 were then estimated. Table 3.4 and 3.5 show the estimated results. In this study, the following ARDL-bounds models are developed for estimation:

$$\Delta \ln IMM_t = \alpha_0 + \theta_0^* \ln IMM_{t-1} + \theta_1 \ln UNEMP_{t-1} + \theta_2 \ln GDP_{t-1} + \theta_3 DU_flood_{t-1} + \beta_1 \sum_{i=1}^p \Delta \ln IMM_{t-i} + \beta_2 \sum_{i=0}^p \Delta \ln UNEMP_{t-i} + \beta_3 \sum_{i=0}^p \Delta \ln GDP_{t-i} + \varepsilon_t \quad (3.1)$$

$$\Delta \ln UNEMP_t = \alpha_0 + \theta_0^* \ln UNEMP_{t-1} + \theta_1 \ln IMM_{t-1} + \theta_2 \ln GDP_{t-1} + \theta_3 DU_flood_{t-1} + \beta_1 \sum_{i=1}^p \Delta \ln UNEMP_{t-i} + \beta_2 \sum_{i=0}^p \Delta \ln IMM_{t-i} + \beta_3 \sum_{i=0}^p \Delta \ln GDP_{t-i} + \varepsilon_t \quad (3.2)$$

Where α_0 is constant, IMM is immigration, $UNEMP$ is unemployment, GDP is GDP per capita, DU is dummy variable and ε_t is an i.i.d. error term. The long-term relations among the study variables are denoted by the first part of the equation, while the summation signs in the second part of the equation correspond to the error correction dynamics. The rate of dependent variable adjustment is given by θ_0^* .

To select the optimum lag length of each series and model, the Schwartz Bayesian Criterion (SBC) has been used in all cointegration estimations. Regarding Pesaran and Shin (1999), the SBC is somewhat superior to Akaike Information Criterion. SBC is also parsimonious because it uses the least acceptable lag to identify the lag selection and avoids losing dispensable degrees of freedom (Pesaran and Shin 1998).

Table 3.4 Estimation of ARDL Model 1: F(lnIMM/lnUNEMP, lnGDP)

	Coefficient	Standard error	t-stats (Prob)
lnIMM(-1)	-0.682	0.143	-4.78 (0.000)
lnUNEMP	0.070	0.106	0.66 (0.511)
lnGDP	2.085	0.524	3.98 (0.000)
Δ lnUNEMP	-0.221	0.162	-1.36 (0.183)
Δ lnUNEMP(-1)	-0.652	0.163	-4.00 (0.000)
Δ lnGDP	-0.477	1.006	-0.47 (0.639)
Δ lnGDP(-1)	-1.655	0.586	-2.83 (0.008)
Δ lnGDP(-2)	1.725	0.908	1.90 (0.067)
DU_flood	0.137	0.126	1.06 (0.297)
Constant	-21.317	5.406	-3.94 (0.000)
R-squared	0.671		
Adj. R-squared	0.554		
F-stats (Prob)	5.75 (0.000)		
Diagnostic Tests			
D.W. d-stats	1.8614		
ARCH test (P-val)	0.7483		
BG-LM test (P-val)	0.5628		
BP test (P-val)	0.5031		
Ramsey RESET test (P-val)	0.1813		

Note: Dependent variable is Δ lnIMM, 43 observations used for estimation from 2008q1 to 2018q3.

Source: Author's calculation.

The results in Model 1 illustrate the significantly positive effect of economic growth on immigration in Thailand. The coefficient of real GDP per capita presents the higher contribution of migrant workers. That is, if the real GDP per capita increases by 1%, immigration will increase by 2.09%. However, the coefficient of unemployment shows a positive but insignificant impact on immigration. It can be, therefore, concluded that economic growth in the receiving country measured by GDP per capita plays an important part in the increasing

inflow of migrant workers in Thailand. The increase in GDP per capita provides more opportunities for employment, which drives in more immigrants.

Table 3.5 Estimation of ARDL Model 2: F(lnUNEMP/lnIMM, lnGDP)

	Coefficient	Standard error	t-stats (Prob)
lnUNEMP(-1)	-0.240	0.114	-2.11 (0.043)
lnIMM	-0.906	0.188	-4.82 (0.000)
lnGDP	2.673	0.609	4.39 (0.000)
Δ lnUNEMP(-1)	-0.343	0.175	-1.96 (0.059)
Δ lnIMM	0.691	0.203	3.41 (0.002)
Δ lnIMM(-1)	0.703	0.161	4.36 (0.000)
Δ lnIMM(-2)	0.614	0.135	4.52 (0.000)
Δ lnIMM(-3)	0.248	0.119	2.09 (0.045)
Δ lnGDP	-2.725	0.740	-3.68 (0.001)
DU_flood	0.201	0.123	1.63 (0.113)
Constant	-27.377	6.257	-4.38 (0.000)
R-squared	0.6211		
Adj. R-squared	0.5027		
F-stats (Prob)	5.25 (0.000)		
Diagnostic Tests			
D.W. d-stats	1.9401		
ARCH test (P-val)	0.3999		
BG-LM test (P-val)	0.7471		
BP test (P-val)	0.4741		
Ramsey RESET test (P-val)	0.8440		

Note: Dependent variable is Δ lnUNEMP, 43 observations used for estimation from 2008q1 to 2018q3.

Source: Author's calculation.

Model 2 shows the estimated impact of immigration and economic growth on unemployment with a different lag length. It demonstrates that immigration has a significantly negative effect on unemployment in the long-term, where a 1% increase in immigration leads to a 0.91% decrease in unemployment rate. This leads to the conclusion that immigrants do not

compete with or take jobs away from natives; rather, they tend to complement native workers in the different jobs and increase natives' productivity.

The coefficient of the speed of adjustment term, or the rate at which the independent variables accumulate in dependent variable estimated from the ARDL model, indicates how fast variables can converge to equilibrium in the dynamic model; and it should be statistically significant with a negative sign. Moreover, the higher the significance of the rate of adjustment term, the greater the presence of a stable long-term relation between variables. Table 3.4 and 3.5 demonstrate that the rate of adjustment term is negative and statistically significant, and equals to -0.682 and -0.240 in models 1 and 2, respectively.

Furthermore, several diagnostic tests were conducted for each ARDL model. For instance, the ARCH test confirmed that the heteroscedasticity in the residual term is not present in each model. The Breusch-Godfrey LM test showed that no residuals are serially correlated, and the Ramsey RESET test indicated that each model is correctly specified. Additionally, the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) statistics on the recursive residuals were conducted for each ARDL-bounds model to justify the stability of regression coefficients (Bahmani-Oskooee, 2001). It can be seen that the CUSUM and CUSUMSQ statistics test of models 1 and 2, as displayed in Appendices 3.5 and 3.6, remain within the 5% significance level of the upper and lower critical bounds, suggesting that both short- and long-term coefficients are stable over time or steady in each ARDL model.

3.4.4 Granger causality test

In this section, a causality analysis to supplement the long- and short-term inferred results will be further performed to determine the robustness of causal linkages between the study variables of immigration, unemployment, and GDP per capita. To implement the causality analysis among the study variables, Granger causality tests were employed. Granger's (1969) causality test was applied not only because it is the simplest and most straightforward method, but also because it shows the existence of causal ordering in a sense that points to a

low causation implying predictability and exogeneity. To analyze the Granger causality test in this study, the estimated equations using the following bivariate vector auto regressive (VAR) model are given below:

$$\ln IMM_t = \lambda_1 + \sum_{i=1}^k a_{1i} \ln IMM_{t-i} + \sum_{j=1}^k b_{1j} \ln UNEMP_{t-j} + \varepsilon_{1t} \quad (3.3)$$

$$\ln UNEMP_t = \lambda_2 + \sum_{i=1}^k a_{2i} \ln UNEMP_{t-i} + \sum_{j=1}^k b_{2j} \ln IMM_{t-j} + \varepsilon_{2t} \quad (3.4)$$

$$\ln IMM_t = \lambda_3 + \sum_{i=1}^k a_{3i} \ln IMM_{t-i} + \sum_{j=1}^k b_{3j} \ln GDP_{t-j} + \varepsilon_{3t} \quad (3.5)$$

$$\ln GDP_t = \lambda_4 + \sum_{i=1}^k a_{4i} \ln GDP_{t-i} + \sum_{j=1}^k b_{4j} \ln IMM_{t-j} + \varepsilon_{4t} \quad (3.6)$$

Table 3.6 Estimation of Granger Causality Test

Null Hypothesis	F-Statistics				Decision
	Lag 1	Lag 2	Lag 3	Lag 4	
IMM does not Granger-cause UNEMP	0.029	0.813	0.271	2.519	Accepted
UNEMP does not Granger-cause IMM	7.648***	10.788***	11.104**	10.664**	Rejected
IMM does not Granger-cause GDP	3.185	1.785	1.761	4.491	Accepted
GDP does not Granger-cause IMM	11.277***	6.237**	8.726**	9.009*	Rejected

Note: *, **, *** indicate the rejection of the null hypothesis at the critical value of 10, 5, and 1% level, respectively.
Source: Author's calculation

The results of Granger causality test displayed in Table 3.6 indicate that the null hypothesis of the Granger causality that unemployment rate does not affect immigration is significantly rejected in all the lag lengths with no evidence of reverse causality. Therefore, there is a unidirectional causality from unemployment to immigration. Moreover, the failure to accept the null hypothesis of the Granger causality that GDP per capita does not lead to immigration also shows that unidirectional causality occurs between GDP per capita and immigration, confirming the results of the ARDL model estimations. These results clearly imply, as could be expected from the current economic situation in Thailand, that both unemployment rate and GDP per capita in the host economy are the major pull factors of immigration.

3.5 Discussion and conclusion

This chapter has assessed the causal relation between migration and two selected economic variables, unemployment and per capita GDP in Thailand, using the approach of ARDL-bounds cointegration and Granger causality tests. Zivot and Andrews (ZA) tests were applied to identify structural breaks in all macroeconomic data series endogenously. The structural breaks significantly detected over the fifteen-year sample period were found to be plausibly related to two important events occurring in Thailand during the period 2009-2012: the first was the impact of the global economic crisis or subprime mortgage crisis in 2008, and the second was the sudden severe floods in several regions of Thailand from mid-2011 until early 2012, which led to economic stagnation in the country. The ARDL model was then employed to determine the antecedents of immigration in the short- and long-run taking these structural breaks into consideration. By and large, this analysis reveals that, in both the short- and long-run, GDP per capita has a positive and statistically significant impact on immigration in Thailand. The estimated results also suggest that the inflow of immigrants has a significantly negative impact on unemployment in the long term. Furthermore, strong evidence resulting from the Granger causality tests emerged to support the existence of a unidirectional causality from GDP per capita to immigration in the long term. Nevertheless, the results of Granger causality test are indicative of unidirectional causality from unemployment to immigration in the short run.

The study reveals bidirectional causality between the variables of immigration and unemployment. In the initial periods of economic development, the process may have started as a unidirectional one where the increase in unemployment due to several factors, such as demographic transitions and job characteristics in Thailand, causes immigration; but later it turned in the opposite direction, where immigration *does not* augment the unemployment in the host country, but rather helps to reduce unemployment as a mean of complementary inputs. Furthermore, the estimated results suggest that economic growth in the host country, measured

by GDP per capita, causes immigration in both the short- and long-run dynamics. Nevertheless, immigration does not cause GDP per capita. Therefore, this may lead to the conclusion that economic growth and unemployment rate in Thailand have generally promoted or attracted more immigration.

In this regard, a number of policy implications have emerged from these findings. To illustrate, owing to immigration's reduction of the unemployment in the host country, migrant workers as complementary inputs to native workers increase the productivity of natives in various types of jobs, as they fill in job vacancies at both the bottom (e.g., undesirable jobs, or 3Ks (or 3Ds): Kitanai (Dirty), Kiken (Dangerous), and Kitsui (Demanding)) and the top (e.g., high-skilled professionals) across the job spectrum. In addition, the results indicate that immigration does not crowd out native employment, nor lead to increased unemployment, but rather helps to reduce the unemployment rate in the labor market of the host economy as a mean of complementary inputs. This invalidates the prevailing arguments that migrant workers reduce job opportunities for the existing workforce in Thailand. Policies, therefore, should be improved by the government to educate native residents to tolerate the presence of an increasing number of temporary and permanent migrant workers. Moreover, Thailand has to specify clear targets and goals regarding immigration policies. Specifying the skills and the number of foreign-born workers needed should be a significant priority and challenge for the policymakers.

CHAPTER 4 IMMIGRATION AND THE LABOUR MARKET OF THAILAND

4.1 Introduction

The introduction of a foreign labor force and its effect on the labor market of the host country is an ongoing debate, especially in many migrant-receiving countries. The main perspective towards the role of migrant workers is that they have become an important influencer of economic activities. By most empirical measures, immigration plays a more major role in the global economy and labor market today than it did in the past in terms of key economic inputs and outcomes such as labor supply, foreign direct investment (FDI), information flows, trade, gross domestic product (GDP), skill and diversity spillovers, and employment rates in the migrant-receiving countries, both developed and developing.¹⁴ Facing with the challenge of the middle-income trap together with the demographic transition, the adoption of immigration policy in some countries, especially in Thailand, is also considered a strategy to enhance the participation of workers in the labor market, to improve economic development (by means of the increase in labor supply of production inputs) and increase job opportunities for the domestic workforce.

Immigration has contributed to growth in the Thai economy since the 1990s and the country's structural and economic transformation from an agricultural to an industrial base, and it continues to increase. Although there are several empirical studies of the impact of immigration on the labor market in both developed and developing economies, most of these have been based on single-equation models and have applied those single-equation techniques (e.g. linear regression, logistic regression, multiple regression, and factor analysis) whereby a number of explanatory variables are employed to predict a dependent variable, in this case

¹⁴ For the empirical studies regarding the impacts of labor immigration on economic outcomes in the host economy, see, for example, Carrasco, Jimeno, and Ortega (2008); Foad (2012); Boubtane, Coulibaly, and Rault (2013); Borjas (2015); Brunow, Nijkamp, and Poot (2015); and Tipayalai (2020).

immigration. These models, in general, do not account for possible causal relationships among variables, thus omitting the indirect effects of these explanatory variables on immigration. In addition, they disregard the possibility of reverse effects or a reciprocal relationship between immigration and the constituent variables.

The present chapter, therefore, addresses these gaps by assessing how migrant workers affect and can be affected by the labor market in Thailand, taking into explicit account the process of interaction and the possibility of feedback effects, which are often ignored by traditional single-equation immigration models. It also provides empirical evidence of the degree to which immigration affects the labor market in Thailand, with particular reference to unemployment level and economic growth. This study, within the overall context, makes a threefold contribution to the literature. First, in order to address the major concern associated with the most traditional (single-equation) migration models, a path model is developed to test causal relationships, both direct and indirect, between immigration and explanatory variables, so that it can explain the pattern of migration inflow in Thailand. Second, a simultaneous equations model, in which the reciprocal relationship or feedback effect can be incorporated within the causal framework, is examined to understand the variables' interrelationships. Third, the chapter provides new empirical findings drawn from the most recent data of macroeconomic indicators and immigration in Thailand that shed more light on international labor migration studies.

The remainder of this chapter proceeds as follows. Section 4.2 briefly reviews the impact of immigration on the labor market of the migrant-receiving country. Section 4.3 explains the data sources and variables employed in the empirical analysis. Section 4.4 covers the methodology, including the path model, simultaneous equations model, and estimated results, while the main conclusions are summarized in Section 4.5.

4.2 Review of immigration impact on the labor market of the receiving country

Over the past decade, the total number of international migrants has increased from 221 million in 2010 to 272 million in 2019, indicating that one out of every 35 individuals in the world today is a migrant (UN, 2019). Without doubt, the international movements of migrants are playing a greater role in the world economy. These facts represent the significance of this topic and this study, which focuses on the effects of immigration on the host economy. This topic, however, has sparked heated debate, particularly when migrants appear to have an adverse impact on domestic workers' wages and employment. The recent increase in immigrants in many developing countries has also increased more attention towards immigration and its effects.

Overall, immigrants have an economic effect on both sending and receiving countries; however, in the present study, only effects on host countries are examined. Specifically, a brief survey of previous literature, stressing the key point of how migrant workers affect the labor market in relation to unemployment and economic growth, has been more focused, owing to its importance in the literature and the purpose of this study. Notwithstanding the prevalent belief that immigrants affect productivity, the potential negative impact of ILM on native labor market outcomes, particularly on native wages and employment, remain doubtful. Most empirical and theoretical studies have focused on the effects of immigration on the labor market.¹⁵ However, such studies have mainly been conducted in the US and other developed countries.

In a cross-country analysis using data from 68 countries, Osang (2006) analyzed the impact of international migration on GDP per capita as a proxy of a country's development level. He found that migration, measured by shares of remittances in GDP and foreign-born

¹⁵ For studies on the impacts of immigration on the labor market, see, for example, Borjas (1987), (1995), (2003); Altonji and Card (1991); Friedberg and Hunt (1999); Card (2001), (2005); Dustmann et al. (2005); Ortega and Peri (2009); Ottaviano and Peri (2006), (2008), (2012).

population, has a positive effect on a country's development level. Similarly, Felbermayr, Hiller, and Sala (2010), using a cross-country dataset, studied the relationship between immigration and per capita income. They follow Frankel and Romer's (1999) instrumental variable strategy for labor immigration and precisely control for trade and financial openness and institutional quality. Their findings indicate that immigration boosts real per capita income in destination countries. Park and Hewings (2009) used a simulation model to assess the effects of immigration on regional and national economic output measured as GDP. Their results show that immigration has a negative impact on average wage and capital per labor ratio and a positive impact on regional and national economic production, which decreases over time. However, this study has shed light on the timeframe for assessing immigration's economic effect and suggests that immigration's positive and negative effects may both be restricted to a certain period and closely related to the demographic structure of immigration.

In Thailand, the past literature has shown that the inflow of migrant workers contributes to a net positive impact on the host economy and slightly depresses wage rates in certain jobs. For instance, Sussangkarn (1996), using a computable general equilibrium (CGE) model, found that the migration flow raised about 0.55% of Thai GDP, or approximately \$839 million, in 1995. This CGE model was later updated by Martin (2007), who also found that immigrants, who comprised around 5% of the total Thai workforce, enhanced GDP by about 1.25% in 2005. Lathapipat (2010) suggested that immigration, particularly in the border areas, reduces wage rates for less-skilled natives, but increases wage rates of highly-skilled natives in Thailand. In a different study, Pholphirul and Kamlai (2014) found that the presence of migrant workers in the agricultural sector depresses wage rates and decreases total employment in the same sector by around 4.34% and 0.67%, respectively.

Although there are several studies of immigration in Thailand, they do not address the major concern regarding traditional single-equation models nor suggest any obvious interrelationships between immigrant workers and the labor market. Bearing this in mind, the

present study will attempt to examine a simultaneous equations model within the causal framework and make an inference concerning the reciprocal relationship or feedback effect of immigration and the constituent variables in Thailand.

4.3 Data and variables

In this chapter, the most recent Thai datasets covering the quarterly period 2007-2019 has been employed. Data on *immigration* is measured as the number of overall migrant workers who are employed. The data are obtained from the annual report conducted by the Foreign Workers Administration Office of Thailand (FWAO), covering 2007-2019 quarterly.

Unemployment is measured as the number of unemployed persons age 15 or above and refers to those who are not working part- or full-time, and not actively seeking unemployment. The data are obtained from the Thai Labor Force Survey of the National Statistical Office of Thailand (NSO).

Economic growth is measured using the economic output which contributes to gross domestic product or GDP in the reference year of 2002 and is obtained from the Office of the National Economic and Social Development Board of Thailand (NESDB).

Agricultural employment is measured as the number of persons employed in the primary or agricultural sector. *Urbanization* is defined as the number of persons living in urban settlements. *Tertiary education* is represented by the number of persons who have a higher education degree or have completed tertiary level of education. The data for these three variables are obtained from the Thai Labor Force Survey of the NSO, covering the quarterly period from 2007-2019.

Table 4.1 Summary of variables and data sources (2007-2019)

Variable	Definition	Data Source
Immigration	Number of employed migrant workers	Foreign Workers Administration Office (FWAO) of Thailand
Unemployment	Number of the unemployed population	Thai Labor Force Survey (LFS), National Statistical Office of Thailand (NSO)
Economic growth	Gross Domestic Product (GDP) chain volume measures at 2002 reference year	National Economic and Social Development Board Office (NESDB)
Agricultural employment	Number of the population employed in the agricultural sector	Thai Labor Force Survey (LFS), NSO
Urbanization	Number of the population living in urban settlements	Thai Labor Force Survey (LFS), NSO
Tertiary education	Number of the population who have completed the tertiary level of education	Thai Labor Force Survey (LFS), NSO

The datasets for this study are available electronically and publicly on the website of each organization. All data are transformed into logarithmic form to verify econometric testing approaches and achieve mean-reverting stochastic process. The definitions and data sources of the study variables are summarized in Table 4.1.

4.4 Methodology and estimated results

4.4.1 Path model

The structural equation model or path model, as developed by Joreskog (1970), is applied to investigate causal relationships among the explanatory variables and immigration. The path model is regarded as a multivariate statistical analysis that has been widely employed in social science research, as it allows one to investigate the magnitude of the relationships among multiple latent (unobserved) variables and the relations between latent and manifest (observed) variables simultaneously, which then explain the underlying processes of interest (Joreskog, 1977; Bollen, 1989; Xiong et al., 2014).

The causal model in the present study has three exogenous variables: tertiary education, size of urban settlements, and agricultural employment; and three endogenous variables:

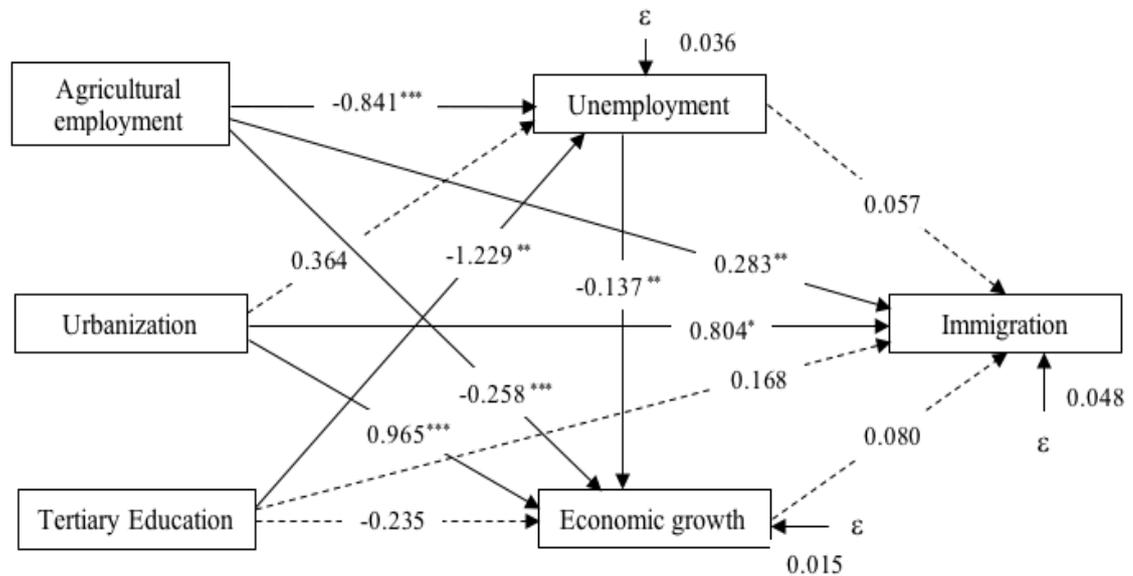
economic growth, unemployment, and immigration. In the matrix form, the path model is represented as follows:

$$\begin{bmatrix} UNEMP \\ GDP \\ IMM \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 \\ \beta_{2,1} & 0 & 0 \\ \beta_{3,1} & \beta_{3,2} & 0 \end{bmatrix} \times \begin{bmatrix} UNEMP \\ GDP \\ IMM \end{bmatrix} + \begin{bmatrix} \gamma_{1,1} & \gamma_{1,2} & \gamma_{1,3} \\ \gamma_{2,1} & \gamma_{2,2} & \gamma_{2,3} \\ \gamma_{3,1} & \gamma_{3,2} & \gamma_{3,3} \end{bmatrix} \times \begin{bmatrix} URBAN \\ AGRI \\ EDU_tertiary \end{bmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \end{bmatrix}$$

where *UNEMP* is the number of unemployed native workers; *GDP* is gross domestic product; *IMM* is the number of employed foreign workers; *URBAN* is the number of persons living in urban settlements; *AGRI* is the number of native workers employed in the agricultural sector; *EDU_tertiary* is the number of native workers who have completed tertiary education. β_{ij} and γ_{ij} are both parameters to be estimated: β_{ij} denotes an $m \times n$ matrix denoting the j th endogenous variable affecting the i th endogenous variable; γ_{ij} denotes an $m \times n$ matrix denoting the j th exogenous variable affecting the i th endogenous variable; and δ_{ij} is the vector of random disturbance terms.

The model was tested for the quarterly period 2007-2019 and developed by means of STATA software. Data were obtained from the National Economic and Social Development Board Office (NESDB), the National Statistical Office of Thailand (NSO), and the Foreign Workers Administration Office (FWAO) of Thailand. The results of standardized pathway coefficients obtained from path analysis are presented in Figure 4.1. By examining the path coefficients of the measurement model, most of the standardized regression coefficients in the direct and structural pathways are in accordance with expectations in respect of their signs and significance practically and statistically.

Figure 4.1 Standardized pathway coefficient



Note: *, **, *** indicate significance at 10, 5, and 1% level of significance, respectively. ϵ refers to the residual path coefficient.

Source: Author's calculation

In Figure 4.1, agricultural employment has a negatively strong significant effect on unemployment and economic growth. The link between agricultural employment and unemployment (0.841) is stronger the link between agricultural employment and economic growth (0.258). This is expected, as agricultural employment, which is considered primary sector employment, tends to create more job opportunities for domestic workers, reducing the unemployment rate. However, heavy employment in the agricultural sector tends to slow down economic growth. This is due to extensive dependence on agriculture which may discourage the adoption of new technologies and may, moreover, reduce the size of the industrial sector as labor reallocates towards the agricultural sector, thereby slowing down economic growth (Matsuyama, 1992). This result is consistent with Gylfason (2000), who uses cross-sectional data from transition economies in three regions (Central Asia, Central and Eastern Europe). He found that expansion in the agriculture share in GDP is related to a reduction in economic growth, education, and trade openness, together with an increase in inflation.

The results also suggest that there is a negative and statistically significant influence of unemployment on economic growth (0.137), which is in line with several previous studies (Semmler and Zhang, 2005; Villaverde and Maza, 2009; Kitov, 2011; Ruxandra, 2015). Likewise, the impact of tertiary education on unemployment is negative and statistically significant at the 5 percent level, indicating that increased population with higher education levels (1.229) may create more job opportunities and decrease unemployment. However, tertiary educational level is found to have a positive but not statistically significant effect on economic growth. In addition, Figure 4.1 shows that the direct effect of urbanization on economic growth is statistically significant and positive (0.965), but its impact on unemployment rate is not statistically significant. These findings indicate that more urbanized areas are unlikely to affect unemployment directly, but rather they have a great influence on economic growth through infrastructure development, agglomeration of people and businesses, and economic activity. This confirms Bertinelli and Black's (2004) assertion that urbanization is the engine of human and economic development.

Table 4.2 Standardized coefficients of each variable on immigration

Variables	Direct Effect	Indirect Effect	Total Effect
Unemployment	0.057	-0.011	0.046
Economic growth	0.079	-	0.079
Agricultural employment	0.283**	-0.059	0.224**
Urbanization	0.804*	0.093	0.897**
Tertiary education	0.168	-0.075	0.093

Note: *, **, *** indicate significance at 10, 5, and 1% level, respectively.

Source: Author's calculation

The path model also presents the standardized direct, indirect, and total effects of the predetermined variables on immigration, which are summarized in Table 4.2. The total effect of each variable can be segmented into indirect and direct effects. While direct effect means the path coefficient of an exogenous construct influences an endogenous variable, indirect effect is

indicated by the standardized pathway coefficient that links two variables through the intervening variable (Tang et al., 2013). Focusing first on the direct effects of the two endogenous variables, unemployment and economic growth are positively related to immigration, although neither are statistically significant at the 10 percent level. Second, in terms of the exogenous constructs, agricultural employment, urbanization, and tertiary education, it can be seen that agricultural employment has a strong significant and positive effect on immigration. Similarly, urbanization is positively associated with immigration, while high level of education is positively related to immigration but not significant.

With respect to the indirect effects, the standardized indirect effects of many causal variables run opposite to the direct effects, thus reducing the size of the total effects. For instance, the positive direct effects of unemployment, agricultural employment, and tertiary education partially outweigh the adverse indirect effects, excepting the direct positive influence of urbanization which, in contrast, is compounded by the positive indirect effects through economic growth and unemployment pathways.

Table 4.3 Model fit indices

Test	Value	Cut-off criteria
RMSEA	0.000	< 0.05
CFI	1.000	≥ 0.95
TLI	1.000	≥ 0.95
SRMR	0.000	< 0.05

Source: Author's calculation

Various tests have been applied to evaluate the appropriateness of the model as the construction of the path model needs to be justified in terms of the goodness of fit. The most used fit indices are the standardized root mean squared residual (SRMR), comparative fit index (CFI), Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA). According to Hooper et al. (2008), there is no precise cut-off rule for these indices; however,

there is an acceptable range of fit indices, which may indicate that the measurement model is reasonably well-fitting (Schreiber et al., 2006). Table 4.3 reports the model fit indices acquired from the path model. The RMSEA and SRMR value are 0.000, which is lower than 0.05, indicating an excellent fit. Additionally, CFI = 1.000 and TLI = 1.000 meet the cut-off criteria, and thus indicate that the model reasonably and appropriately fits the data (Schreiber et al., 2006; Hooper, Coughlan, and Mullen, 2008).

However, the standardized regression coefficients in the path model are associated with random disturbance terms. These indicate that the model stipulation could be adjusted and improved. Given the previous conceptual hypotheses, it is suggested that there might be reverse or feedback effects in the measurement model, particularly in relation to unemployment, immigration, and economic growth. It is therefore necessary to specify the relationships among these variables by means of a simultaneous-equations model.

4.4.2 Simultaneous-equations model

Unlike the previously discussed path model, the relationship between immigration and the labor market of the migrant-receiving country is, in fact, not a one-way relationship. Immigration not only affects the labor market of the host country but is also affected by it. In general, economies that enjoy relatively lower rates of unemployment, together with relatively high rates of growth, succeed in attracting migrant workers. At the same time, migrant workers contribute to the deceleration of the unemployment rate and tend to increase economic growth in the host country for several reasons.

First and foremost, immigration usually enables the expansion and/or formation of new labor markets. This then enhances employment in the host country, and hence contributes towards economic growth. Secondly, in some developing countries, especially Thailand, the new challenges of demographic transition and low fertility rate lead to insufficient labor force. Migrant inflow bringing an additional supply of labor results in an extension of the productive capacity of the host economy. Also, by expanding production capacity, migrant workers' inflow

Predetermined variables:

$URBAN_t$ = the number of persons living within urban settlements in period t

$AGRI_t$ = the number of native workers employed in the agricultural sector
in period t

$EDU_tertiary_t$ = the number of native workers who have completed tertiary education
in period t

Equation (4.1) shows that the inflow of immigration will be determined by economic growth, unemployment rate, and size of urban settlements in the host country. Based on the path analysis, it is expected that countries with relatively higher unemployment rates will experience relatively lower immigration rates. On the other hand, countries that enjoy higher growth rates and have larger urban areas are likely to attract more migrant workers. Therefore, the two coefficients of economic growth and urbanization, (α_2) and (α_3) , are expected to carry a positive sign, while the coefficient of unemployment (α_1) with respect to this equation is expected to have a negative sign.

Next, equation (4.2) tests the hypothesis that the unemployment level is identified by both demand for and supply of labor. Immigration is assumed to perform a dual role. First, it provides a factor input and assists or complements domestic workers to increase production capacity. Secondly, migrant workers foster consumption demand for local goods and services, which further induces demand for labor. Demand can also be dependent on income growth in the host country's labor market and the opening of new markets. Relatively high levels of income growth are likely to be linked with relatively low unemployment levels. Given the previous path analysis results, agricultural employment tends to create more job opportunities for domestic workers, thus decreasing unemployment. Thus all the coefficients of this equation, (β_1) , (β_2) , and (β_3) , are expected to carry a negative sign.

The third equation, with respect to equation (4.3), assumes that economic growth depends on unemployment level, population with high education level, and migrant worker

absorption. Countries that enjoy greater inflow of migrant workers and a more highly-educated population are expected to have higher growth, while countries experiencing high levels of unemployment are expected to have low income levels. Thus the two coefficients of immigration and emigration, (γ_1) and (γ_3), are expected to carry a positive sign, while the coefficient of unemployment (γ_2) of this equation is expected to have a negative sign.

The model identification issue, which involves the total number of structural equations and also the total number of variables (both exogenous and endogenous), must be considered a necessary condition when dealing with the simultaneous equation system (Greene, 2003). For a structural equation to be identified within a given measurement model, the total number of variables (both exogenous and endogenous) excluded from the equation should be above or equal to the total number of endogenous variables, or in other words, structural equations, less one, which can be written mathematically as follows:

$$T - N \geq E - 1$$

(Excluded variables) (Structural equations minus one)

where T = Total number of variables (both exogenous and endogenous) in the model

N = Number of variables that are included in the considered equation

E = Total number of endogenous variables, or structural equations, minus one

Therefore, if the number of variables excluded from the equation (T-N) is equal to the total number of endogenous variables minus one (E-1), then the equation is said to be exactly identified, whereas if the total number of excluded variables is more than the total number of endogenous variables less one, the equation is then over-identified. Otherwise, if the variables excluded are less than the total number of endogenous variables, then the equation is said to be under-identified.

In the present study, however, the above systems of simultaneous equations are mathematically complete in the way that they contain the number of equations as many as they contain the number of endogenous variables. By applying the identification condition, it can be

noticed that each equation in the simultaneous equations model is exactly identified. Therefore, the two-stage least squares (2SLS) method is suitable to estimate the coefficients of the model (Intriligator, 1978; Mittelhammer et al., 2000).

An important process before estimating the simultaneous equations model is to determine the properties of the time-series data, since the application of non-stationary data can lead to spurious estimated results. To this end, Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Dickey-Fuller GLS (DF-GLS) tests have been employed to examine the stationarity status or the degree of integration, or otherwise, of the time-series data. The empirical results of the ADF, PP, and DF-GLS tests are given in Appendix 4.1. According to these three unit root test results, all the variables adopted in the simultaneous equations model are stationary with the order of integration of either zero I(0) or one I(1).

Table 4.4 2SLS estimated results of the simultaneous equations model

Variable	Coef.	Std. Err.	P>z
<i>Immigration Equation (Dependent Variable: lnIMM)</i>			
lnUNEMP	-0.399**	0.177	0.024
lnGDP	-0.321	0.786	0.683
lnURBAN	4.402***	1.149	0.000
cons.	-47.620***	9.493	0.000
R ²	0.712		
<i>Unemployment Equation (Dependent Variable: lnUNEMP)</i>			
lnIMM	0.186	0.150	0.216
lnGDP	-3.269***	0.774	0.000
lnAGRI	-2.575***	0.415	0.000
cons.	145.460***	25.941	0.000
R ²	0.446		
<i>Aggregate Economic Growth Equation (Dependent Variable: lnGDP)</i>			
lnIMM	0.287*	0.151	0.057
lnUNEMP	0.056	0.047	0.237
lnEDU_tertiary	0.077	0.359	0.831

cons.	22.472***	3.469	0.000
R ²	0.563		

Note: Standard errors are in parentheses. *, **, *** indicate significance at 10, 5, and 1% level of significance, respectively.

Source: Author's calculation

With the use of the two-stage least squares (2SLS) method, the coefficients of the variables in the three estimated equations are mostly as expected. The regression results of the simultaneous equations model are reported in Table 4.4. The coefficients of the variables in the immigration equation (Equation 4.1) are largely as predicted. The regression results suggest that immigration is negatively related to unemployment but positively associated with urbanization. These indicate that while a lower rate of unemployment results in a greater inflow of migrant workers, the ability of urbanization development exerts a significant effect on the attraction of migrant workers in Thailand. The results also indicate that the ability of urbanization development has a much stronger effect on the attraction of immigration than unemployment in the case of Thailand. However, the coefficient for economic growth is negative but not statistically significant. Therefore, the results of the immigration equation imply that when describing immigration in Thailand, variables related to unemployment rates seem to be more relevant than economic growth, since potential immigrants are more concerned about the availability of jobs in the host country's labor market.

The regression results of the unemployment equation (Equation 4.2) are exactly as expected, except that the immigration variable is positive but not significantly different from zero. All the other coefficients in the equation are, however, significant at the 1 percent level, suggesting that while agricultural- or primary-sector employment and economic growth are negatively associated with unemployment, the inflow of migrant workers is not associated with unemployment level in the host country. Also, the second equation's results support the hypothesis that the low levels of unemployment in Thailand are strongly influenced by

employment in the primary or agriculture sector, which has been deeply rooted in the economic structure of Thailand for a long time.

The economic growth equation (Equation 4.3) results indicate the predicted relationship only with respect to immigration. That is, immigration has a statistically significant and positive effect on economic growth, supporting the hypothesis that economic growth is directly affected by the inflow of migrant workers. In other words, migrant workers, who are considered additional labor input, tend to increase economic output in the host country. Economic growth is positively related to a tertiary or high level of education, but it is not significantly different from zero. More surprisingly, however, the estimated coefficient of unemployment is positive but not statistically significant.

The present study also aims to estimate the parameters of the simultaneous equations model for the feedback relationships among immigration, unemployment, and economic growth. The results do not indicate that immigration is a determinant of unemployment in Thailand. However, exceptionally, there tends to be a strong feedback relationship between unemployment and immigration, where unemployment in Thailand leads to immigration. To be more specific, low unemployment levels in the host country attract migrant workers, but as migrant workers increase, unemployment levels do not increase. Economic growth is statistically a significant determining factor of unemployment, whereas unemployment seemingly has a far less significant impact on economic growth. Similarly, immigration is also a determining factor of economic growth, but economic growth is not a statistically significant determinant of immigration. Therefore, to summarize, growth in the host country's economy leads to a lower unemployment level. Hence, the low level of unemployment attracts more migrant workers to the country, which in turn leads to growth in GDP.

4.5 Conclusions

The primary purpose of this chapter is to explain how immigration affects and is affected by the labor market in Thailand, taking into explicit account the process of interaction and the possibility of feedback effects, which are usually ignored by the traditional single-equation immigration models. With the use of the most recent Thai data from 2007 to 2019, both the path model and the simultaneous equations model in which the non-stationarity problems are incorporated, which is very usual in the econometric time-series data, are constructed to capture any possible indirect effects and reciprocal causation.

The path analysis indicates the existence of indirect effects in the migration model. The negative indirect effects partially offset the positive direct effects of many variables, e.g. unemployment, agricultural employment, and tertiary education, on immigration. Only with respect to urbanization is the direct effect, in contrast, compounded by the positive indirect effects of unemployment and economic growth. The simultaneous equations model results suggest that a lower rate of unemployment appears as one of the main causes for a greater inflow of migration. This aspect is very important as these migrant workers tend to be more concerned about the availability of jobs in the labor market of the receiving country. Thus immigrants are attracted to the high employment rate and the availability of jobs and react negatively towards any increase in the unemployment rate in Thailand. The empirical results also point to the importance of urbanization in the migrant-receiving country. Therefore, the importance of infrastructure development, agglomeration of people and businesses, and economic activity can promote Thailand as a destination country for migrant workers.

Based on the regression results, the variable of agricultural employment can serve to highlight the fact that the historical background of Thailand has mainly relied on a primary or labor-intensive agricultural sector, and to date, most of the population are still employed in this sector. Consequently, the major employment sector is negatively related to unemployment. The regression results also support the hypothesis and previous studies' assertions that

unemployment levels are strongly influenced by economic growth, in which higher economic growth leads to lower unemployment levels in the labor market. Furthermore, as might have been expected, immigration contributes positively to economic growth in Thailand. Thus the implementation of policy and regulatory improvement concerning economic activities and investment facilitation may generate a welcoming stance to migrant workers, particularly high-skilled ones.

It should also be noted that there are some limitations in the use of the path model and simultaneous equations model in this study. The first limitation arises for the specification error, or, in other words, the wrong model, which involves the model misspecification and omission of the relevant variables. Therefore, the subsequent difficulty is to identify the specification of the correct equation based on substantive theory. Owing to a lack of specific theory regarding immigration behavior, it is usually too difficult to propose the precise and particular functional form of the equations in the model. It is also too informal to recognize a unique causal model, especially when latent (or unobserved) variables are included, since several alternative causal structures might potentially be more complex and evenly compatible with the choice of data substantially increased. However, from a methodological viewpoint the simultaneous equations model is considered useful because it takes explicit account of the causal linkages and captures any possible reciprocal causations that are more appropriate than others. It also helps to formalize verbal frameworks or theories. Hence it allows us to identify the research gaps within these theories and, in this case, provides supplementary knowledge for understanding the phenomenon of immigration in the Thai labor market.

CHAPTER 5 IMMIGRATION PATTERNS AND ECONOMIC GROWTH BY REGIONS IN THAILAND

5.1 Introduction

Over the last two decades, immigration has made an increasingly significant contribution to Thailand's regional economic growth. Tipayalai (2020) explained how an increase in migrant workers, especially high-skilled ones, has led to a more efficient distribution of resources, which has subsequently led to an increase in regional economic growth and productivity in Thailand. The increase in economic growth can cause a country to shift its labor-intensive resources to more innovation-led economic development, and this creates improvement in human capital, quality of labor, and wages, which in turn leads to further increase in migration inflow. Although previous studies have shown inconsistent findings on whether immigration can stimulate long-term economic growth, they all agree that immigration is considered to be one of several drivers of economic growth and productivity. Hence, its contribution is dependent on its role in economic activity. In addition, regions with more migrant workers tend to be more productive than regions that have only domestic workers. This is because migrant workers who possess skills and knowledge bring in new innovation and resources, thus leading to greater economic growth through the process of technological transfer and knowledge spillover (Bretschger, 2001; Hunt, 2011).

However, in recent years, the importance of spatial spillover and proximity has been used to explore a possible influence on regional economic growth. According to the first law of geography developed by Tobler (1979), which states that "everything is related to everything else, but near things are more related than distant things", interactions among contiguous regions are relevant as no region in an open economy is isolated. Exchanges of information, communication, technology, and products have always occurred. Moreover, knowledge transfer, technology diffusion, and labor migration both internally and internationally, testify that

economies are actually related or spatially dependent on each other. Therefore, the analysis of proximity or spatial spillover in the process of regional economic growth cannot be neglected.

The regional economic development under the national policy of Thailand 4.0, i.e. the Eastern Economic Corridor (EEC), is accompanied by the challenge of economic convergence in which poorer economies in less developed regions can catch up to wealthier economies in more developed regions. However, a widespread perception of Thailand's economic growth process is the presence of vast economic disparity and inequality across Thai regions. Accordingly, the essential argument for Thai regional growth policy is that balanced regional development should be a prerequisite for increased competitiveness and social cohesion within the country. Income disparities and convergence in Thailand and its regions, therefore, still remain an important study area, as they can further provide the effective implication and development of Thai regional growth policies.

The new economic geography approach provides an explanation for the persistent regional inequalities, given the importance of spatial dependence in regional growth processes and geography in shaping economic activities. As immigration is considered one of the major catalysts of the economic growth process, it is useful to understand how immigration affects or is affected by the geographical concentration and spatial spillover of regional development and economic growth processes. Furthermore, Thailand has recently been focusing on balanced regional development, in which inclusive growth is an essential aspect. While many studies have emphasized measurement of economic performance within the assumption that economies are assumed to be independent of each other, research that recognizes the role of geography and space in Thailand's economic development process is still relatively scarce. Moreover, none have investigated the spatial patterns and characters of immigration and regional economic growth.

This chapter aims to understand the significance of space and spatial spillovers in immigration and Thailand's regional growth processes and tries to offer more specific

information regarding regional economic convergence. Particular emphasis is placed on the development of income disparities among Thailand's regions and their differences in the economic growth process. In addition, this chapter is the first attempt to focus more on the spatial patterns and characteristics of immigration and regional economic outcomes, i.e. income per capita and native employment. By comparing these for different regions of Thailand, it will provide a better understanding of how immigration and regional economic outcomes are spatially dependent and correlated. Also, based on the results of this chapter's analysis, some suggestions for how regional growth policy may reduce income disparities and attain balanced economic development among Thailand's regions will be proposed.

In this chapter, regional income disparities and convergence in Thailand's 77 provinces will be analyzed covering the 23-year period from 1995-2017. These years also cover the first period of the introduction of foreign labor (the result of Thailand's economic structural transformation). In order to do so, income per capita at the regional level at current market prices will be used to estimate both sigma and beta convergence, as well as club convergence to identify the regional income convergence both on average and beyond the average. Moreover, since the regional growth process may be influenced by spatial dependence, exploratory spatial data analysis will be applied to identify the spatial patterns of immigration and regional economic outcomes in Thailand. Applying this technique will allow us to see how immigration and regional economic outcomes exhibit their different spatial characteristics.

This chapter comprises five sections. The following section (Section 5.2) reviews earlier empirical studies and literature related to regional income convergence and the economic growth process. Section 5.3 explains the variables and data used, and the methodologies adopted in this chapter. Section 5.4 presents the regional growth analysis and discusses the empirical results of this study, while the concluding remarks with some suggestions for policy implications are provided in the last section (5.5).

5.2 Summary of theoretical and literature review

In general understanding, the concept of economic convergence is the decrease of inequalities or disparities between economies or regions. Without a doubt, regional income convergence has become the main goal of regional economic development, as well as the most topical issue to study for most development economists. Theoretically, there are two major underlying concepts regarding the economic growth process – neoclassical growth or Solow growth theory, and the endogenous growth model.

According to Solow (1956), regional economic growth in neoclassical growth theory is based on three main input factors: labor, physical capital, and technological progress. The wealthier economies or regions tend to occupy more capital in their production processes. However, an increase in capital or investment will lead to diminishing returns (or decrease in marginal returns) to capital, and hence slow down economic growth. Trade openness or international trade, foreign direct investment, capital flows, and international labor migration are considered prerequisites for reducing disparities in production and productivity between countries and regions. Therefore, in open economies in the real world, labor tends to move to the developed or rich regions owing to more job opportunities with higher wages, while capital, on the other hand, will flow from developed regions to developing ones and hence enhance their economic growth and minimize the gaps between regions (Armstrong and Taylor, 2000). Moreover, Rey (2001) suggests that technology transfers and the dispersion of innovations across regions can result in economic convergence. That is, developed or advanced regions usually create new innovations and technology, and poorer regions then adopt these new technologies from the developed ones at lower costs than the actual costs of inventing them.

In contrast to neoclassical or Solow's growth theory, the endogenous growth model considers the concepts of human capital and technology as endogenous growth factors that generate increasing returns and drive economic growth (Romer, 1986). When human capital and technology are considered important factors in the economic growth process, it is no longer

possible to assume that there are diminishing returns to scale. Thus, regions with income and knowledge differences may not be able to catch up or converge with each other even if technology, saving rates, and capital are similar among these regions. It is unfortunate that most convergence studies only focus on the concept of production factors in both neoclassical and endogenous growth theory, meaning that the role of geography or space in economic activity is often ignored. However, the approach of New Economic Geography (NEG), heavily based on trade theory, explains the regional growth process by the agglomerations or dispersions of economic activities across geographical space.¹⁶ NEG describes the pattern of spatial agglomeration or dispersions of regions as due to the preconditions of imperfect competition, input prices, transport costs, and agglomeration externalities such as knowledge and technological spillovers. Furthermore, NEG highlights the significant role of geography or space in the regional growth process. As well as the aforementioned determinants, the economic growth process of a particular region also depends on its location and neighboring regions, in which backward or poorer regions may have more opportunities for development if they are surrounded by advanced or richer neighbors.

Though theoretical studies have suggested that geography and labor market externalities are the key factors in spatial agglomeration of economic activities, empirical studies investigating regional economic disparities and convergence have still lagged behind. Studies of economic convergence and income disparities between regions have become more popular over the past two to three decades.¹⁷ In Barro and Sala-i-Martin's (1991) cutting-edge study,

¹⁶ For reviews of the New Economic Geography approach, see Krugman (1991); Fujita et al. (1999); Martin and Ottaviano (1999); and Baldwin et al. (2003).

¹⁷ See, for example, Barro and Sala-i-Martin (1991); Armstrong (1995); Sala-i-Martin (1996); Rey and Montouri (1999); Webber and White (2004); Chowdhury (2005); Ertur et al. (2006); Ismail (2008); Liviu-Stelian et al. (2014); Mutaqin and Ichihashi (2012); Li et al. (2018); and Mohanty and Bhanumurthy (2018).

they adopted neoclassical growth theory as an underlying framework to study economic convergence across 48 US states since 1880 and 73 regions of Western Europe since 1950, using data on both personal income and gross state product. Significant convergence was found in the European regions similar to that in the US states. These results were then exploited as reference for later studies during the same periods.

Sala-i-Martin (1996) has applied the concepts of sigma (σ) convergence (occurs if income inequalities across regions decrease over time) and beta (β) convergence (occurs if poorer regions tend to grow faster than richer ones) to several datasets, i.e. 110 countries in the world, OECD countries, 90 regions in Europe, 48 states in the US, and 47 prefectures in Japan. He discovered strong evidence of both sigma and beta convergence for all datasets, except for the 110 countries in the world. Additionally, slowdown in the convergence process was found to be consistent across all datasets, with a speed of two percent per year. Subsequently, Webber and White (2004) applied this idea to examine the existence of convergence across 97 countries from 1960 to 2000. They found the existence of both beta and sigma convergence across countries during their study period.

In the study of convergence hypothesis in ASEAN countries, to the best of my knowledge, Chowdhury (2005), using data from the World Bank, was the first to analyze the convergence of income per capita across 9 ASEAN countries at that time for the period 1960-2001. The empirical results from his study failed to identify evidence of beta and conditional beta convergence. He also suggested that no evidence of per capita GDP convergence in ASEAN countries could be explained by the slow growth of exports and imports, low volume of domestic trade, and low-income growth of each individual country. In a more recent study, Li et al. (2018) have tested convergence clubs on economic growth at the county level (2286 counties) in China from 1992-2010. The authors found evidence of convergence club patterns, forming six multiple convergence clubs across counties of China.

To study the role of spatial autocorrelation or dependence in a regional growth study, Rey and Montouri (1999) first analyzed patterns of economic convergence across the U.S. states and found significant evidence of spatial dependence in both per capita state income levels and per capita state growth rates. They further showed that the spatial movements of states in the convergence process are not independent of each other; rather, they tend to be similar to their neighboring states. Ertur et al. (2006) used spatial econometric methods to estimate the spatial autocorrelation and heterogeneity in 138 European regions during the period from 1980 to 1995. By using exploratory spatial data analysis (ESDA), the tests reveal spatial autocorrelation as well as spatial heterogeneity in the form of dual spatial clusters where the high-income regions are surrounded by high-income regions and low-income regions are surrounded by low-income regions. By using spatial error models, the estimations show that the convergence process is different across spatial clusters. More recently, Mohanty and Bhanumurthy (2018) also used ESDA to explore the spatial dependence and spatial heterogeneity of outcomes and determinant variables in the economic growth process for 14 states of India. They detected both spatial autocorrelation and heterogeneity across regions, in which there is a formation of different spatial clusters, i.e. clusters of rich states, clusters of poor states, and spatial outliers. Additionally, the study found that the patterns of outcomes (i.e. income per capita level, income growth rates, and employment) correspond with the possible determinant variables (i.e. infrastructure, FDI, shares of manufacturing, and service sector in regional output) in space.

From all of the above, it can be considered that the empirical results vary among studies depending on methods, sample regions, or countries, as well as sample periods. However, no earlier study has provided clear evidence of economic convergence and the spatial effects of immigration in the regional growth process in Thailand and its regions. Thus the present empirical study, by employing spatial econometric analyses, will provide some input for addressing this research gap.

5.3 Data and methodology

In this section, the methodologies and statistical tools employed in this chapter are presented, and the data sample and data sources are described. Given that there is wide income disparity and inequality across Thai regions and an absence of previous studies in the spatial character of immigration and economic outcomes in the context of Thailand, this chapter attempts to understand more about income disparities and convergence among regions as well as the spatial pattern of immigration in the economic growth process at the regional level.

The regional economic growth outcomes are defined by Gross Provincial Product per capita (GPP) and native employment (the total number of employed workers) in each region (province). In contrast to the earlier chapters, native employment is included instead of the unemployment rate since the essential determinant of inclusive growth is overall employment or job creation within a country. The only determinant of the immigration process is the immigration rate, which indicates the total number of migrant workers in each particular region.

The dataset comprises 77 major Thai provinces.¹⁸ The data on GPP per capita in the 2002 reference year is sourced from the Office of the National Economic and Social Development Board of Thailand (NESDB). The data on employment are from the Thai Labor Force Survey of the National Statistical Office of Thailand (NSO), while that on immigration is from the Foreign Workers Administration Office of Thailand (FWAO), Ministry of Labor. Using an annual Thai dataset for a period of 23 years from 1995-2017, tests and analyses are performed using the statistical software Stata 16.1 and GEODA.

¹⁸ The latest 77th province of Thailand, as established by the Act Establishing Bueng Kan Province, BE 2554 (2011) on 23 March 2011, is Bueng Kan province. The province lies in the Northeastern region of Thailand, partitioning off Nong Khai province.

5.3.1 Classical convergence: Beta and Sigma convergence

Baumol (1986) formulated the concept of beta (β) convergence, which is a widely and commonly used method for various studies of convergence to this day.¹⁹ Beta (β) convergence refers to a process in which backward or poor economies tend to grow faster than advanced or rich ones, defined as a negative correlation between initial income level and income growth rate. Hence, beta (β) convergence can be examined by the following regression equation:

$$\log y_{i,t} - \log y_{i,t-T} = \alpha + \beta \log y_{i,t-T} + \varepsilon_t \quad (5.1)$$

where $\log y_{i,t}$ is the natural log of income per capita at the final time period; $\log y_{i,t-T}$ is the natural log of income per capita at the initial time period; and ε_t is the vector of the error term. Also, in respect of the above equation, a negative and significant value for β implies the presence of beta (β) convergence (or when $\beta < 0$), while a value of β greater than or equal to zero (or when $\beta \geq 0$) suggests non-convergence.

Though the relationship between the traditional growth and initial income level or beta (β) convergence is necessary for the study of convergence, it does not offer a definite answer regarding convergence as the correlation may be found in a negative value even if economic inequalities (or income differences) across regions are not decreased.²⁰ Therefore, the study of sigma (σ) convergence has become of interest because it directly addresses whether income among regions is distributed more evenly, or in other words, whether income disparities across economies have decreased over time. Sigma (σ) convergence can be estimated by the following equation:

¹⁹ For empirical studies that employed the method of beta convergence, see Barro and Sala-i-Martin (1992); Ismail (2008); Young, Higgins, and Levy (2008); and Mutaqin and Ichihashi (2012).

²⁰ For example, the studies of Barro and Sala-i-Martin (1991); Quah (1993); Sala-i-Martin (1996); and Young, Higgins, and Levy (2008) found the negative correlation between the initial income and growth level. However, the income disparities across regions were not decreased throughout the years.

$$\sigma_t = \gamma + \rho_t + \varepsilon_t \quad (5.2)$$

where σ_t is the standard deviation of all regions at time t ; γ and ρ are parameters, and ε_t is the vector error term. The sigma (σ) convergence occurs when the value of ρ is negative and significant (or when $\rho < 0$), while $\rho \geq 0$ suggests non-convergence. Also, it should be noted that the existence of beta convergence does not sufficiently provide a condition in which sigma convergence is also present.

5.3.2 Multiple convergence club

The study of convergence club has become more popular among scholars since traditional convergence methods were heavily criticized for their failures in determining individual heterogeneity and developmental paths across economies. According to Bernard and Durlauf (1995), convergence phenomena may still exist within groups of economies with similar conditions and structural characteristics, even though the whole economy cannot achieve a state of convergence. The concept of convergence club, therefore, is determined by economies or groups of regions that share similar initial conditions, such as income per capita, education level, and human capital, and have a steady-state equilibrium of economic transitions. The differences in structural characteristics across regions, such as shortage of resources, insufficient technology and infrastructure, and poor education, found in most backward economies, act as barriers that prevent them from leaping from their level to a higher level of club convergence. Thus multiple convergence clubs are helpful for investigating the economic development of a particular region with respect to other regions and identifying the differences or similarities between regions.

In order to identify the presence of convergence clubs across regions, the log t regression test developed by Phillips and Sul (2007) can be used. To construct the log t convergence test regression, first the panel data is decomposed as:

$$\log y_{it} = \theta_i \mu_t + \varepsilon_{it} \quad (5.3)$$

where y_{it} denotes per capita income, θ_i represents the unit-specific component, μ_t represents the common component, and ε_{it} is the error term. The classical panel data is further transformed to indicate a time-varying factor by separating common components, as follows:

$$\log y_{it} = \left(\theta_i + \frac{\varepsilon_{it}}{\mu_t} \right) \mu_t = \delta_{it} \mu_t \quad (5.4)$$

where δ_{it} is an idiosyncratic component that varies over time, and μ_t is a common factor. By removing the common factor, the relative transition parameter is then defined as follows:

$$h_{it} = \frac{\log y_{it}}{\frac{1}{N} \sum_{i=1}^N \log y_{it}} = \frac{\delta_{it}}{\frac{1}{N} \sum_{i=1}^N \delta_{it}} \quad (5.5)$$

where h_{it} denotes the relative transition parameter, which eliminates a common transition path of economic unit i in relation to the cross-sectional average. Under the convergence condition, all economic units must follow the same transition path in which the mean of the relative transition parameter converges to unity (or $h_{it} \rightarrow 1$) and the cross-sectional variance of the relative transition parameter (V_{it}) converges to zero, expressed as follows:

$$V_{it} = \frac{1}{N} \sum_{i=1}^N (h_{it} - 1)^2 \rightarrow 0, \text{ when } \lim_{t \rightarrow \infty} \delta_{it} = \delta \quad (5.6)$$

Then the log t regression test model of Phillips and Sul (2007) can be written as follows:

$$\log \left(\frac{V_1}{V_t} \right) - 2 \log(\log(t)) = a + b \log(t) + \varepsilon_t, \quad (5.7)$$

for $t = [rT], [rT] + 1, \dots, T$ and $r > 0$

For the sample T , which is less than 50, the Monte Carlo simulations suggested setting r equal to 0.3. Further, Phillips and Sul (2007) showed that the parameter b is associated with the value of α in the null hypothesis, where $b = 2\alpha$. The null hypothesis of $\alpha \geq 0$ can be conveniently tested by a one-sided t -test robust to HAC (Heteroscedasticity and Autocorrelation). If the robust t -statistic for the coefficient b is less than -1.65 (or $t_b < -1.65$), then the null hypothesis of convergence can be rejected at the 5% significance level.

5.3.3 Exploratory spatial data analysis

The motivation for applying spatial estimation techniques in this chapter is obvious. As spatial dependence and spillover effects are significant in immigration and Thailand's regional growth processes, considering regional economies as isolated units may give wrong and incomplete results. Therefore, exploratory spatial data analysis is conducted to investigate the spatial character and pattern of immigration and economic outcomes in Thai regions.

5.3.3.1 Global spatial autocorrelation and Moran's scatter plot

According to Anselin (1995) and Anselin et al. (2007), global spatial autocorrelation indicates the spatial cluster of a variable as a whole in which the magnitude or level of the linear relationship between the value of an original variable at a particular location and the spatially lagged values of variables at contiguous locations is measured. The widely used tool for examining global spatial autocorrelation is Moran's I statistic, given as follows:

$$I_t = \frac{N}{\sum_{i=1}^n \sum_{j=1}^n w_{ij}} \left[\frac{\sum_{i=1}^n \sum_{j=1}^n w_{ij} (X_i - \bar{X})(X_j - \bar{X})}{\sum_{i=1}^n (X_i - \bar{X})^2} \right] \quad (5.8)$$

where N is the number of observations (or the number of regions); \bar{X} is the mean of the variable; X_i is the value of a variable at a particular location; X_j is the value of a variable at another location; and w_{ij} is an element of binary spatial weights matrix of regions i and j , in which $w_{ij} = 1$ if i and j are neighboring regions, and $w_{ij} = 0$ if otherwise. Hence, Moran's I statistic is the correlation coefficient for the relationship between a variable and its neighboring values. It should also be noted that $I_t \in [-1, 1]$, in which a value of Moran's I statistic close to 1 shows a positive spatial autocorrelation (a cluster of only high or low values), while Moran's I statistic closes to -1 indicates a negative spatial autocorrelation (a cluster of both high and low values). However, the value of Moran's I statistic, which closes to zero, shows a random distribution across space.

By using spatial econometric methods, a binary spatial weight matrix can be classified as a contiguity-based and a distance-based matrix. The contiguity-based spatial weight matrix

is measured by the contiguous or neighboring regions (or countries) which share common borders and vertices, as depicted on the map. It is also the simplest and most frequently used binary weight matrix. On the other hand, the distance-based spatial weight matrix is measured by the distance values between observational regions (or units), using the longitude and latitude location depicted on the map. As a result of spatial spillover effects, regions that are closer to each other should reflect a higher degree of spatial autocorrelation or dependence than those that are further apart.

Moran's scatter plot regresses the values of the spatially lagged variable on the original variable in which the slope of Moran's scatter plot indicates the value of Moran's I statistic, and hence divides the spatial association among regions into four particular categories. These are groups of *high-high* spatial autocorrelation (regions with high values surrounded by high-value regions), located in the upper right quadrant; groups of *low-high* spatial autocorrelation (regions with low values with high-value neighbors), located in the upper left quadrant; groups of *low-low* spatial autocorrelation (low-value regions surrounded by low-value regions), located in the lower left quadrant; and groups of *high-low* spatial autocorrelation (regions with high values surrounded by regions with low values), located in the lower right quadrant. Therefore, the presence or absence of spatial heterogeneity, as well as spatial outliers, can be identified by Moran's scatter plot.

5.3.3.2 Local indicators of spatial association (LISA)

Local Moran's I statistic or LISA was first introduced by Anselin (1995) to capture the existence of the spatial clusters and/or outliers for a particular region. The significant locations can be classified as *high-high* clusters (or hot spots) and *low-low* clusters (or cold spots), while the spatial outliers are those in *high-low* or *low-high* clusters represented on the map. The equation of Local Moran's I statistic or LISA for region i and year t is represented as:

$$I_i = \left(\frac{X_i - \bar{X}}{s_0} \right) \sum_{j=1}^n w_{ij} (X_j - \bar{X}), \text{ with } s_0 = \sum_{i=1}^n \frac{(X_i - \bar{X})^2}{n} \quad (5.9)$$

where $I_i > 0$ indicates positive spatial autocorrelation (or spatial clusters), a region is similar to surrounding regions; where $I_i < 0$ indicates negative spatial autocorrelation (or spatial outliers), a region is different from surrounding regions. Also, the global Moran's I is equivalent to the average of Local Moran's I statistics for each region, in which $I = \sum_{i=1}^n \frac{I_i}{n}$.

5.4 Empirical results and discussion

This section firstly presents the results of regional convergence analysis in all regions (provinces in this case) of Thailand, followed by the investigation of club convergence, and the spatial characteristics and patterns of immigration and regional economic outcomes (i.e. income per capita and native employment) in the final sub-section.

5.4.1 Classical convergence in Thailand's regions

In order to examine the classical convergence in this chapter, beta and sigma convergence for the natural log of income per capita for all provinces of Thailand have been initially analyzed. Beta (β) convergence can be tested by growth and initial income level regression in which the annual growth rate of the natural log of economic output measured by income per capita is regressed over the natural log of income per capita in the initial year (i.e. 1995). Beta (β) convergence occurs if the coefficient of the regression result shows a negative and significant coefficient. This implies that a percentage increase in the annual economic growth rate is caused by a decrease in the percentage of economic output in the initial level (see Equation 5.1), or in other words, backward or poor economies tend to grow faster than the advanced or rich ones. In this study, the graph of the growth-initial level regression can be seen in Figure 5.1. Table 5.1 indicates also evidence of beta (β) convergence as the coefficient of the growth-initial level regression is negative and highly significant at the 1 percent level, equal to -0.011. This shows that backward or poorer provinces grow faster than advanced or richer provinces in Thailand.

Figure 5.1 Beta convergence of income per capita for all provinces of Thailand

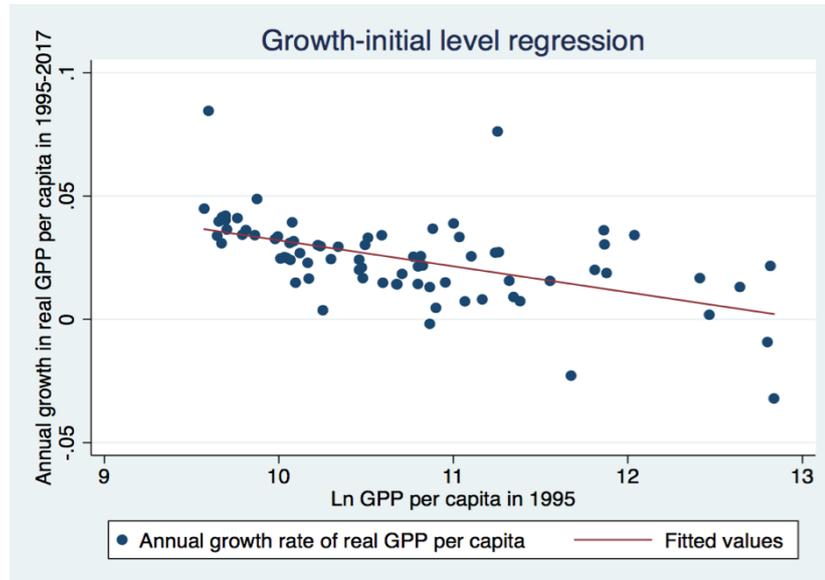


Table 5.1 Results of beta convergence for all provinces of Thailand

	Annual Growth of GPP Per Capita
β	-0.011
R-squared	0.283
p-value	0.000
No. of Obs.	77
Convergence	Yes

Note: 1. The regression includes a constant term, which is not presented in this table.
 2. Missing data in Buengkan province is interpolated using linear regression presented in Appendix 5.1

Source: Author's calculation

According to the estimation of sigma (σ) convergence, the standard deviation of all provinces of Thailand is calculated at one time first. It is then regressed to measure sigma convergence for all periods (i.e. from 1995 to 2017). Sigma (σ) convergence occurs if the calculated standard deviation of average income per capita decreases over time (see Equation 5.2), or in other words, if the inequality of per capita income across the Thai regions has declined over time. Figure 5.2 presents the graph showing the time series of the standard deviation of the per capita income for all provinces of Thailand. Moreover, the result in Table 5.2 shows a decrease in the standard deviation of income per capita for all provinces of Thailand

over time with a negative value of -0.013, suggesting the presence of sigma (σ) convergence. This implies that inequalities between wealthier and poorer provinces within Thailand are declining over time and that regional economies within the country are converging in the aspect of income disparity.

Figure 5.2 Sigma convergence of income per capita for all provinces of Thailand

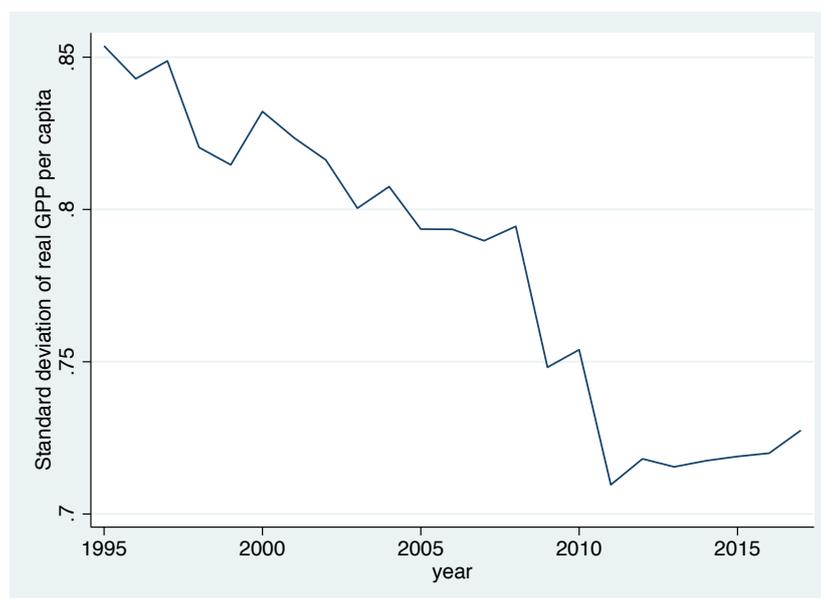


Table 5.2 Results of sigma convergence for all provinces of Thailand

	Annual Growth of GPP Per Capita
ρ	-0.013
R-squared	0.049
p-value	0.000
No. of Obs.	77
Convergence	Yes

Note: 1. The regression includes a constant term, which is not presented in this table.
 2. Missing data in Buengkan province is interpolated using linear regression presented in Appendix 5.1
 Source: Author's calculation

From the findings of this study, both beta and sigma convergence can be seen in all provinces of Thailand for the natural log of income per capita from 1995 to 2017. This supports the convergence hypothesis that, on average, economic convergence exists in Thailand at the

regional level, suggesting that poorer economies in backward regions are catching up with wealthier economies in advanced ones. However, the possible existence of multiple club convergence may be a common concern regarding traditional or classical convergence analysis, in regard to whether, beyond the average, income convergence does still exist. Accordingly, the next sub-section also applies Phillips and Sul (2007)'s log t regression test to estimate the existence of convergence clusters.

5.4.2 Multiple convergence clubs in Thailand's regions

By applying Phillips and Sul's (2007) log t regression test, the possibility of economic growth club convergence for 77 provinces across Thailand can be investigated. Since the coefficient was significantly less than zero, equal to -0.410, and the t -statistic value (calculated as -17.744) was less than -1.65, the null hypothesis of convergence was rejected at the 5% significance level (Table 5.3). Therefore, global convergence was not found for all 77 provinces of Thailand at the 5% level, implying that no steady state of regional economic convergence could be found in Thailand.

Table 5.3 Results of the log t regression test for all provinces of Thailand

Variable	Coeff.	SE	T-stat
log (t)	-0.410	0.023	-17.744
No. of Obs.	77		
Year	23		

Note: The null hypothesis of convergence is rejected at the 5% level when the t -statistic is less than -1.65.

Source: Author's calculation

Accordingly, the convergence club classification method was then used to identify multiple convergence clubs. The results of the convergence club identifications of income per capita for all provinces of Thailand over the period of 1995-2017 are reported in Table 5.4. The 77 provinces of Thailand were classified into three subgroups (or clubs), as shown in the first column of Table 5.4. The second column gives the fitted coefficients of each subgroup with the

t-statistic values in parentheses. The middle columns of Table 5.4 then show the results of club merging tests. This is to examine whether the initial clubs can possibly be merged or combined to create larger convergence clubs. Based on the results obtained from the analysis of club merging, none of the original clubs can be merged. Therefore, the three clubs are then taken to create separate convergent clubs, as shown in the right column (labeled as Final Club) of Table 5.4. The last panel of Table 5.4 exhibits the convergent club differences in terms of average income per capita. To illustrate, Club 1 is explicitly different from the other clubs as its income per capita is 248,606, which is much higher than the others. Thereby, Club 1 can be represented as a high-income club, whereas Clubs 2 and 3 can be represented as middle- and low-income clubs, respectively.

Table 5.4 Convergence club classifications for all provinces of Thailand

Initial Club		Club Merging Tests		Final Club		Average GPP per capita (1995-2017)
Club (provinces)	Coeff. (t-stat)	Coeff. (t-stat of Coeff.)	Club (provinces)	Coeff. (t-stat)		
Club 1 (12)	0.711 (6.249)	Club 1+2 -0.278* (-8.512)	Club 1 (12)	0.711 (6.249)	248,606.30	
Club 2 (42)	0.010 (0.226)		Club 2 (42)	0.010 (0.226)		
Club 3 (23)	0.174 (3.941)	Club 2+3 -0.177* (-6.102)	Club 3 (23)	0.174 (3.941)	40,046.22	

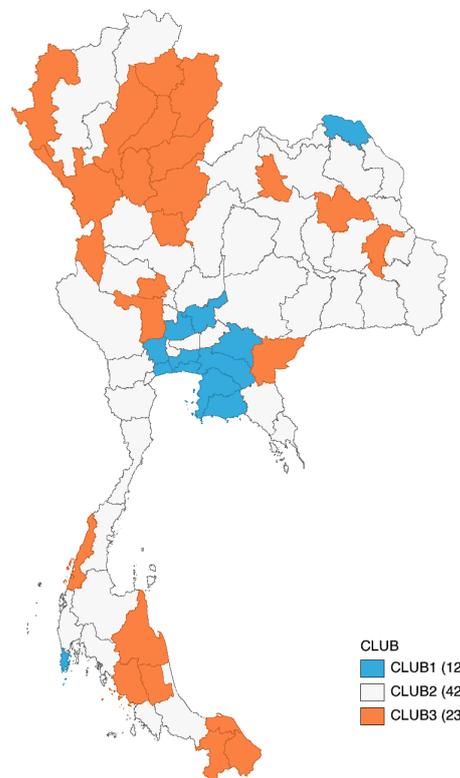
Note: The null hypothesis of convergence is rejected at the 5% level when the t-statistic is less than -1.65. The unit of GPP per capita is millions of baht. The list of provinces in each club is presented in Appendix 5.2.

Source: Author's calculation

Furthermore, the GEODA software was used to spatially characterize the convergence club distributions. Figure 5.3 shows the convergence club distributions for all Thai provinces from 1995-2017 in more detail. The convergence club distributions illustrate the spatial patterns of regional clusters within the country. For instance, Bangkok and the Vicinities, and provinces in the Eastern region clusters form high-income club groups (as shown in the blue color), while the low-income club groups are mostly found in provinces located in the Northern region (as

shown in the red color). The capital city of Thailand, Bangkok and all Eastern Economic Corridor (EEC) provinces (Bangkok, Chachoengsao, Rayong, and Chonburi) are more likely to be considered high-income areas, suggesting that the level of administration and scale of a province significantly affect the distribution of convergence club. Also, regional population densities are high, infrastructure and other facilities (such as roads, railways, highways, airports, and seaports) are abundant, and the number of manufacturing industries in these regions is relatively high, which are the major factors of the relatively high income per capita of these provinces. The middle- and low-income club areas which are dispersed in most parts of the country exhibit the spatial patterns of poverty distribution.

Figure 5.3 Convergence club distributions for all provinces of Thailand



Source: Created by the author using GEODA software

Therefore, the economic convergence study can be more easily represented in a group of regions or a subset of provinces in the country that share some common characteristics. To conclude, the results of convergence club analysis indicate that beyond the average, there are

three convergence club characteristics of regional income: one with the group of the wealthiest provinces, the group of the poorest provinces, and the remaining group of middle-income provinces.

Nevertheless, this chapter further applies Moran's *I* spatial autocorrelation in order to confirm the existence of spatial clusters as well as to investigate the spatial patterns of regional economic growth, immigration, and employment processes, and whether they are random or have a similar character across space. That is, whether regions (or provinces in this case) with similar growth and development level are agglomerated together or scattered apart (where more developed regions are surrounded by less developed ones or vice versa).

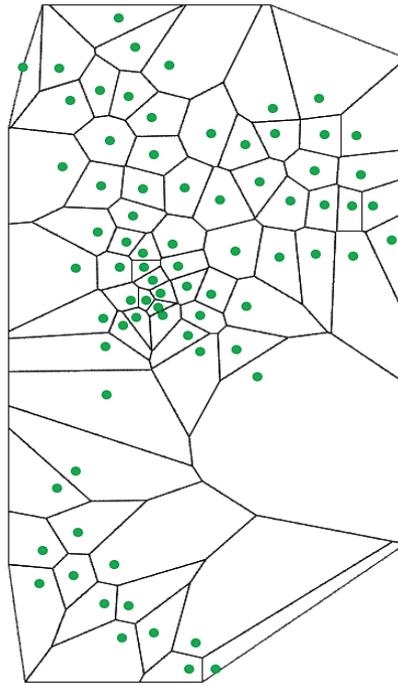
5.4.3 Spatial character and pattern of immigration and regional economic outcomes

5.4.3.1 Moran's *I* spatial autocorrelation

In order to estimate the values of Moran's *I* statistics for immigration and regional economic outcomes, i.e. GPP per capita and native employment, the spatial weight matrix has to be computed first (see Equation 5.8). Since one province of Thailand, Phuket, is an island that does not share any neighbors to the mainland, the locations of capital cities for all provinces have been used to estimate Thiessen polygons (for more details see Yamada 2016) and recover a contiguity-based matrix from distance data. Figure 5.4 shows the Thiessen polygons of the Thai provinces. The binary weight matrix for Moran's *I* statistics then adopts first-order (only direct neighbors included) queen-contiguity weights, where the neighboring regions (provinces) are specified as the regions that share the common borders and vertices.²¹

²¹ Other spatial weights apart from contiguity-based spatial weights are included distance-based spatial weights (e.g., provinces within 100 km) and k-nearest neighbors (e.g., the two nearest or closest provinces). These spatial weights are appropriate for examining the characteristics of the weights in the isolated or neighborless locations (e.g., regions in Indonesia or provinces in the Philippines).

Figure 5.4 Thiessen polygons of Thailand's provinces



Source: Created by the author using GEODA software

The results of Moran's I statistics for immigration and regional economic outcomes are illustrated in Table 5.5. The Moran's I values are positive for all variables which show the presence of positive spatial autocorrelation. This suggests that immigration patterns, as well as regional economic growth processes, are clustered across space, and thus any attempts to foster economic growth or to understand migration inflow in one region (province) should not be isolated from its neighboring regions.

Table 5.5 Moran's I value for immigration and regional economic outcomes

Year	Immigration	GPP per capita	Native employment
2006	0.461	0.161	0.496
2017	0.400	0.142	0.593

Source: Author's calculation

While the Moran's I value only provides the agglomerations of the entire regions as a whole, the scatter plots of Moran's I can demonstrate the composition of the regional

agglomerations and also determine which regions (or provinces) diverge from the overall trend. Figures 5.5, 5.6, and 5.7 gives Moran's scatter plots for immigration, income per capita, and native employment. The horizontal alignment (x axis) portrays the initial standardized value of the variable, where the points on the left (or right) side refer to the variables that have lower (or higher) values than the average. Similarly, the vertical alignment (y axis) shows the lagged values of the initial variable, where the points on the upper (or lower) part of the zero-mean horizontal line in the middle correspond to the variables that have high (or low) values. As a consequence, both horizontal and vertical scatter plots divide the dataset into four particular groups. The first group in the top right (known as Quadrant 1) is the group of high-value provinces surrounded by high-value neighboring provinces, thereby defined as *high-high* spatial autocorrelation (or HH provinces). The second group in the top left (known as Quadrant 2) is the group of low-value provinces but surrounded by high-value neighboring provinces, thereby defined as *low-high* spatial autocorrelation (or LH provinces). The third group in the bottom left (known as Quadrant 3) is the group of low-value provinces with low-value neighbors, thereby defined as *low-low* spatial autocorrelation (or LL provinces). Finally, the fourth group in the bottom right (known as Quadrant 4) is the group of provinces with high value but surrounded by low-value neighboring provinces, thereby defined as *high-low* spatial autocorrelation (or HL provinces). Appendix 5.3 classifies the provinces according to their distribution of immigration, GPP per capita, and native employment in the four quadrants.

Figure 5.5 Moran's scatter plot of immigration

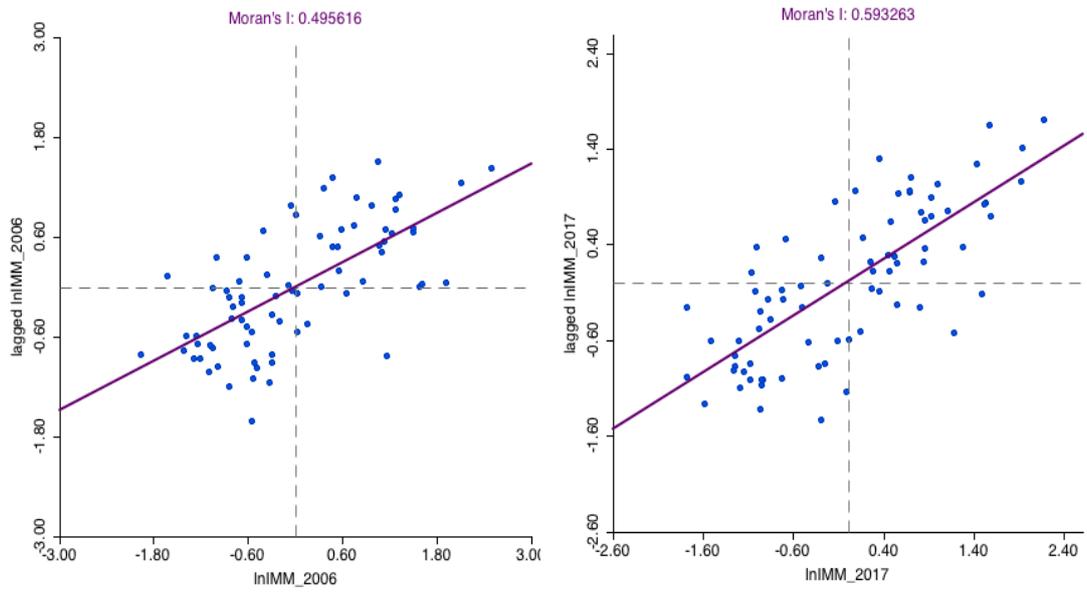


Figure 5.6 Moran's scatter plot of GPP per capita

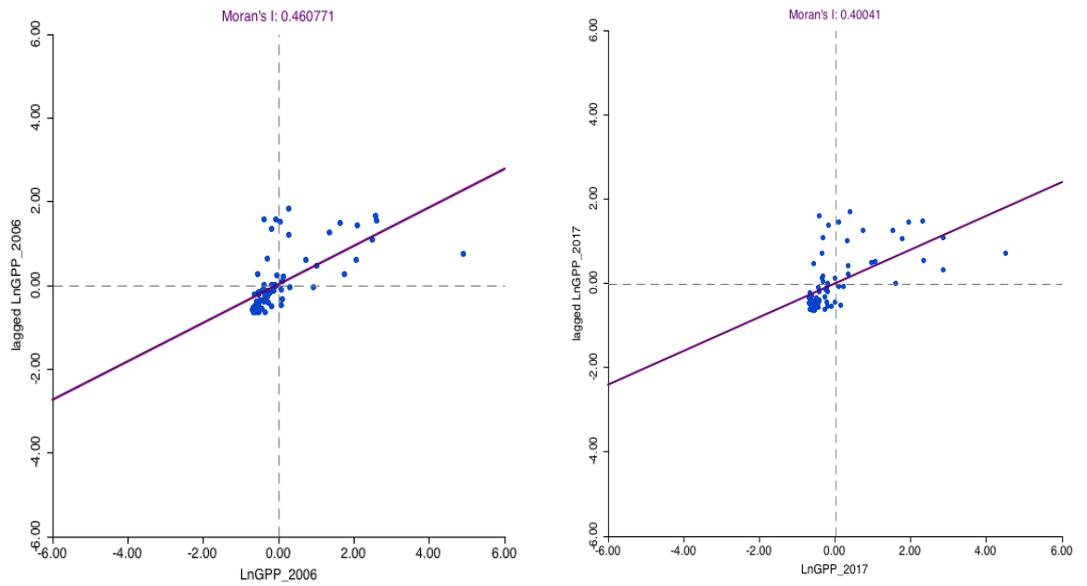
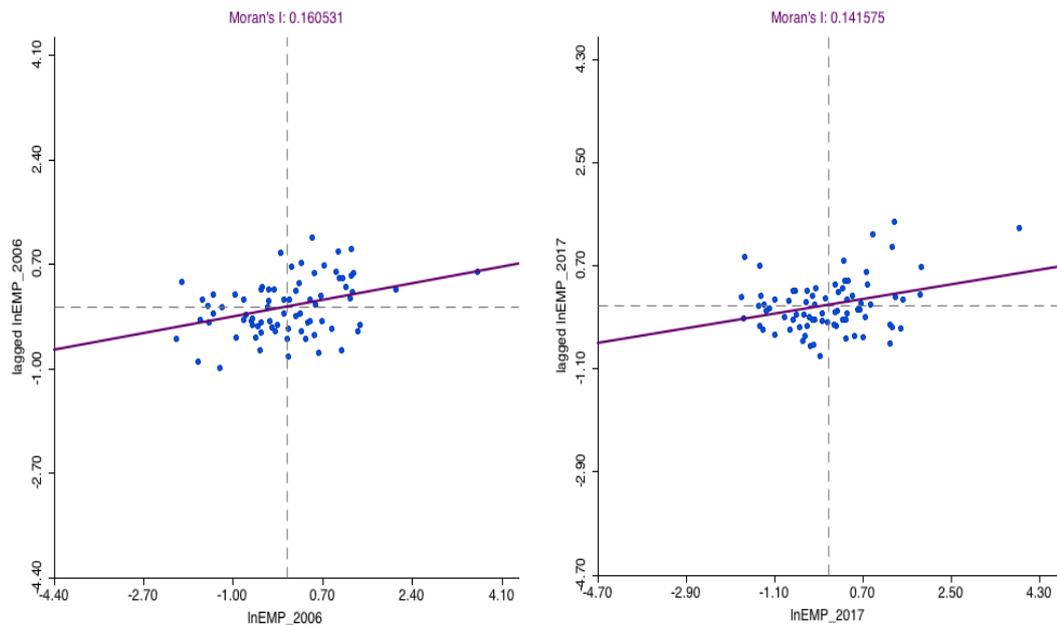


Figure 5.7 Moran's scatter plot of employment



Source: Created by the author using GEODA software

The Moran's scatter plot for immigration evidences spatial heterogeneity, in which there is a dominance of two distinct clusters of HH and LL provinces, with relatively more in the latter cluster, underlying the positive spatial autocorrelation. In the case of income per capita, the Moran's scatter plot also indicates the dominant dual clusters of HH and LL provinces, with only five provinces (Kamphaengphet, Nakhonratchasima, Nakhonsawan, Saraburi, and Songkhla) belonging in the HL quadrant in 2006 and six provinces (Angthong, Mahasarakham, Pattani, Phatthalung, Satun, and Uthaitхани) in the LH quadrant in 2017. As for native employment, it shows that most Thai provinces are agglomerated in HH and LL groups in both 2006 and 2017. In native employment, although the dominance of two spatial clusters of high-employment and low-employment provinces is presented, the distribution of provinces is inclined towards spatial outliers (i.e. HL and LH clusters in both years).

The pattern of the dual spatial clusters of immigration and income per capita is highly persistent over the years, with the spatial positions of provinces being relatively unchanged. Only a few high-income or low-income provinces concerning the GPP per capita variable have

shown little improvement. Most high-income provinces are found in Bangkok and the Vicinities and Eastern regions, while the provinces in the Northern and Northeastern regions tend to be low-income provinces (see Appendix 5.3). Furthermore, it is found that high-income provinces are also high-immigration provinces, and low-immigration provinces are also low-income provinces. This explains the phenomenon in Thailand that migrant workers tend to migrate towards high-income regions.

5.4.3.2 Local indicators of spatial association (LISA)

To further examine the spatial association around each location, LISA or Local Moran's *I* statistic was employed. Figures 5.8, 5.9, and 5.10 show LISA cluster maps of immigration, income per capita, and native employment in 2006 and 2017 respectively. The LISA map of immigration shows the significant and persistent results of HH and LL spatial clusters of provinces, as found in Moran's scatter plot. The LL-clustered areas are mostly formed by provinces in the Northern and Northeastern regions, while the HH areas are found in most provinces in Bangkok and the Vicinities and the Eastern region, as well as some provinces in the Southern region of Thailand.

Figure 5.8 LISA map of immigration in 2006 and 2017

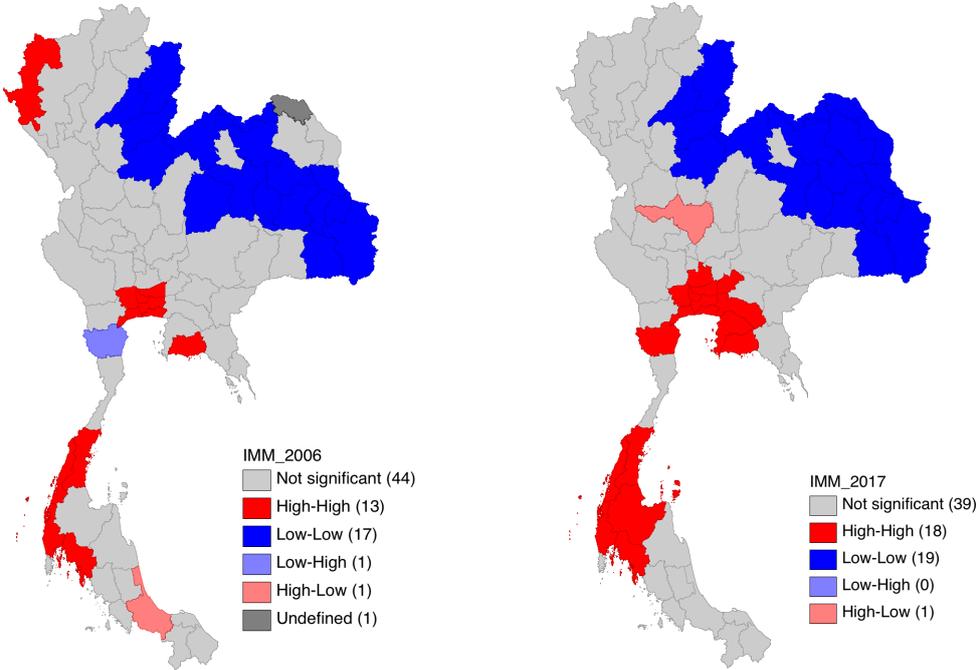


Figure 5.9 LISA map of GPP per capita in 2006 and 2017

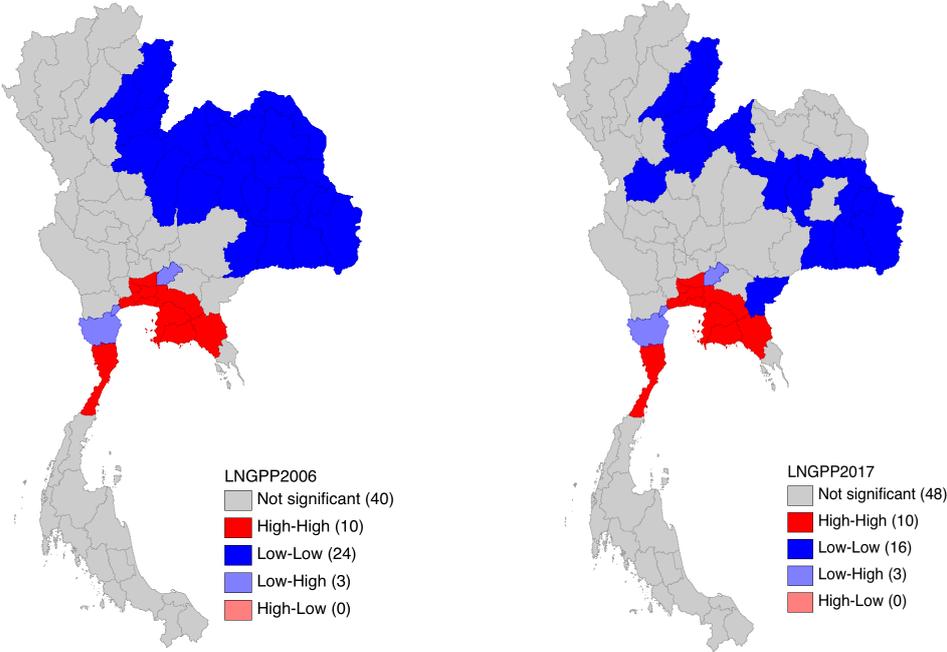
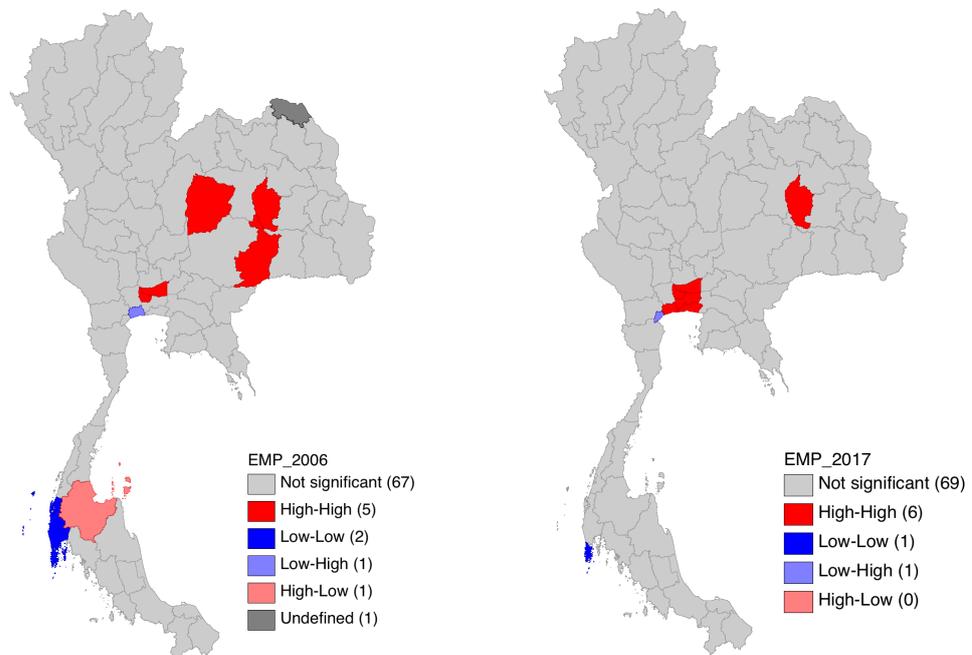


Figure 5.10 LISA map of employment in 2006 and 2017



Source: Created by the author using GEODA software

High clusters of immigrant workers in these regions of Thailand can be explained one by one. First, the high density of migrant workers in the Southern region is related to employment in fishing and fishery products and processing industries, as this region is bordered by the seas; therefore, most migrant workers in this region are considered to be low-skilled, mostly from Myanmar. Second, the high density of migrant workers in Bangkok and the Vicinities and the Eastern region is due to employment in manufacturing and service sectors, which requires a large labor force. Hence, migrant workers employed in these regions are both high and low-skilled. Moreover, by comparing the LISA maps between 2006 and 2017, significant expansion of the High-High clusters can be seen in these regions. This may be due to the regional development project in Thailand (the Eastern Economic Corridor or EEC). Third, the low density of migrants in the Northeastern and some provinces in the Northern region of Thailand is related to their geographical characteristics, being mountainous areas. Therefore,

agriculture, forestry, and trading with neighboring countries are their major economic sectors. However, most of the jobs are usually occupied by domestic or local Thai workers.

In immigration, the LISA map for income per capita illustrates the existence of HH clusters (hot spots) in most provinces in Bangkok and the Vicinities, and all Eastern Economic Corridor provinces (Bangkok, Chachoengsao, Rayong, and Chonburi), but there is a LL group of provinces, mostly located in the Northeastern and Northern regions, in both years. Although there was no significant change in the number of provinces in the HH cluster between the two years, the number of provinces in the LL Cluster in 2017 has been decreasing since 1995. This confirms the existence of income convergence in Thailand's regions, found in the above analysis of classical convergence. Therefore, the spatial pattern of the immigration process and the outcome of regional growth measured by real GPP per capita are not random; rather, they show a spatial association, dominated by LL groups in a dual cluster of HH and LL provinces.

Unlike immigration and income per capita, the dominance of HH clusters can be found in the spatial distribution of employment, i.e. a few provinces in Bangkok and the Vicinities as well as the Northeastern region of Thailand. The significance of low-income provinces high-employment provinces, especially the provinces in the Northeastern region, can be explained by the historical background of the country and the fact that this region has relied mainly on a labor-intensive agricultural sector for a long time. Even since the country has undergone a structural transformation from an agricultural to an industrial based, the majority of the population in the Northeastern region are still employed in the agricultural sector. Both the high-income and high-employment provinces are located in Bangkok and the Vicinities region, where the population is mostly employed in the manufacturing and service sectors.

5.5 Conclusions

In recent years, the importance of spatial spillover and geography in shaping economic activities has gained more attention among scholars. However, no empirical studies have

investigated spatial dependence or spatial patterns of immigration and economic outcomes in Thai regions. This chapter first examined the presence of convergence and the multiple convergence clubs of regional economic development in Thailand using the annual data for 77 provinces in Thailand for the period of 1995-2017. Then the chapter analyzed the spatial characteristics of immigration and regional economic outcomes, comparing the years 2006 and 2017.

The presence of beta (β) convergence was identified by growth and initial-income level regression. For the 77 provinces in Thailand from 1995-2017, the results show the presence of beta (β) convergence, suggesting that poorer or backward regions in Thailand tend to grow more rapidly than high-income or advanced regions. Sigma (σ) convergence, tested by the standard deviation of income per capita time-series, is evidenced in all Thai regions during the same period. A significant decrease in the standard deviation of GPP per capita between 1995 and 2017 implies that income disparities between poorer and wealthier regions in Thailand are decreasing; in other words, the country's regional economies converge in terms of economic inequality.

The results of multiple convergence clubs, which were identified by the log t regression test, suggest that the three groups of Thai provinces (or convergence clubs) are significantly different from each other. Spatial clustering effects within the club classifications are strong, so that they cannot be agglomerated or merged. Most Thai provinces are located in the middle- and low-income clubs, with more provinces in the Northern region located in the latter group and relatively more urban clusters in the Eastern provinces, Bangkok (the national capital city) and the Vicinities; provinces with abundant resources are found in high-income clubs. These results suggest that, beyond average economic progress, regional income disparity is still an issue in the country.

The analysis and results of the spatial pattern and characteristics of immigration and regional economic outcome variables show that regional income per capita and immigration

have a similar spatial distribution. Although both have different clusters in space (i.e. group of high-income/immigration provinces, group of low-income/immigration provinces, and spatial outliers), their main features are dominant dual spatial clusters of high income/immigration-concentrated and low-income/immigration-concentrated provinces, with a dominance of low income/immigration group of provinces. Also, by comparing the two years of 2006 and 2017, the results show that such spatial characteristics are highly persistent, with a few significant decreases in low-income groups and increases in the high-immigration group.

These research findings provide information regarding regional economic growth as well as suggestions for regional growth policies that aim to promote balanced economic development in Thailand. First, balanced growth policies and strategies should not only be based on their effects on a specific region or a single economy as a whole, but also on how they affect the neighboring regions or economies that face similar challenges in the growth process. Hence, taking into account the spatial pattern and spillover effects, different groups of regions require different policies. For example, the groups of low-income or backward economies may need more particular attention in their growth policies. Specifically, policies designed for the groups of spatial outliers (backward regions surrounded by advanced ones, or vice versa) should not benefit these to the disadvantage of others. Second, because the spatial pattern of immigration is considered to correspond with the pattern of the economic outcome variable, any changes in regional growth policy may affect the inflow of migrant workers; or either way, any changes in migration regulation may affect economic outcomes. Further, the effects of balanced economic development policies such as Thailand 4.0 may not be noticeable instantly, though they will have significant effects in the long run. Thus, in order to reduce inter-regional inequality or regional income disparity in Thailand, the government may need regionally-based development policies.

Although the empirical analyses conducted in this chapter have successfully offered answers to the research questions, some limitations should be considered. Owing to a lack of

some data at the provincial level in Thailand, convergence analyses of the long term are difficult to perform. Currently, only data from 1995-2017 is available, but some incomplete data from the newly-established administrative province of Buengkan in 2011 may limit this research. In response, linear regression has been used to interpolate the missing data; however, this method should still be questioned. Apart from this data consideration, further improvements could be made in future research: for example, more explanatory variables on economic growth processes, such as physical stock, infrastructure, foreign direct investment, and literacy rates, could be included. In addition, future studies could examine the convergence of Thailand and migrant-sending countries, or Thailand and Southeast Asian countries.

CHAPTER 6 IMPACT OF INTERNATIONAL LABOR MIGRATION ON REGIONAL ECONOMIC GROWTH IN THAILAND

6.1 Introduction

In an era of global labor markets, the demand for foreign workers as an input of production in labor-importing countries is the major driver of international labor migration. It can be noticed that, in the tradition of the labor movement, the migration flow was overwhelmingly from less developed to more developed countries and has geographically occurred from the Global South to the Global North region. However, recent trends have shown a rapid increase in the flow of migrants from less-developed economies to newly emerging countries in the developing world, known as “South-South” migration (Ratha and Shaw 2007; Hujo and Piper 2010). The growing presence of migrant workers in the South has continuously sparked heated debate in migrant-receiving countries over both economic and social impacts of migrant intakes as well as the policy implications for dealing with any difficulties regarding migrant workers (Paitoonpong 2011; Athukorala and Devadason 2012; Bryant and Rukumnuaykit 2013). Although there is a large body of literature related to the experiences of the traditional migrant-receiving countries in the North²², it is perilous to generalize from these studies due to the different conditions of local labor markets, the economic developments and structures, and the distinctive consequences of the characteristics of migrant workers.

As far as I know, there are only few empirical studies on the economic impacts of immigrants on host countries in the South, and Thailand is no exception. In fact, Thailand has been one of the major migrant-destination countries in Southeast Asia for over a decade where concerns have arisen regarding the impact of immigration on economic growth. Further

²² For the literature surveys, for example see Card (2001), Borjas (2003), and Ottaviano and Peri (2012) in the US; Akbari and De Voretz (1992) in Canada; De New and Zimmermann (1994) in Germany; Ortega (2008) in Spain; Addison and Worswick (2002) in Australia.

concerns have been fueled by the fact that Thailand, in more recent years, has been faced with the new challenge of the so-called “middle-income trap” (Jitsuchon 2012), an economic development situation in which the country is trapped between the competitive edge of low wages among developing countries and the high value-added market of more developed economies. This is mainly due to low private investment and productivity growth rates. Together with the declining trend in the fertility rate together with the aging population in Thailand, which may have the significant impacts on the availability of workforce in the labor market, these are identified in a considerable amount of economic empirical studies as potential pressures slowing down the Thai economy. In this respect, international labor migration is considered an important instrument to mitigate these effects of economic situation and population transition as well as to reverse the declining trend in fertility; it has now become a major factor of regional economic development strategy in several countries.

Nevertheless, the Thai government recently rolled out its long-run economic development plan called “Thailand 4.0”: a 20-year national strategic plan (2017-2036) focusing on improvement of human resources, technologies, and investment in R&D and infrastructure. The primary purpose of the Thailand 4.0 policy is to shift the country from intensive labor-driven growth or resource-based production that mostly relies on cheap, low-skilled labor and imported technologies to innovative-driven growth or a knowledge-based economy, which places more emphasis on high productivity and innovative creation from advanced skilled workers (Jones and Pimdee 2017). In principle, the Thailand 4.0 agenda is the continuous process of the development or evolution of the Thai economic structure based on innovation, R&D, technology and high-quality services. Thailand 1.0 concentrated on farmer mechanization in an attempt to increase yields in the agricultural sector before Thailand 2.0 utilized cheap labor in light industry to turn raw materials into finished goods with a greater focus on household and domestic products such as garments and textiles. This was followed by concentrating on heavy industries in Thailand 3.0, which focused on more complex and

assembly productions, such as electronic materials and automobiles, in order to make Thailand an industrial hub for exports and attract more foreign direct investments. Nevertheless, under Thailand 3.0, the country has been confronted with the significant challenges of growing income disparities, imbalanced economic development, and the middle-income trap; therefore, the value-based economy of the Thailand 4.0 policy aims to turn the Thai labor force into knowledge-based or skilled workers in order to reach high-income status.

To put Thailand 4.0 in practice, the Eastern Economic Corridor or EEC is offered as a pilot project. The recently launched EEC project concentrates on developing new infrastructure and enhancing long-term economic growth in the Eastern region of Thailand.²³ Making the Eastern region of Thailand a destination of choice for high-skilled immigrants from high-income countries is one of the goals of this strategic plan. Therefore, by providing estimates for regional level, this chapter provides useful input to the EEC as well as other regional development projects in the future. To do so, this chapter estimates a production function using a panel data model for the period 2003-2015. The analysis is performed across different regions of Thailand. This regional breakdown further indicates the feasibility of examining the impacts of economic growth in regions which are often assumed to be the geographical units of immigration in a regional development study. To the best of my knowledge, no study has yet adopted this production function to study the economic growth impact of immigration at the regional level in Thailand, particularly with migrant workers distinguished into high-skilled and low-skilled immigrants. In this regard, the present study thus emphasizes the need to fill this knowledge gap, and focuses specifically on the Thai regions by exploring the issue of how economic growth is affected by foreign workers using a panel dataset in Thailand.

²³ More details regarding the project can be found at: <https://www.eeco.or.th/en/project/core-development-areas>

The structure of this chapter is structured as follows. Section 6.2 explains the recent trends and characteristics of foreign workers in Thailand and its regions. Section 6.3 reviews the theoretical underpinnings and the literature review regarding the impacts of foreign workers on economic growth and labor productivity. Section 6.4 illustrates the production function specification and the estimated model formulation, and then describes the employed data, variables construction, equations and methods used for the estimation. Results and further discussion are outlined in Section 6.5, while the last section (Section 6.6) presents conclusions with some policy implications.

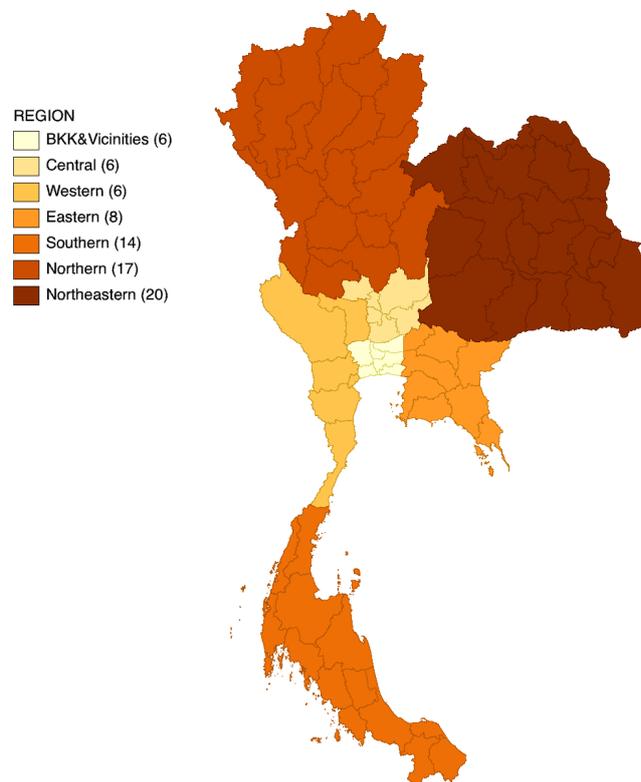
6.2 International labor migration in Thailand: Some facts and figures about immigrants in Thailand and its regions

According to the World Bank report (2017), the movement of population in Southeast Asia is an issue of increasing significance. Malaysia, Singapore, and Thailand combined are home to more than 6.5 million ASEAN migrant workers or approximately 96 percent of all migrant workers in Southeast Asia, and Thailand alone accounts for more than half of all ASEAN migrant workers. Thailand, while regarding itself as a developing country, has enjoyed a fast-growing economy since the mid-1980s due to the country's structural transformation from an agricultural to an industrial base, which came together with a rapid inflow of migrant workers, particularly from neighboring countries in the Southeast Asia – Cambodia, Myanmar, and Lao PDR (more than half of them from Myanmar). As a result, the majority of immigrant workers from these countries enter Thailand illegally, with around 2-3 million of the estimated overall number of irregular immigrants in Thailand arriving in the late 1990s (Manning and Bhatnagar 2004; Chantavanich and Jayagupta 2009). This cross-border labor migration influx is primarily due to the increasing income disparities between Thailand and its neighbors, the relatively high wage, and the growing economy with greater labor demands from the expansion

of industrial sector (Pholphirul 2013; Paitoonpong and Chalamwong 2012; Pholphirul and Kamlai 2014).

Regardless of the large-scale immigration, the increase in the foreign labor force in Thailand, most of them considered low-skilled workers, has led to a growing concern over its effects on productivity growth as well as on the native labor market. According to the Office of the National Economic and Social Development Board of Thailand (NESDB), Thailand has been divided into seven administrative sub-regions, which are the Bangkok and Vicinities, Central, Western, Eastern, Southern, Northern, and Northeastern regions (Figure 6.1).

Figure 6.1 Map of study regions in Thailand



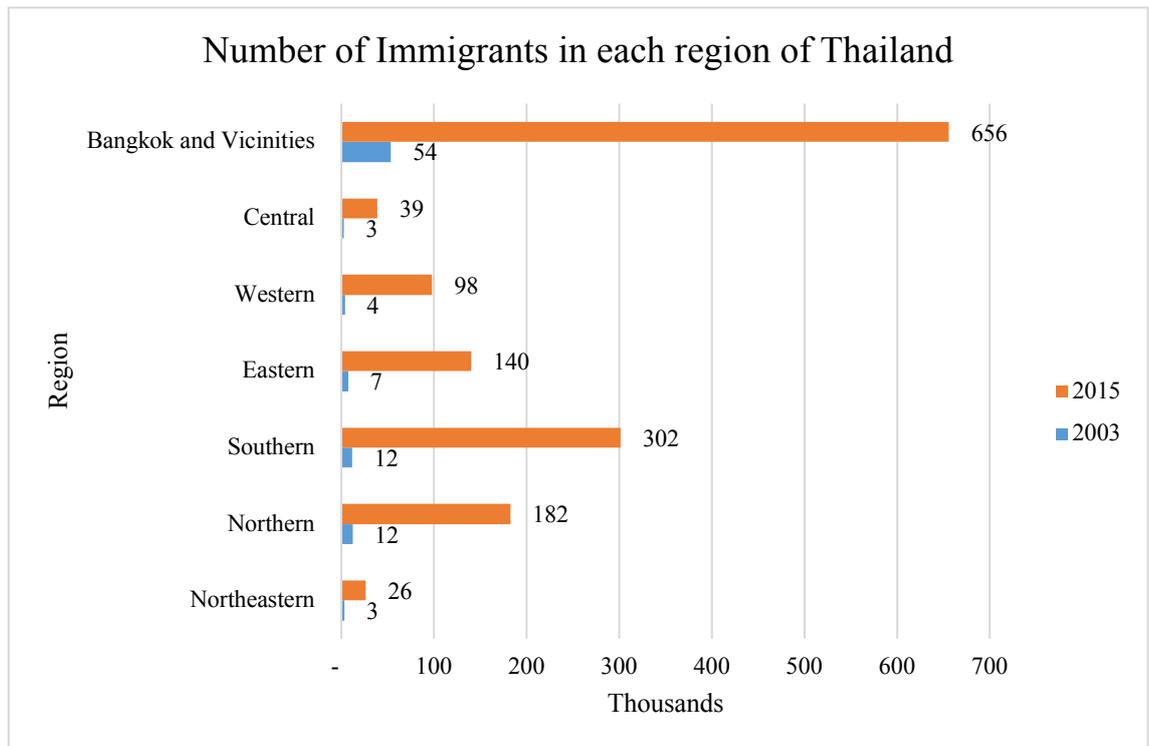
Source: Created by author using GEODA software

Though the Northeastern region is the largest region in terms of area and population, it is considered as the poorest region in Thailand, in which the GDP per capita is only one-third of the national average. This is mainly due to the geographical characteristics of this region, where there is less irrigated land, poor soil fertility, and water shortages during the dry season,

which has thus resulted in low productivity in the agricultural sector. Therefore, there is no doubt that the number of immigrants residing in this region tends to be low.

In Thailand, more than 80 percent of foreign-born workers have tended to gravitate towards the Bangkok and Vicinities, Southern, and Eastern regions, and half of the immigrants have resided in Bangkok and Vicinities. These regions also account for about 90 percent share of high-skilled foreign workers and 75 percent of Thailand's GDP in 2015, where Bangkok and Vicinities region has the largest GDP in the country at \$158.7 billion, followed by the Eastern at \$51.2 billion, and Southern region at \$25.9 billion (NESDB 2019). As illustrated in Figure 6.2, a significantly larger regional distribution of foreign workers in Thailand occurred between 2003 and 2015. However, the distribution of immigrant arrival rates in each region has not been changing over time. This is attributed to the development of the economic structure in the seven sub-regions of Thailand to attract and retain immigrants, particularly high-skilled immigrants from more developed countries. Most of the high-skilled immigrants are from Japan, followed by China, the Philippines, the UK, India, and the US. Immigrants from Japan and other developed countries are mostly expatriates who work as senior officials and managers in companies or industries, while migrant workers from India and the Philippines tend to work more in the educational sector as teachers, professors, or researchers. The primary goal of the project (i.e., EEC, SEC, and NEC) to attract and retain high-skilled immigrants in the different sub-regions of Thailand is to mitigate any adverse effects on the regional population of the economic situation and population transition due to the decline in fertility. Therefore, this study will provide some evidence of the economic growth effect of foreign workers at the regional level.

Figure 6.2 Immigrant arrival rates, Thailand and Regions

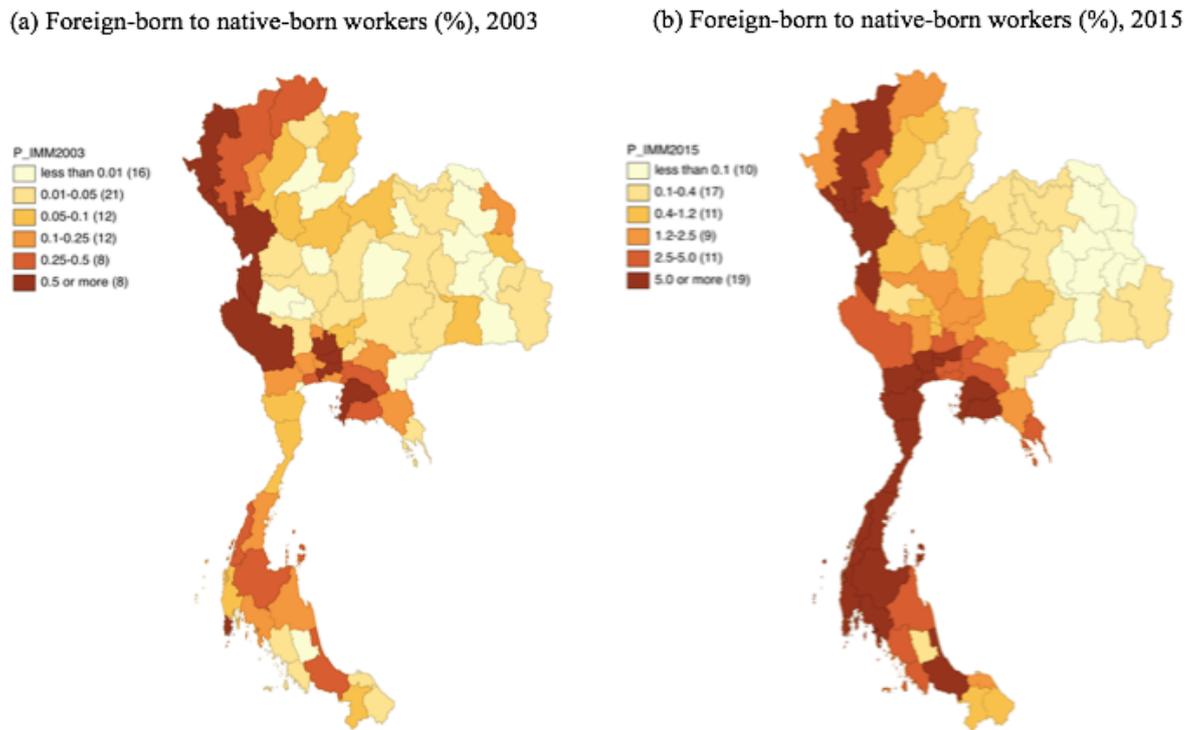


Source: Created by author using data from Office of Foreign Worker Administration in 2003 and 2015

There are some reasons why the regional area is considered a suitable unit of analysis, rather than the province or country level. First, the foreign-born population and labor concentrate in clustered areas. To consider whether the distribution of immigrants is concentrated in clustered regions in the data, the geographical distributions of the percentage of foreign-born to native-born workers at the province level in both 2003 and 2015 are illustrated in Figure 6.3, in which the provinces of Thailand are categorized into six levels. Figure 6.3 shows that the provinces with the highest proportion of foreign-born to native-born workers include an immigrant population of more than 0.5 and 5.0 percent, compared with the lowest of less than 0.01 and 0.1 percent, in 2003 and 2015, respectively. Also, the higher percentage of immigrants to natives in 2015 are mostly clustered in the Northern, Western, Southern, Bangkok and Vicinities, and Eastern Regions, while they are less concentrated in the Northeastern and Central Regions. Therefore, immigration is mostly a result of chain migration and considering provinces alone is not sufficient. Furthermore, a regional area, by definition, is

a more complete economic entity in terms of studying its economic growth and development, especially when the focus is on Thailand's regional area-based development under the Eastern Economic Corridor (EEC) project.

Figure 6.3 Geographical distributions of foreign-born workers in Thailand



Source: Created by author using data from Office of Foreign Worker Administration in 2003 and 2015

6.3 Brief theoretical and literature review

The objective of this section is to provide an overview of the main underlying theories and literature concerning the impacts of immigration on economic growth. The immigration phenomenon has both direct and indirect impacts on the migrant-receiving economy. While a direct effect of immigration comes from an increasing amount of labor supply, which helps to enhance economic output, an indirect impact comes from the possession of skills, knowledge, and abilities of migrant workers, which helps to supplement those of natives in the host country. In regards to this, there are two underlying theories which explain the relationship between immigration and its impacts on economic growth. A neoclassical view of the economic growth emphasizes that a country's population changes and technological progress are keys to its long-

run economic growth, and ultimately to its convergence of growth (Solow 1956). That is, considering the economic growth exogenous, the growth rate of a region declines as the region becomes more and more developed. Hence, more developed regions and less developed regions will eventually have similar growth rates. However, some scholars have argued that there is a largely unexplained factor in the Solow growth theory, and they state that the skills, knowledge, and abilities of labors are the actual engines of economic growth (Lucas 1988; Dolado et al. 1994; Romer 1994; Hunt 2011; Peri 2012). An increase in the population not only increases the supply of labor and consumers but also increases diversity of a population, which can result in increased innovation and technological advancement. According to Kremer (1993), a large population spurs innovation and technology by sharing knowledge and new ideas, and thus leads to economic growth. Unlike the exogenous growth or neoclassical theory, the endogenous growth model considers the concept of human capital as an endogenous growth factor that drives economic growth.

The literature related to this study has primarily focused on two dimensions: the economic impact of immigration on the receiving country; and economic growth with a focus on the role of human capital and the relationship between migration and economic growth. Changes in the labor force as the result of labor movement is considered to be the most important reason why some regions expand while others are stagnant. Kuznets (1965) assessed the correlation between immigration and regional development in the U.S. and found that migration inflow is positively associated with economic growth, including GDP per capita, employment, and construction activity. Therefore, the combination of a large population and an inflow of foreign workers has contributed to the economic development of a region as a large population is crucial to maintaining the labor supply and thus supports national and regional development. Similarly, in a cross-country analysis using data from 68 countries, Osang (2006) analyzed the impact of international migration on GDP per capita as a proxy of a country's

development level. He found that migration, measured by the shares of remittances in GDP and foreign-born population, has a positive effect on a country's development level.

Studies analyzing the impact of immigration on economic growth, in the long run, have mostly been based on human capital theory, where the migration factor is included in the endogenous growth model. The role of immigrants is considered as a contributing factor to innovation, technological progress, and productivity. As Peri (2014) notes, "in the long run, immigrants can increase the overall efficiency of the economy by bringing new skills, stimulating efficient specialization, and encouraging firm creation" (p. 6). To cite some previous studies from the relevant literature, Ottaniano and Peri (2008) show that immigrants encourage firms to expand capacity and increase their investment, thereby resulting in increased productivity for both native and foreign workers. Using data from 22 countries, Boubtane et al. (2016) examine the contribution of migrant workers by skill levels. They find a sizeable positive impact of immigrants on labor productivity growth only in the countries where the ratio of high-skilled or highly educated migrant workers to native workers is relatively large. Furthermore, high-skilled immigration is often viewed as the determinant of growth and development. The influx of high-skilled immigrants can promote innovation and technological advancement by decreasing the costs of R&D and also by increasing the number of patents (Bretschger 2001; Hunt 2011; Aydemir 2014).

Gennaioli et al. (2013) study the association between human capital and regional development using a cross-country dataset across 1,569 subnational regions from 110 countries which accounts for 96 percent of the world's GDP. They follow Lucas (1988)'s model of regional income and specifically attribute productivity growth to different measures of human capital such as workers' education and managers' education. Their findings indicate that the human capital possessed by immigrants is the most crucial factor of regional development.

The study of Park and Hewings (2009), using a simulation model, has assessed the effects of immigration on regional and national economic output measured as GDP. Their

results show that immigration has negative impacts on average wage and capital per labor ratio and positive impacts on regional and national economic output, which will decrease over time. However, this study has shed light on the timeframe of the assessment of immigration's economic effect and suggested that immigration's positive and negative effects may both be restricted to a certain period and is closely related to the immigration's demographic structure. Also, research by Peri (2012) on the U.S. case has analyzed the impact of migrant workers on total factor productivity at state level. He finds that foreign-born workers promote job specialization and therefore increase the total factor productivity at the state level. This impact, however, is offset by the negative impact of immigration on the skills base in production technologies which leads to a slightly negative effect on the average income of native-born workers.

Some relevant research examined the macroeconomic impact of migrant workers on receiving countries in Southeast Asia and found a positive association between immigration and GDP, although the impact is small (Martin 2007; Kanapathy 2011; Thangavelu 2012). Sussangkarn (1996), using a computable general equilibrium (CGE) model in Thailand, examined the impact of removing all migrant workers from the country and found that it leads to a decline in GDP per capita of 0.48 percent. When the effect is disaggregated by economic sector, the decrease in per capita GDP becomes more acute in agricultural and low-skilled industrial sectors as they are where most migrant workers are located. Martin (2007) updated this research and showed that immigrants which is estimated to be around 5 percent of the total labor force in 2005 would enhance GDP by 1.25 percent.

6.4 Methodology

6.4.1 Model and econometrics

As discussed in the theoretical literature review, this study focuses on the empirical relationship of economic output with skill levels of migrant workers and the impact on regional

economic growth by applying the standard production function. Economic output can be increased or decreased according to the quality of the production inputs, and particularly the quality of labor. In the present analytical framework, the differences between native and migrant workers as major production inputs are constructed in the model separately factoring in potential differences in productivity. Additionally, a distinction is made between the quality of the migrant workers in the analysis. M_H and M_L in this context thus capture migrant workers who are classified by the levels of skill.

To obtain an econometric estimation of the impacts of the skill levels of migrant workers and native workers on regional economic growth in Thailand, the production function could be applied and written as follows:

$$Y = f(K, N, M_H, M_L) \quad (6.1)$$

where Y denotes the net domestic product of a given regional economy (measured in Thai baht); K refers to the physical capital (measured, again, in Thai baht); N to native workers (measured in numbers); M_H to high-skilled migrant workers (measured in numbers); and M_L to low-skilled migrant workers (measured in numbers).

The production function specified by equation (6.1) is presumed to generate constant returns to scale (CRS). This indicates that the total income from output equals the total costs from inputs, or in other words, if input factors are increased by a factor c , the output factor will also increase in a proportion of c -fold.

The above function, which is estimated in its log-linear form, is expressed as:

$$\ln Y = \beta_0 + \beta_1 \ln K + \beta_2 \ln N + \beta_3 \ln M_H + \beta_4 \ln M_L \quad (6.2)$$

where the coefficients β_1 , β_2 , β_3 , and β_4 denote the rate of change in output due to physical capital, native workers, high-skilled, and low-skilled migrant workers, respectively.

Moreover, by dividing the overall standard production function in equation (6.2) with the total labor force (L), the effects of the shares of high-skilled (M_H/L) and low-skilled (M_L/L) immigrants on labor productivity (Y/L) can be estimated as:

$$\ln(Y/L) = \beta_0 + \beta_1 \ln(K/L) + \beta_2 \ln(N/L) + \beta_3 \ln(M_H/L) + \beta_4 \ln(M_L/L) \quad (6.3)$$

The estimation of the equations (6.2) and (6.3) was employed in panel regression analysis through three estimating models.

The first model is the pooled time-series cross-section estimation which combines all data from both cross-sectional effects of independent variables on total output and time-series effect within units. The model is performed under ordinary least squares (OLS) regression and therefore, applied to the present study the OLS regression model has the following shapes:

$$\ln(Y_{it}) = \beta_0 + \beta_1 \ln K_{it} + \beta_2 \ln N_{it} + \beta_3 \ln M_{Hit} + \beta_4 \ln M_{Lit} + \varepsilon_{it} \quad (6.4)$$

$$\ln(Y/L)_{it} = \beta_0 + \beta_1 \ln(K/L)_{it} + \beta_2 \ln(N/L)_{it} + \beta_3 \ln(M_H/L)_{it} + \beta_4 \ln(M_L/L)_{it} + \varepsilon_{it} \quad (6.5)$$

where $i = 1, 2, \dots, n$ refers to cross-section units (sub-regions in this case); $t = 1, 2, \dots, n$ is the number of the time-series index (year in this case); and β are a vector of parameters, while ε_{it} is the error term with a mean value of zero.

However, the pooled time-series estimation using OLS regression may cause temporal autoregressive problems, multicollinearity and spatial heterogeneity to some extent. In order to deal with these possible errors, the second way of estimating production function gives rise to the panel data analysis through region-specific modeling using the random effects (RE) model.

The following random effects (RE) models for estimating the regional economic and labor productivity impacts of immigration are given by:

$$\ln(Y_{it}) = \beta_0 + \beta_1 \ln K_{it} + \beta_2 \ln N_{it} + \beta_3 \ln M_{Hit} + \beta_4 \ln M_{Lit} + u_i + \varepsilon_{it} \quad (6.6)$$

$$\ln(Y/L)_{it} = \beta_0 + \beta_1 \ln(K/L)_{it} + \beta_2 \ln(N/L)_{it} + \beta_3 \ln(M_H/L)_{it} + \beta_4 \ln(M_L/L)_{it} + u_i + \varepsilon_{it} \quad (6.7)$$

where u_i and ε_{it} are assumed to be the two error term components of the random effects (RE) model: i.e., u_i which is specific to the i th cross-sectional error component and does not change over time; and ε_{it} which is the idiosyncratic error term.

The choice between the pooled time-series cross-section (pooled OLS) and the RE models was made through Breusch and Pagan (1980)'s Lagrange Multiplier (LM) test, which is designed to test for the RE model based on the OLS residual.

$$H_0: \sigma_u^2 = 0$$

$$H_1: \sigma_u^2 \neq 0$$

Under the null hypothesis (H_0), the BP-LM test statistic complies with the chi-squared distribution with one degree of freedom or $\chi^2(1)$. A finding that the calculated LM-statistic is greater than the critical values of the conventional 5% levels of significance²⁴ is taken as evidence that σ_u^2 is significantly different from zero, and hence the null hypothesis (H_0) would be rejected in favor of the alternative hypothesis (H_1). The rejection of the null hypothesis conceptually implies that the RE model is considered to be the appropriate model.

Nevertheless, the appropriate estimation method for the random effects (RE) models is based upon the properties of the two error term components. If the individual-specific component (u_i) is uncorrelated or independent with the regressors, the OLS estimator for β would be consistent and the overall error terms are known to be random and the application of random effects (RE) model would be appropriate. However, if the individual-specific component (u_i) is correlated with the regressors, the OLS estimator would be inconsistent and the individual-specific component is the leftover variation in the dependent variable and must be treated as a further set of parameters to be estimated. Therefore, this gives rise to the third estimating models which is called a fixed effects (FE) model.

The fixed effects (FE) models for estimating the regional economic and labor productivity impacts of immigration are specified as:

$$\ln(Y_{it}) = \beta_0 + \beta_1 \ln K_{it} + \beta_2 \ln N_{it} + \beta_3 \ln M_{Hit} + \beta_4 \ln M_{Lit} + \alpha_i d_{it} + \varepsilon_{it} \quad (6.8)$$

²⁴ The critical value of $\chi^2(1, 0.05)$ is 3.841.

$$\ln(Y/L)_{it} = \beta_0 + \beta_1 \ln(K/L)_{it} + \beta_2 \ln(N/L)_{it} + \beta_3 \ln(M_H/L)_{it} + \beta_4 \ln(M_L/L)_{it} + \alpha_i d_{it} + \varepsilon_{it} \quad (6.9)$$

where d_{it} is a dummy variable which has the value of one for region i and zero otherwise; and α_i is the coefficient for the region i .

In the above equation, the subscript i means that the intercepts are allowed to vary or differ across regions because all regions have their own characteristics. These characteristics are such as trade openness, industrial sectors, and etc. Therefore, the fixed effects (FE) models allow each region to have its own intercept value and does not vary over the period of time. However, the FE model from estimating the transformed data using the OLS technique is applied to provide consistent estimators. In other words, the fixed (or within) effects model offers a reasonable approach to estimating when there is unobserved heterogeneity across units, and the individual-specific effects are correlated with the regressors. In other settings, the random effects model might be more appropriate if the individual-specific effects are distributed independently of the regressors (Greene 2003).

Hence, the choice between the RE and FE models was made through the Hausman test, which is designed to test whether the individual errors (u_i) are correlated with regressors:

$$H = (\hat{\beta}_{RE} - \hat{\beta}_{FE})' [Var(\hat{\beta}_{RE}) - Var(\hat{\beta}_{FE})] (\hat{\beta}_{RE} - \hat{\beta}_{FE})$$

where $\hat{\beta}_{RE}$ and $\hat{\beta}_{FE}$ are the vectors of random and fixed effects models estimates.

Under the null hypothesis (H_0), the Hausman test statistic complies with a chi-squared distribution with the number of degrees of freedom equal to the number of regressors in the model. The calculated Hausman-statistic that is greater than the critical values of the conventional five-percent levels of significance is taken as evidence that there is a significant difference between the RE and FE estimators, and hence the null hypothesis (H_0) would be rejected in favor of the alternative hypothesis (H_1). The rejection of the null hypothesis conceptually implies that the FE model is considered to be the appropriate model.

6.4.2 Data and variable construction

As mentioned before, this study uses the regional area as the geographical unit of analysis. The data used as a dependent variable or a measure for regional economic growth come from the Office of the National Economic and Social Development Board of Thailand (NESDB). The NESDB has divided Thailand into seven sub-regions, which are the Northeastern, Northern, Southern, Eastern, Western, Central, and Bangkok and Vicinities Regions, and provided real regional GDP or gross regional product (GRP) as the sub-region counterpart of the national GDP. Changes in real GRP that captures the changes of a regional area's aggregate economic activities and performance serves as a proxy for economic growth.

The key independent variables in this research are native-born employment and foreign-born employment, the latter divided again in terms of different skill levels. In the regression analysis, the logged number of different skill levels of foreign-born workers is used as the key explanatory variable. The native-born employment is defined as the number of Thai people between the ages of 15 and 60 who are working part- or full-time or actively seeking employment. The data are obtained from the Thai Labor Force Survey (LFS) and population and housing censuses, which are available electronically on the website of the National Statistical Office of Thailand (NSO).

For this study, foreign-born employment data are classified into two major categories: high-skilled and low-skilled foreign workers. While low-skilled foreign workers are mainly from neighboring countries in Southeast Asia (i.e., Myanmar, Cambodia, and Lao PDR), most of the high-skilled foreign workers are from Japan, China, the Philippines, the UK, India, and the US. Also, it should be recognized that the typology of migration in the context of Thailand is somehow arbitrary and the distinction between high-skilled and low-skilled foreign workers could be more administrative than usual. Foreign skilled workers refer to workers who have been granted visas to engage in work under section 9 (General category) and section 12 (Investment promotion category) of the Working of Aliens Act, B.E. 2551. In general, they are

professional and managerial workers, investors, high-skilled technicians, and experts. Low-skilled foreign workers are those who hold temporary work permits which need to be renewed annually and entry into the country apart from the above categories. The data on foreign-born employment are compiled from the electronic data files of the annual report conducted by the Foreign Workers Administration Office of the Ministry of Labor.

The most important control variable is the physical capital of the regional areas, as labor and physical capital are the two basic inputs in a production function. A fixed asset is the measure for capital stock. However, the NESDB provides fixed assets only at the national level. Therefore, capital stock series for the regional level were generated through the method developed by Garofalo and Yamarik (2002) using the national measure of fixed assets multiplied by the ratio of region-level personal income to the national personal income. The regional level capital is calculated separately for each industry and then totaled across all industries. This method is also used for an immigration study by Peri (2012) as capital control at the state level. Following this method, this research calculated the regional personal income over the national personal income (equation 6.10), then summarized it through all the industries (equation 6.11).

$$K_{ijt} = \left[\frac{y_{ijt}}{Y_{jt}} \right] K_{jt} \quad (6.10)$$

$$K_{it} = \sum_{j=1}^n K_{ijt} \quad (6.11)$$

where i denotes regional area; j denotes industry; y is the personal income in a regional area; Y is the national personal income, and K is the capital measured by fixed assets. n denotes the total number of industries, and the NESDB's fixed asset report provides the national values of 14 aggregated industries²⁵.

²⁵ 14 aggregated industries in Thailand are: i) agriculture, forestry and fishing; ii) construction; iii) mining and quarrying; iv) electricity, gas and water supply; v) manufacturing; vi) wholesale and retail trade, repair of

Panel data are then constructed as in equations (6.2) and (6.3), covering the period 2003-2015 across the seven sub-regions of Thailand.

6.5 Empirical results and discussion

In order to analyze the regional economic impacts of foreign workers in Thailand, the data used to estimate the standard production function are arranged in a balanced panel data form by pooling time-series annual data and all cross-sectional units across the seven regions for 13 years from 2003 to 2015. The descriptive statistics for all variables used in the estimation are first presented in Table 6.1.

Table 6.1 Descriptive statistics

Variables	Mean	Maximum	Minimum	Std. dev.	Observations
GRP ^a	1,132,811	4,809,895	248,566.4	1,189,019	91
Physical capital ^b	247,304.9	1,031,862	53,357.35	274,807.4	91
Native-born workers	5,351,389	12,969,995	1,569,365	3,431,517	91
Foreign-born workers	138,660.7	884,829	2,617	170,505	91
Low-skilled immigrants	123,324	820,423	383	154,371.3	91
High-skilled immigrants	15,336.68	99,051	623	23,777.93	91

Note: ^{a, b} millions of baht unit

Source: Author's calculation

The results in Table 6.1 show that there is a significant difference and variability in the observed variables which could be due to the large disparities in the characteristics of labor markets in each region and the differences in the size of regional economies. Also, the prevalence of economic cycles emerging over time that are attributed to several economic situations are generally perceived to be varied and different across regions. The standard production function in this study is therefore estimated using both random and fixed effects

motor vehicles and motorcycles; vii) hotels and restaurants; viii) transport, storage and communications; ix) education; x) real estate, renting and business activities; xi) financial intermediation; xii) public administration and defense; xiii) health and social work activities; and xiv) other community, social and personal service activities.

model. The random and fixed effects models correct for both temporal and spatial heterogeneity that may arise in using pooled-OLS procedures.

The estimated results of an aggregate production function regarding equations (6.4), (6.6) and (6.8) are presented in Table 6.2 in order to estimate the impact of immigration on economic growth at the regional level in Thailand. Table 6.2 provides pooled-OLS, random effects, and fixed effects production functions, which are estimated by splitting the skill level attainment variable for migrant workers into high-skilled and low-skilled migrant workers. Pooled OLS estimation shows that native-born and high-skilled foreign-born workers have statistically significant positive effects on regional economic output. Also, the results suggest that although immigrant workers do have a positive impact on regional economic growth, compared to native workers, the magnitude is much smaller. This suggests that an overall increase in migrant workers is good but not as much as an increase in natives. In the case of low-skilled migrant workers, the positive and statistically significant effects on regional economic output are also found. In this context, a 10 percent increase in employment of high-skilled (M_H) and low-skilled (M_L) foreign workers increased overall economic growth by about 0.9 percent and 0.1 percent, respectively.

Table 6.2 Immigration and regional economic growth in Thailand, 2003-2015

Dependent Variable: Regional economic output						
	Pooled OLS		Random Effects		Fixed Effects	
	NCR	CR	NCR	CR	NCR	CR
lnK	0.7610 [0.0094]***	0.7506 [0.0090]***	0.8158 [0.0203]***	0.8196 [0.0200]***	0.9988 [0.0758]***	0.9054 [0.0541]***
lnN	0.1740 [0.0077]**	0.1499 [0.0045]***	0.1299 [0.0322]***	0.1006 [0.0177]***	0.0286 [0.0476]	0.0121 [0.0467]
lnM _H	0.0854 [0.0075]***	0.0902 [0.0074]***	0.0793 [0.0135]***	0.0722 [0.0024]***	0.0793 [0.0135]***	0.0850 [0.0114]***
lnM _L	0.0107 [0.0029]***	0.0093 [0.0028]***	0.0052 [0.0034]	0.0077 [0.0024]***	-0.0016 [0.0028]	-0.0024 [0.0028]
Constant	4.2258 [0.2075]***	4.8384 [0.1329]***	3.5959 [0.4315]***	3.9919 [0.2318]***	0.6047 [1.5558]	3.1170 [0.6223]***
R-squared	0.9972	0.9972	0.9611	0.9611	0.9687	0.9687
Observations	91	91	91	91	91	91
Regions	7	7	7	7	7	7
Breusch-Pagan LM test ^a	-	-	$\chi^2(1) = 137.64$ ***	-	-	-
Hausman test ^b	-	-	-	-	$\chi^2(4) = 32.24$ ***	-

Note: NCR and CR indicate Non-Constraint and Constraint regression model, respectively. Robust standard errors are in parentheses. *, **, *** indicate significant at 10%, 5%, and 1% level of significance, respectively.

^a Random effects versus pooled-OLS estimations test.

^b Fixed versus random effects model test

Source: Author's calculation

Table 6.3 Immigration and economic growth in Thailand by region, 2003-2015

Dependent Variable: Economic output							
	North Eastern	Northern	Southern	Eastern	Western	Central	BKK& Vicinities
lnK	1.048 [0.088]***	0.945 [0.167]***	1.065 [0.111]***	0.929 [0.052]***	1.064 [0.202]***	0.721 [0.034]***	0.832 [0.025]***
lnN	-0.110 [0.058]*	-0.033 [0.138]	-0.083 [0.010]	-0.002 [0.053]	-0.126 [0.205]	0.090 [0.029]***	0.023 [0.019]
lnM _H	0.080 [0.043]*	0.103 [0.049]**	0.011 [0.027]	0.074 [0.020]***	0.054 [0.032]*	0.186 [0.025]***	0.132 [0.015]***
lnM _L	-0.018 [0.014]	-0.015 [0.011]	0.007 [0.003]**	-0.001 [0.003]	0.009 [0.009]	0.003 [0.002]	0.013 [0.002]***
Constant	1.833 [1.111]*	2.953 [1.848]	1.181 [1.208]	2.650 [0.631]***	1.391 [2.053]	5.665 [0.494]***	4.103 [0.340]***
R-squared	0.986	0.959	0.983	0.997	0.920	0.998	0.998
Observations	13	13	13	13	13	13	13

Note: Standard errors are in parentheses. *, **, *** indicate significant at 10%, 5%, and 1% level of significance, respectively.

Source: Author's calculation

The model is then estimated using RE and FE estimators and the estimated results are compared using the Hausman test. The Hausman test statistics are overwhelmingly significant at the one-percent level. The test decisively rejects the null hypothesis while using the RE estimator that the individual-specific effects are not independently distributed of the regressors, and supports the specification of the fixed effects estimator. Therefore, in interpreting the econometric results the main focus is on the fixed effects model estimates, while the random effects model is also estimated in this study for reference purposes.

The fixed effects (FE) model in Table 6.2 show that the high-skilled foreign-born workers variable (M_H) is statistically highly significant, while other types of workers become statistically insignificant. Nonetheless, the estimated results are consistent with the hypothesis that the existence of high-skilled immigrants boosts regional economic growth, although on a small scale. In relation to the high-skilled foreign-born workers variable (M_H), the estimated result suggests that only an increase of around 0.8-0.9 percent in output growth compared to a 10 percent increase in the degree of high-skilled foreign workers.

Furthermore, estimating the impacts of immigration on economic output for each region in Thailand shows a 10 percent increase in employment of high-skilled (M_H) significantly increased economic output in most regions, i.e., Northeastern, Northern, Eastern, Western, Central, and Bangkok and Vicinities region by about 0.80 percent, 1.03 percent, 0.74 percent, 0.54 percent, 1.86 percent, and 1.32 percent, respectively (Table 6.3). The impacts of low-skilled immigrants on economic output were mostly found to be insignificant, except for the Southern and Bangkok and Vicinities regions. However, their economic impacts seemed to be very low. A 10 percent increase in employment of low-skilled (M_L) significantly increased economic output in Bangkok and Vicinities, and Southern region by only around 0.13 percent and 0.07 percent, respectively (Table 6.3). The results of immigration's impacts on output growth suggest the characteristic differences among sub-regions of Thailand, where the share of immigrants who are relatively high-skilled and mostly employed in manufacturing and

services sectors as senior managers and professionals as a mean of foreign investment. Low-skilled immigrants from neighboring countries are mostly absorbed in economic sectors which tend to be labor intensive but low productivity such as agriculture, fishery, construction, and domestic work sectors. In accordance with the results in the previous chapter (Chapter 5), the high intensity of migrant workers in the Southern region, particularly low-skilled ones, is related to the employment in fishing and fishery products and processing industries as this region is bordered by the seas. Additionally, considering Bangkok and Vicinities as a metropolitan region that requires a great deal of the labor force, the share of the foreign workers is more concentrated in this region. Hence, migrant workers employed in this region are comprised of both high and low-skilled.

By dividing the overall standard production function in equation (6.2) with the total labor force (L), the effects of high-skilled (M_H/L) and low-skilled (M_L/L) immigrant shares on labor productivity (Y/L) can be estimated. Table 6.4 provides the results of the pooled OLS, and random effects, and fixed effects estimations. The results from RE and FE estimators are then compared using the Hausman test. The Hausman test statistics are again significant at the one-percent level, which means the FE model is appropriate.

The results of all explanatory variables except the share of capital per labor and high-skilled immigrants seemingly tend to vary on each estimation model, which may possibly be due to upward bias from not controlling or including several other determinants of labor productivity in the model such as innovation, technological investment, and physical infrastructure, as well as other political and social issues. Nonetheless, a 10 percent increase in the share of capital per labor (K/L) would contribute to an increase in labor productivity (Y/L) by about 7.3-9.3 percent (Table 6.4). This suggests that greater use of machinery and tools by regions increases capital intensity, making labor more efficient, and would enhance regional labor productivity. Therefore, regions with higher intensity of physical capital tend to show more productivity in the long term rather than those that have low physical capital intensity.

Table 6.4 Immigration and labor productivity in Thailand, 2003-2015

Dependent Variable: Labor productivity						
	Pooled OLS		Random Effects		Fixed Effects	
	NCR	CR	NCR	CR	NCR	CR
ln(K/L)	0.7345 [0.0090]***	0.7458 [0.0086]***	0.7641 [0.0246]***	0.8054 [0.0227]***	0.9301 [0.0516]***	0.8596 [0.0482]***
ln(N/L)	-1.1097 [0.2711]***	0.1520 [0.0046]***	-0.4058 [0.1184]***	0.1065 [0.0105]***	-0.5405 [0.1621]**	0.0521 [0.0422]
ln(M _H /L)	0.0928 [0.0065]***	0.0901 [0.0064]***	0.0923 [0.0155]***	0.0854 [0.0154]***	0.0808 [0.0127]***	0.0873 [0.0126]***
ln(M _L /L)	-0.0045 [0.0047]	0.0122 [0.0028]***	0.0004 [0.0016]	0.0027 [0.0015]*	-0.0041 [0.0033]	0.0011 [0.0030]
Constant	4.9198 [0.1261]***	4.9036 [0.1261]***	4.6501 [0.3349]***	4.2304 [0.3207]***	2.8063 [0.5959]***	3.6302 [0.5548]***
R-squared	0.9973	0.9973	0.9485	0.9485	0.9542	0.9542
Observations	91	91	91	91	91	91
Regions	7	7	7	7	7	7
Breusch-Pagan LM test ^a	-	-	$\chi^2(1) = 117.4$ ***	-	-	-
Hausman test ^b	-	-	-	-	$\chi^2(4) = 34.57$ ***	-

Note: NCR and CR indicate Non-Constraint and Constraint regression model, respectively. Robust standard errors are in parentheses. *, **, *** indicate significant at 10%, 5%, and 1% level of significance, respectively.

^a Random effects versus pooled-OLS estimations test.

^b Fixed versus random effects model test

Source: Author's calculation

Table 6.5 Immigration and labor productivity in Thailand by region, 2003-2015

Dependent Variable: Labor productivity							
	North Eastern	Northern	Southern	Eastern	Western	Central	BKK& Vicinities
ln(K/L)	1.048 [0.093]***	0.945 [0.146]***	1.065 [0.138]***	0.929 [0.051]***	1.064 [0.217]***	0.721 [0.055]***	0.832 [0.090]***
ln(N/L)	-0.110 [0.061]*	-0.033 [0.120]	-0.083 [0.125]	-0.002 [0.052]	-0.126 [0.220]	0.090 [0.046]*	0.023 [0.070]
ln(M _H /L)	0.080 [0.045]*	0.103 [0.043]**	0.011 [0.033]	0.074 [0.020]***	0.054 [0.035]	0.186 [0.040]***	0.132 [0.055]**
ln(M _L /L)	-0.018 [0.011]	-0.015 [0.009]	0.007 [0.003]**	-0.001 [0.003]	0.009 [0.009]	0.003 [0.003]	0.013 [0.006]**
Constant	1.833 [1.172]	2.953 [1.613]*	1.181 [1.505]	2.650 [0.617]***	1.391 [2.212]	5.665 [0.793]***	4.103 [1.226]***
R-squared	0.990	0.954	0.905	0.990	0.764	0.990	0.966
Observations	13	13	13	13	13	13	13

Note: Standard errors are in parentheses. *, **, *** indicate significant at 10%, 5%, and 1% level of significance, respectively.

Source: Author's calculation

Even though the econometric estimations concerning the share of low-skilled immigrants (M_L/L) and labor productivity (Y/L) were mostly found to be negative and insignificant, the relationship between the high-skilled immigrant share (M_H/L) and labor productivity (Y/L) was found to be positive and significant. A 10 percent increase of high-skilled foreign worker share would increase labor productivity by about 0.8-0.9 percent. The breakdowns of such estimations by regional level as shown in Table 6.5 further suggested a positive and significant relationship between the high-skilled immigrant share and labor productivity in most regions of Thailand. A 10 percent increase of high-skilled foreign worker share increased labor productivity by about 0.80 percent in Northeastern, 1.03 percent in Northern, 0.74 percent in Eastern, 1.86 percent in Central region and 1.32 percent in Bangkok and Vicinities (Table 6.5). These results suggest that high-skilled migrant workers in Thailand who brought in the new ideas, inventions, and technological innovation have an enhancing effect on the efficiency of task specialization through the adoption of labor-saving or knowledge-based technology, and thus they help to increase labor productivity. Also, there was a positive and significant relationship between the low-skilled immigrant share and labor productivity but in the small magnitude in some particular regions of Thailand, i.e., Bangkok and Vicinities and the Southern region. Table 6.5 shows a 10 percent increase of low-skilled foreign worker share increased labor productivity by around 0.13 percent in Bangkok and Vicinities and 0.07 percent in the Southern region.

Overall, the result of this study shows that immigration, of high-skilled immigrants in particular, has a statistically positive and significant impact on regional economic growth in Thailand; however, the magnitude of the impact is rather small. Real regional economic output seems basically embedded in the market structure of regional areas through physical capital and performance of native-born workers, with the influx of immigrants, especially low-skilled immigrants, affecting only the margins. The study also shows that the low-skilled immigrants which are considered to be the majority of immigrants in Thailand and usually viewed the most

adversely in terms of Thai regional economic development have an insignificant impact on economic growth, but the high-skilled immigrants which the present study has confirmed. Most regions of Thailand were found to benefit most from the inflow of high-skilled immigrants. In contrast, only Southern and Bangkok and Vicinities regions were found to benefit from the inflow of low-skilled migrants. Moreover, the econometric estimations show that a rise in the share of high-skilled migrant workers also causes an increase in overall labor productivity. This results from the increased diversity of the labor force that brings in new ideas, inventions, investment, and technological innovation to produce a wider variety of goods and services, thus indicating greater social returns to higher skill effects. Many regions of Thailand such as the Northeastern, Northern, Eastern, Western, Central, and Bangkok and vicinities region substantially benefit from employing high-skilled migrants. Even though many low-skilled immigrants are employed in Bangkok and vicinities and the Southern region, their contributions in these regions are considered to be relatively low. This may be due to the fact that most of them are employed in low productivity sectors.

The mostly insignificant impact of both native and low-skilled migrant workers on regional economic growth and productivity could possibly be related to the fact that the characteristics of these types of workers in each region of Thailand do not differ much from another as well as a more general issue of large numbers of undocumented and irregular low-skilled immigrants in the Thai labor market which should be addressed by the proper enforcement of migration policy. Evidently, immigration of low-skilled foreign workers, particularly irregular ones, causes a slight decrease in the low-skilled native wages as well as a decrease in technology investment by domestic firms, resulting in the reduction of overall labor productivity. This could imperil economic development in the long run. However, the low-skilled immigrants are considerable sources of labor supply, which helps to maintain the country's economic competitiveness. Therefore, it is necessary to appropriately manage and balance both economic costs and benefits of low-skilled migrant workers. Until now, it can be

seen that the immigration management system in Thailand still lacks this stability due to weak and inconsistent implementation of migration policy.

6.6 Conclusions

During the past decade, Thailand has become a major migrant-receiving country in Southeast Asia whose population of high-skilled immigrants has gradually increased over the years. However, most existing studies have extensively focused more on low-skilled workers from other ASEAN countries, showing a lack of recognition of skilled immigrants in Thai labor markets (Martin 2007; Lathapipat 2010; Pholphirul and Kamlai 2014). The present study, therefore, aims to investigate the economic impact of both low-skilled and high-skilled foreign workers immigrating into Thailand's regional labor market. In this study, the regional economy has been used to estimate the economic growth impact of immigrants using the standard production function. Even though the empirical analysis conducted in this chapter may be simple, it somehow sheds a new light for future research in this under-studied area in Thailand.

An important limitation of this study as previously mentioned is the extensive, but barely understood, underreporting number of undocumented and irregular low-skilled immigrants. Hence, it would be imprudent to put too much emphasis on the precise figures of immigration effects. Given that this chapter is a first attempt at this topic in Thailand, the sensitivity analysis of these findings with the estimation of irregular immigrants needs to be further examined. Certainly, more confirmation of the results could be obtained if one could study the regional economic growth impacts of those irregular migrant workers in Thailand. Also, it should be noted that although the econometric estimations are grounded on a conventional framework of economic analysis, some of the results illustrate insignificant effects of low-skilled immigrants on regional economic output which could be due to the reverse causality problem whereby low-skilled immigrants might not boost the regional economic growth, but instead the economic growth in the host country pulls in the low-skilled immigrants,

and the endogeneity problem resulting from not controlling several other determinants of regional economic growth and labor productivity, given the lack of data. When more data are available, these results can be further examined and revised.

Nevertheless, this study reveals that Thailand has long been enjoying price competitiveness by greatly relying on cheap labors from the neighboring countries, which causes the country to become stuck in the middle-income trap. Additionally, the imbalance between the number of low-skilled migrants and high-skilled migrants has been existing in Thailand for more than two decades. While it is evident that employing low-skilled immigrants can have short-term advantages in terms of economic output expansion and reductions in labor shortages, its contribution to regional economic development in the host country in the long run remains unclear. Since the inflow of high-skilled immigrants has a positive impact on regional economic growth, Thailand therefore should focus more on bringing in high-skilled foreign workers as they are likely to promote new innovation and technology, attract more foreign investment, increase knowledge transfer, and improve overall labor productivity. By offering more flexible entry regulations as well as tax and non-tax incentives and other business opportunities can attract high-skilled immigrant workers. In addition, the government itself should effectively invest in infrastructure and facilitation including research support and research institutes to engage in R&D activities focusing on regional area-based development such as the EEC development project, which can help to attract both foreign and domestic investment as well as high-skilled immigrants into the country.

CHAPTER 7 CONCLUSION AND POLICY IMPLICATIONS

7.1 Introduction

For several decades, international labor migration (ILM) has played a significant role in transforming the global economy. It has been estimated that over 270 million people are now international migrants worldwide, where Europe hosts the largest number of international migrants, followed by Northern America and Asia (UN, 2019). Moreover, it cannot be denied that the movement of people across country boundaries will increase in the future. This is owing to socioeconomic differences in living standards, real incomes, and demographic characteristics between nations (Wickramasekara, 2002). Research suggests that ILM creates a win-win-win situation which not only it benefits migrants themselves, but also both migrant-sending and receiving countries (Newland, 2009; Wickramasekara, 2011).

In Southeast Asia, Thailand is one of the three major destination countries of migrant workers, along with Malaysia and Singapore. Previously, Thailand was considered a labor-exporting country to other developed regions. However, since the late 1980s, the number of foreign workers, especially from the three neighboring countries – Myanmar, Cambodia, and Lao PDR – has continuously increased as a result of the changing national policy and economic structural transformation within the country (see Chapter 2). There is no doubt that the rising number of these immigrants have had a dominant impact on the Thai economy. The key challenges surrounding the introduction of the foreign labor are how to help the country accommodate large-scale immigration and reap the benefits of such immigration flows.

In Thailand, it can be said that immigration policies have been developed with a focus on the differences between various types of migrants and as part of the government's economic and development strategy. Even so, the immigration policies are perceived to be insufficient and are usually made on a reactive and ad-hoc basis. The foreign labor force was attracted to Thailand through the implementation of several interstate (intergovernmental) agreements with

the governments of neighboring countries. Also, Thailand has relied on bilateral agreements with these neighboring states as legal instruments for controlling the cross-border movement of labor. For instance, Thailand initiated memoranda of understandings (MOUs) with Lao PDR, Cambodia, Myanmar, and a nationality verification (NV) procedure from 2002 to 2003, in an effort to regularize the recruitment of immigrant workers in their home countries before arriving in Thailand.

The main reason for the inability of Thailand to develop efficient policy to regulate immigration is lack of knowledge of the process of migration, labor mobility determinants, and the contribution of immigrants to Thailand's economy. This study aims to address this information deficiency and provide useful insight into the current debate on issues of ILM. The study was empirically undertaken to enhance understanding of the introduction of international migrants into Thailand. This includes the characteristics, causes, determinants, processes, and impacts of the introduction of foreign labor on the Thai economy.

This chapter presents a summary of the major findings of the study regarding the research objectives and discusses some of the implications for policy development in Thailand. Some limitations and recommendations for further research in this area are also put forward.

7.2 Main findings

The overarching goal of the present study has been to investigate the characteristics, causes, determining factors, patterns, and contributions of international labor migration to the Thai economy – as explained at an early stage of this chapter – by providing the big picture. In order to achieve this goal, five main objectives were then established and addressed in the following sub-sections below.

7.2.1 Potential trends, characteristics, and measures of ILM in Thailand

The first research objective was:

“to indicate the potential trends and characteristics of immigration in Thailand and identify measures to tackle potential problems”.

To achieve this objective, a qualitative research method was applied by reviewing relevant literature, as well as official government publications and documents. Some secondary data related to ILM was also collected from different Thai government agencies, namely the Foreign Workers Administration Office (FWAO), Office of Immigration Bureau, Ministry of Labor, and Ministry of Foreign Affairs. The data obtained from these organizations suggested that the magnitude of the inflows of international migrant workers has been increasing significantly since the late 1980s.

The study provided in Chapter 2 has suggested that the major turning point of ILM in Thailand was in the 1990s after the country underwent the economic structural transformation from agricultural to a newly industrial. The greater demand for more laborers put pressure on the Thai government to consider more open approaches to international migration. As a consequence, a series of immigration policies and regulations regarding legal status and skill level were developed. In addition, the increased economic activity and the challenge of the middle-income trap, together with demographic changes in the country, have attracted more foreign workers to both the highly-qualified and low-skilled ends of the job spectrum. However, the total number of low-skilled immigrants is much higher than the number of high-skilled immigrants.

Over the past few decades, the countries of origin of foreign labor have not altered. The statistical evidence specifies that the origins of high-skilled migrants are usually dictated by the original sources of foreign investment and the requirement for specialized skills and knowledge, whereas the origins of low-skilled migrants can be explained by geographical proximity and demand for a cheap labor supply. Japan, China, the Philippines, India, and the UK are the major sources of legal high-skilled migrant workers, while low-skilled migrants are mostly irregular and from the three neighboring countries – Myanmar, Cambodia, and Lao PDR.

Furthermore, the analysis in Chapter 2 has indicated that government policies and measures have played an important role in determining the composition and volume of foreign workers and shaping their movement patterns and processes. However, it is noteworthy that such immigration policies and measures are usually driven by the government's economic development plan and strategy at a particular time. For example, the National Competitiveness Plan during the administration of Prime Minister Thaksin Shinawatra's government established the National Committee on Illegal Worker Administration, and the twelfth National Economic and Social Development Plan (2017-2021) during Prime Minister Prayut Chan-ocha's administration established the Foreigners' Working Management Emergency Decree 2017, which replaced the Alien Employment Act 2008.

The migrant-receiving measures can generally be categorized into two conditions – condition for the period of entry and condition for the period of employment – based on the immigration stages. The legal immigrant workers, as outlined in Chapter Two, are those foreigners entering the country with valid visas and performing jobs specified in work permits. Although obtaining a work permit is required for any foreigners who intend to work in Thailand, most migrant workers from neighboring countries still work without the work permit. In this regard, several Thai governments have long attempted to govern these illegal and irregular migrant workers.

7.2.2 Causes of ILM in Thailand's economy

The second research objective was:

“to examine a causal relationship between immigration and two macroeconomic indicators, namely economic growth and unemployment”.

Reflecting on the major theoretical perspective about the ILM initiation, it is evident that immigration, development, and economic growth are interrelated processes. As set out in Chapter 3, these key factors have led to the emergence of the country as a chief migratory destination in Southeast Asia, bringing in both highly skilled and low-skilled foreign workers.

At the aggregate level, these factors are the fast-growing economy in Thailand, demographic changes due to the declining fertility rate and increasing aging population, an imbalance in both quality and quantity of the Thai workforce, and widening disparities between Thailand and its neighbors.

Nevertheless, the increase in immigration has been increasingly accompanied by public views of foreign workers as a threat to Thai economic and social well-being. In particular, most Thai local populations are afraid that foreign workers will steal jobs from them, resulting in a high unemployment rate in the country. Accordingly, it is necessary to examine a causal relationship between immigration and two important macroeconomic indicators: economic growth and unemployment. For the second objective of this study, I conducted quantitative research based on the Thai data, using an Autoregressive Distributed Lag (ARDL) bounds cointegration test and Granger causality tests.

The empirical findings, as presented in Chapter 3, show that the development of the Thai economy or the increase in economic output measured by per capita GDP is the main reason given by foreign workers for migrating to work in Thailand. It was also found that, at least in the short-run, the employment opportunities or the availability of jobs have a greater impact on attracting more migration into Thailand. That is, in the context of Thailand, the low unemployment rate and job availability are the results of the change in demographic structure, labor shortages, and job characteristics, including a mismatch in the native workforce's quality.

Also, in the causal relationship between immigration and unemployment, it is evident that foreign workers are not likely to cause increased unemployment in Thailand. Instead, they tend to reduce unemployment in the country by means of complementary input to native workers. The foreign workers help to fill in job vacancies both at the bottom (e.g., undesirable jobs, or 3Ks (3Ds): Kitanai (Dirty), Kiken (Dangerous), and Kitsui (Demanding)) and the top (e.g. skilled professionals, technicians, specialists, etc.) of the job spectrum. This invalidates

the prevailing arguments that migrant workers crowd out native employment and reduce job opportunities for the existing workforce in Thailand.

The theoretical framework of Battistella (1999) argues that “*unskilled migrants do not compete with nationals because they are employed in sectors that are shunned even by unemployed national workers. On the other hand, highly skilled migrants also do not compete, since the demand for highly skilled workers in Asia is expanding and largely unmet*”. Clearly, the findings of this study support this conclusion, and it is argued that the causes of ILM in Thailand cannot be fully understood without incorporating demographic changes and economic development into the migration theoretical framework.

7.2.3 Determinant factors of ILM in Thailand’s economy

The third research objective was:

“to investigate the determinant factors that cause the inflow of migrant workers and the extent to which migrant workers affect the Thai labor market”.

After the Asian financial crisis in 1997, Thailand witnessed the two major slumps which strongly affected its economy: one was the global financial crisis, which emerged from the U.S. sub-prime crisis during 2007-2009; and the other was the severe flood crisis in the country at the end of 2011. Thailand has been progressively recovering from these economic downturns, and the foundations of the Thai macro economy have been flexible and relatively strong. Apart from such crises, Thailand has rapidly accumulated capital in both the private and public sectors. This can be seen in the rapid expansion of domestic and foreign investment throughout the country. The expansion in Thailand’s capital accumulation has generated new job opportunities, which, in turn, have increased labor demand in terms of scope and scale. However, the demand for labor has grown much faster than the country’s labor supply, resulting in a disequilibrium between demand and supply in the Thai economy. The declining growth of the Thai labor force and the newborn population, combined with the insufficient skills of the Thai labor force and low technological capabilities, have further led to critical labor shortages in the Thai market.

Labor shortages within the country have therefore been the major pull factors for the foreign labor force.

Nevertheless, such demand for labor cannot automatically bring about and maintain labor immigration. Other determinants are also responsible for labor movement in the initial stage, and for sustaining it. Chapter 4 of this study proposes five such determining factors in the Thai labor market. First, as previously mentioned, the movement of both skilled and low-skilled migrants is driven by awareness of labor shortages and employment opportunities in Thailand, particularly owing to the greater demand for labor and demographic transitions in Thailand. Second, despite high employment opportunities and labor demand, the migration of both skilled and low-skilled migrants into Thailand is in accordance with the country's economic development. The divergences in economic growth between Thailand and other countries in the same region are likely to attract more foreign workers. Third, while the industrial sector has played an important role in encouraging foreign investment and labor into Thailand, the "primary" or agricultural sector's employment, which has been deeply rooted in the economic structure of Thailand for a long time, has facilitated and sustained migrant inflows, especially from the neighboring countries. Fourth, urbanization may attract such a movement of foreign workers facilitated by infrastructure development, agglomeration of people and businesses, and economic activity. Fifth, improved skills and educational levels in the local population have created a good environment for investment and are therefore attractive to foreign investors and migrants.

However, this study, as outlined in Chapter 4, has not only investigated whether these five factors cause immigration, but has also estimated that these factors can be predicted by labor migration. This study employed two empirical analyses of the path model and simultaneous equations model. The findings show that economic matters are of fundamental significance in the introduction of the foreign labor force to Thailand. The size of urban settlements and employment-related factors due to agricultural employment and low

unemployment in Thailand underpinned the ILM. It was also found that when describing immigration in Thailand, variables related to employment opportunities seem to be more relevant than economic growth, since potential immigrants, especially low-skilled immigrants, are more concerned about the availability of jobs in the labor market. Furthermore, regarding the reverse causations, it does not appear that immigration is a determinant of unemployment in Thailand, while economic growth has been directly contributed to by migrant workers.

7.2.4 Patterns of ILM in Thailand's economy

The fourth research objective was:

“to show how regional differences affect migration patterns and regional economic growth in Thailand”.

According to the first law of geography developed by Tobler (1979), which states *“everything is related to everything else, but near things are more related than distant things”*, interactions among contiguous regions are relevant as no region in an open economy is isolated. Exchanges of information, communication, technology, and products have continuously occurred. Moreover, knowledge transfer, technology diffusion, and labor migration, both internally and internationally, testify that economies are actually related or spatially dependent on each other. Therefore, the analysis of proximity or spatial spillover in the process of international labor migration and regional economic growth cannot be neglected.

To achieve the fourth objective of this study, I applied Exploratory Spatial Data Analysis (ESDA) to identify the spatial patterns and dependence of immigration and regional economic outcomes in Thailand. The statistical analysis in Chapter 5 indicates that geographical proximity and spatial spillover have played a significant role in the patterns of foreign workers' movement and regional economic growth. It suggests that immigration and economic growth measured by income per capita are clustered across space, and their main features are dominant dual spatial clusters of high income (or high immigration-concentrated) and low-income (or low immigration-concentrated) provinces. Furthermore, it is found that high-income provinces

are also high immigration-concentrated provinces, and low immigration-concentrated provinces are low-income provinces. This explains the immigration phenomenon in Thailand that foreign workers tend to migrate towards better economic development or high-income regions, thus confirming the findings from previous chapters (Chapters 3 and 4).

Geographically, immigrant workers are more concentrated in high economic activity or large expanding provinces throughout the country, especially in Bangkok and the Vicinities, the Eastern region, and some provinces in the Southern region, where work can be easily found. As economic development has increased in some areas of the country, migrant workers, both highly-qualified and low-skilled, have been attracted to those particular areas.

In addition to the research objective, as Thailand has recently been focusing on balanced regional economic development, I further conducted classical convergence and multiple convergence club analyses to explain Thailand's regional growth process. This study has found that although backward or less developed regions have shown average economic progress, the economic disparity between regions is still a big issue in the country. That is, the convergent club distributions illustrate that the three economic growth clusters within the country – high-income, middle-income, and low-income clubs – are significantly different from each other. Most Thai provinces are located in the middle- and low-income clubs with more provinces in the Northern region located in the latter group, while relatively more urban clusters in the Eastern region, Bangkok (the capital city) and the Vicinities, and metropolitan areas with abundant resources are found in high-income clubs.

7.2.5 Impacts of ILM on Thailand's economy

The fifth research objective was:

“to examine the impact of immigration on economic outcomes in different regions of Thailand”.

The empirical evidence identified in the previous sub-section clearly indicates that foreign-born workers concentrate in clustered areas or regions (see Chapter 5), and that ILM is

mostly a result of the chain migration process in which considering country or provincial level alone is not sufficient. Furthermore, Thailand has recently implemented the 20-year National Strategic Plan (2018-2037), with the aim of turning Thailand into a knowledge-based economy under Thailand 4.0 and a developed nation with a balanced growth process across the country (see Chapter 2). To put this plan into practice, the current Thai government clearly specified the new economic development plan regarding the cluster-based Special Economic Development Zones (SEZs) and regional area-based Economic Corridors, e.g. the Eastern Economic Corridor (EEC).

To better understand the introduction of the foreign labor force and the economy of Thailand, my final objective was to examine the impact of immigration on economic outcomes in different regions of Thailand, as outlined in Chapter 6. Also, the historical context of ILM in Thailand, as explained in Chapter 2, suggests that immigrant workers in Thailand have changed quite considerably over the past few decades in terms of the total number and increased variation with regard to legal status and skill level. This was evident in Chapter 6 in the study conducted by both highly-skilled and low-skilled foreign workers as part of the analysis.

In the study of the economic impact of immigration in Thailand, I applied the standard production function and used panel data regression analysis with the estimation of the pooled OLS, random effects, and fixed-effects model to achieve this research objective. An increase in international labor mobility to Thailand, particularly among high-skilled foreign workers, has resulted in a positive impact on regional economic growth and labor productivity. Although low-skilled migrant workers do have a positive impact on Thailand's economic growth in some particular regions of Thailand, the magnitude is much smaller compared to highly-skilled migrants. However, when region-specific characteristics or the differences across regions were considered and included, this study found that only skill-qualified migrant workers contribute positively to regional economic growth and labor productivity of Thailand's regions. A plausible reason for this positive effect is that the highly skilled foreign workers who brought

in the new ideas, innovations, and technological advancement have an increasing focus on task specialization efficiency through the adoption of labor-saving or value-based technology, increasing labor productivity.

Nevertheless, it is undeniable that demand for low-skilled foreign workers from neighboring countries can still be seen in many Thai economic sectors; for example, fishery, agriculture, construction, and some other primary industries. By integrating the main findings in the analytical chapters (Chapters 3, 4, and 6), it can be seen that even though the contributions of low-skilled immigrants to economic production and labor productivity are relatively low compared to those of highly-skilled migrants, the large scale of such workers plays an important role in the Thai economy. Low-skilled immigrants bring benefits in terms of reduction of labor shortages and decreased unemployment levels by filling occupational gaps in many sectors of the Thai economy. They have also prolonged the life of Thai industries, which have faced the challenge of demographic transitions, by ensuring the supply of labor force to the Thai labor market.

7.3 Some policy implications

There is a need for comprehensive and robust policies regarding the governance of ILM and the development of the Thai economy. At present, Thailand's immigration policies and regulations seem to be ad hoc and inconsistent responses to specific circumstances. Based on the major findings of this study, some policy implications are outlined as follows.

First, this study found that immigration has a positive impact on labor shortage reduction by adding more labor supply to the Thai labor market; it thus serves as a short-term mechanism for decreasing the unemployment level in Thailand. Nevertheless, the problem is that most migrant workers, particularly from the three neighboring countries, who comply with all the legal provisions of Thai migration policies, still end up making their cross-border movement illegally. The study found that these migrant workers were mainly attracted by economic factors,

and most of them are relatively poor. Therefore, the policy for reducing illegal cross-border migration should aim to reduce the cost of travel and legal migration procedures. However, with the establishment of One-Stop Service Centers (OSSCs), explained in Chapter 2, it is expected that migrant workers can complete all the requirements of the regularization process in one location. Also, it is hoped that both employers and migrant workers can reduce recruitment expenses and other costs.

Second, efforts have to be made to change native perceptions that criminalize foreign workers, particularly low-skilled ones. As indicated in Chapter 3, public perceptions of low-skilled immigrants as a threat to economic and social well-being and nothing more than cheap and disposable labor, continue to make these people third-class citizens. Though they take up jobs shunned by the local people, and which support the Thai economy, they are still seen as aliens undeserving of equal rights or pay, rather than as employed labor contributing to the country. Such migrant workers are then living at the edge of society, unsure of their legal rights, and more vulnerable to abuse and exploitation. Policymakers in Thailand, therefore, should concentrate on ensuring immigrants' legal rights and other welfares. Moreover, the government should improve policies to educate native residents to tolerate the presence of an increasing number of temporary and permanent migrant workers.

Third, the issue of ILM in Thailand is a complex and multifaceted one which cannot be addressed by a single solution, or by the Thai government alone. The cooperation of other sectors (e.g. the private sector, including businesses and non-governmental organizations) and international collaboration from migrant-sending countries as well as the ASEAN community is needed to build policies that do not allow immigrants to be unfairly treated. Thus, in order to ensure the legal rights and welfare of migrant workers, long-term policies should be implemented with the cooperation of both migrant-sending and receiving countries. Migrant-sending countries should collaborate through their embassy and immigration offices in Thailand to ensure that migrant workers are not socially excluded and still remaining connected.

Fourth, this study found that the existence of registered and regular migrants seems to be stimulated by legislation and policies on immigration, while such immigration policies and legislation are also driven by the government's economic development plan and strategy. This means that immigration policies must not be seen in isolation from other national economic and development policies, and must be embedded within a political and socio-economic system that supports equal rights for all people. While residents might have more privileges, non-residents must be provided with full support. Stronger and more effective enforcement of related legislation and laws is the key to such policy implementation.

Fifth, in order to promote balanced economic development and reduce income disparity under the recent national strategic plan, balanced growth policies and strategies should not only be grounded in their effects on a specific region or a single economy as a whole, but also on how they affect the neighboring regions or economies that face similar challenges in the growth process. According to the spatial pattern and spillover effects presented in Chapter 5, different groups of regions require different economic development policies. In addition, because the spatial pattern of immigration is considered to correspond with the pattern of the economic outcome variable, any changes in regional growth policy may affect the inflow of migrant workers. Learning from the pilot project of the regional growth policy, the Eastern Economic Corridor, which has created hundreds of thousands of jobs and attracted many international migrants, the government should apply the principle of this project to other areas of Thailand.

Finally, as explained in Chapter 6, although the advantages of employing low-skilled foreign workers in terms of the reduction of labor shortages are evident, their contribution to economic development in the long run is doubtful as it possibly delays the adoption of labor-saving or value-based technology. The empirical evidence of this study shows that high-skilled migrant workers have a positive impact on both regional economic growth and labor productivity. Regarding this, policymakers in Thailand should develop policies to bring in skilled international migrants. Government measures for providing more flexible entry

requirements, and more encouraging opportunities in both the short- and long-term, including tax and non-tax incentives in promoting investment, may attract these workers. Furthermore, knowing that foreign workers have been attracted by urbanization and high-income areas (see Chapters 4 and 5), the Thai government should invest in infrastructure, including advanced information technology and transportation, as well as other facilities that uphold agglomeration of people and businesses and economic activity.

7.4 Some suggestions for further study

This study has explored the potential trends and characteristics of migrant workers in Thailand, patterns of the movement of foreign workers, and causes and impacts of the introduction of foreign labor on the Thai economy, through different approaches to measurement and analysis. The central aim, including the specific objectives, has been satisfied, and provides a significant contribution to a better understanding of the introduction of international migrants to the Thai economy. However, further empirical analyses of other aspects of ILM and the Thai economy will allow a more thorough understanding of this complex phenomenon.

Therefore, this research indicates the value of further study of this topic, particularly at the micro-level. Skill-classified migrant workers in different regions of Thailand need to be compared and studied, in order to enable in-depth information on issues concerning a specific region. For instance, regarding the economic impact of foreign workers, this study found that many regions of Thailand, such as the Northeastern, Northern, Eastern, Western, Central, and Bangkok and Vicinities region, substantially benefit from employing high-skilled migrants. This suggests that geographical differences and other specific characteristics across the Thai regions may influence such a result. Further exploration of similar matters specific to each Thai region would be particularly useful for Thai policymakers.

There is also a need for further research to examine and revise the economic contribution of skill-qualified migrant workers because existing ILM data in Thailand, especially for irregular unskilled migrants, is still inadequate and lacking in availability. Thus, the satisfactory examination of such workers for the purposes of policy development has not yet been met. For studies of the economic impact of foreign workers to generate more satisfying results, both the quality and quantity of data collected by government agencies must be improved and accessible to the public. As well as the economic impact of such movement measured quantitatively over a period of time, a qualitative research method, such as in-depth interviews and direct observation, would enable more detailed and complete results.

Finally, the potential challenges emerging from the implementation of labor immigration policies in Thailand justify the need for further investigation. Chapter 2 revealed that Thailand's immigration policies were mainly adopted as a consequence of the government's economic development plan and strategy at a particular time, and such policies are still mostly ad hoc, reactive, and inconsistent. This reflects the fact that ILM is a complex phenomenon with regard to policy development in Thailand. While recognizing that the ILM situation in Thailand has its own specific characteristics, investigations of foreign employment and immigration policies and measures of other migrant-receiving countries could pave the way for policy implications in terms of immigration in Thailand. Since the statistical evidence indicates that migrant workers' inflow will continue to increase, policymakers could effectively prevent and tackle the problems, thus maximizing the benefits to the country and to migrants themselves.

7.5 Final remarks

In all, the overarching goal of this study to investigate the nature, causes, patterns, and contributions of foreign labor immigration to Thailand's economy, has been accomplished. While there is a need for further exploration to enable a more complete knowledge of this

complex phenomenon, this research has provided a historical background to the mobility of international migrants in Thailand. It has empirically identified the reasons, determinant factors, and processes behind such movement. Finally, the research has examined the economic consequences of both skill-qualified and low-skilled foreign workers migrating into Thailand. In doing so, this study has added substantial new evidence to the growing body of research and current debates at the nexus of ILM and the Thai economy.

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Appendices

Appendix 3.1 A number of immigrants from major countries (in thousands)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Myanmar	1083.5	944.3	1313.3	715.7	780.2	933.9	996.6	935.4	1341.0	1205.1
Lao PDR	161.1	106.1	168.6	81.1	61.0	54.1	68.1	105.8	154.5	225.7
Cambodia	179.2	122.6	347.8	202.1	185.5	194.9	210.4	251.9	338.4	425.5
Japan	23.2	24.0	25.9	29.8	35.5	35.5	36.7	36.5	36.6	33.7
China	8.7	9.0	9.6	12.0	15.2	17.0	18.8	22.2	23.6	25.9
UK	8.5	8.6	9.1	9.8	11.0	10.7	10.8	10.6	10.4	10.2
India	8.0	8.2	8.5	9.3	10.8	11.0	12.0	12.4	13.6	14.0
USA	6.6	7.0	7.4	8.2	9.3	8.6	8.8	8.6	8.2	7.9
The Philippines	6.8	7.0	7.8	9.2	12.0	12.2	13.4	14.4	15.2	17.3
Taiwan	4.6	4.5	4.0	4.4	4.9	4.9	5.3	5.5	5.7	5.8
South Korea	3.3	3.2	3.4	3.5	4.3	5.8	6.1	6.0	6.0	5.8
Australia	3.0	3.0	3.1	3.2	3.5	3.4	3.5	3.4	3.3	3.2
Germany	2.6	2.7	2.7	2.9	3.4	3.2	3.2	3.3	3.4	3.5
France	2.6	2.8	3.0	3.5	4.1	4.3	4.7	5.0	5.1	5.1
Malaysia	2.3	2.2	2.2	2.3	2.8	2.7	2.8	2.8	3.0	3.3
Canada	1.5	1.6	1.5	1.7	2.0	1.8	1.9	1.9	1.8	1.8
Singapore	1.6	1.5	1.5	1.7	1.9	1.9	2.0	2.0	2.0	2.1
The Netherlands	1.1	1.1	1.1	1.2	1.4	1.3	1.4	1.4	1.4	1.4
Italy	1.2	1.3	1.4	1.6	1.9	1.9	2.0	2.1	2.1	2.1
Switzerland	0.9	0.9	0.9	1.0	1.1	1.1	1.1	1.1	1.0	1.0
Pakistan	0.7	0.7	0.8	0.8	1.0	1.0	1.2	1.2	1.2	1.2
Russia	0.8	1.0	1.4	1.8	2.5	2.8	2.4	2.6	3.0	3.1
Sweden	0.9	1.0	1.0	1.1	1.2	1.2	1.3	1.4	1.3	1.2
Other countries	41.3	45.6	34.5	37.3	42.0	37.2	42.7	55.4	99.0	125.6
Total	1554.0	1309.9	1960.5	1145.2	1198.5	1352.4	1457.2	1492.9	2080.8	2131.5

Source: Computed by author based on the OFWA, Ministry of Labor

Appendix 3.2 Descriptive statistics

	lnIMM	lnUNEMP	lnGDP
Mean	0.6316	-0.0223	10.4367
Maximum	1.2679	0.7308	10.6365
Minimum	-0.6225	-0.7510	10.2717
Std. Dev.	0.3882	0.3172	0.0988
Variance	0.1507	0.1006	0.0098
Skewness	-0.8648	0.0733	0.0254
Kurtosis	3.9100	2.7786	1.9379
Observations	47	47	47

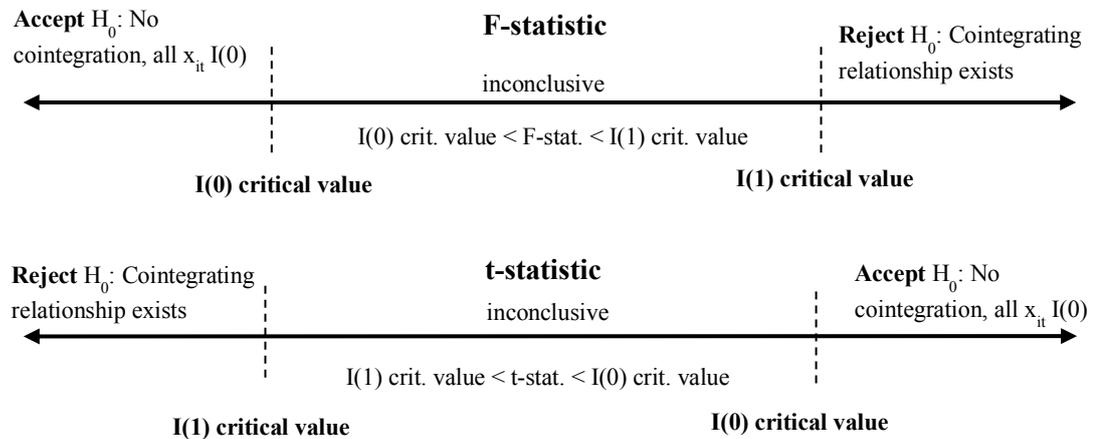
Source: Author's calculation

Appendix 3.3 Correlation Matrices

	lnGDP	lnUNEMP	lnIMM
lnGDP	1		
lnUNEMP	-0.0265	1	
lnIMM	-0.0812	-0.1519	1

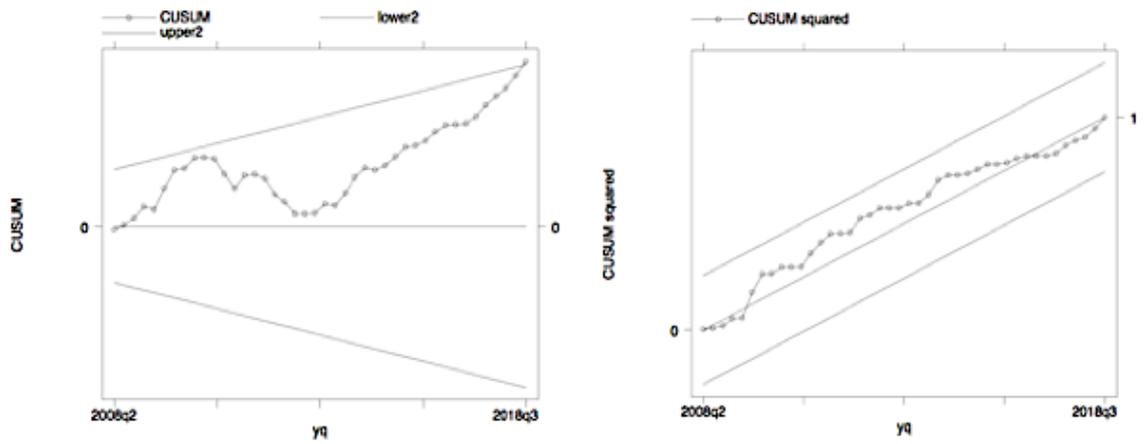
Source: Author's calculation

Appendix 3.4 ARDL Bounds Testing Statistics



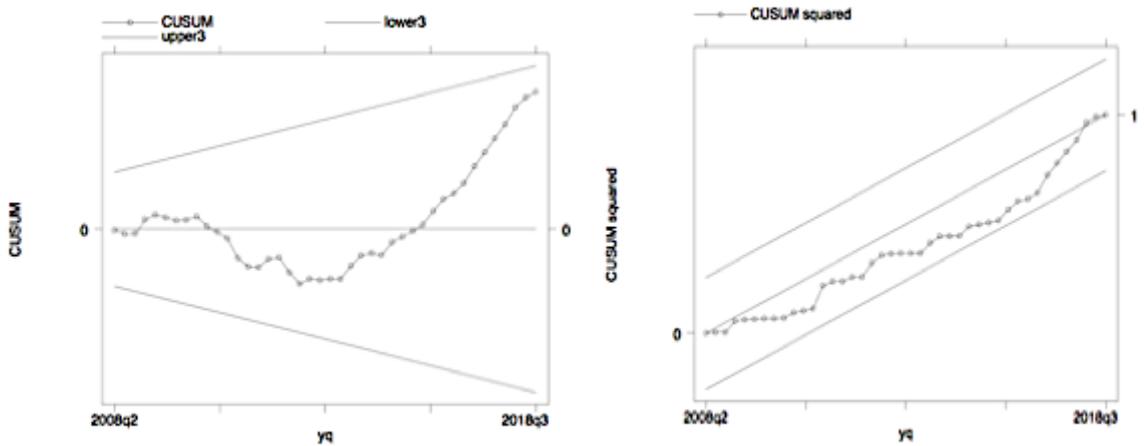
Source: Philips (2018)

Appendix 3.5 CUSUM and CUSUMSQ of Model 1: $F(\ln IMM/\ln UNEMP, \ln GDP)$



Source: Author's calculation

Appendix 3.6 CUSUM and CUSUMSQ of Model 2: $F(\ln UNEMP/\ln IMM, \ln GDP)$



Source: Author's calculation

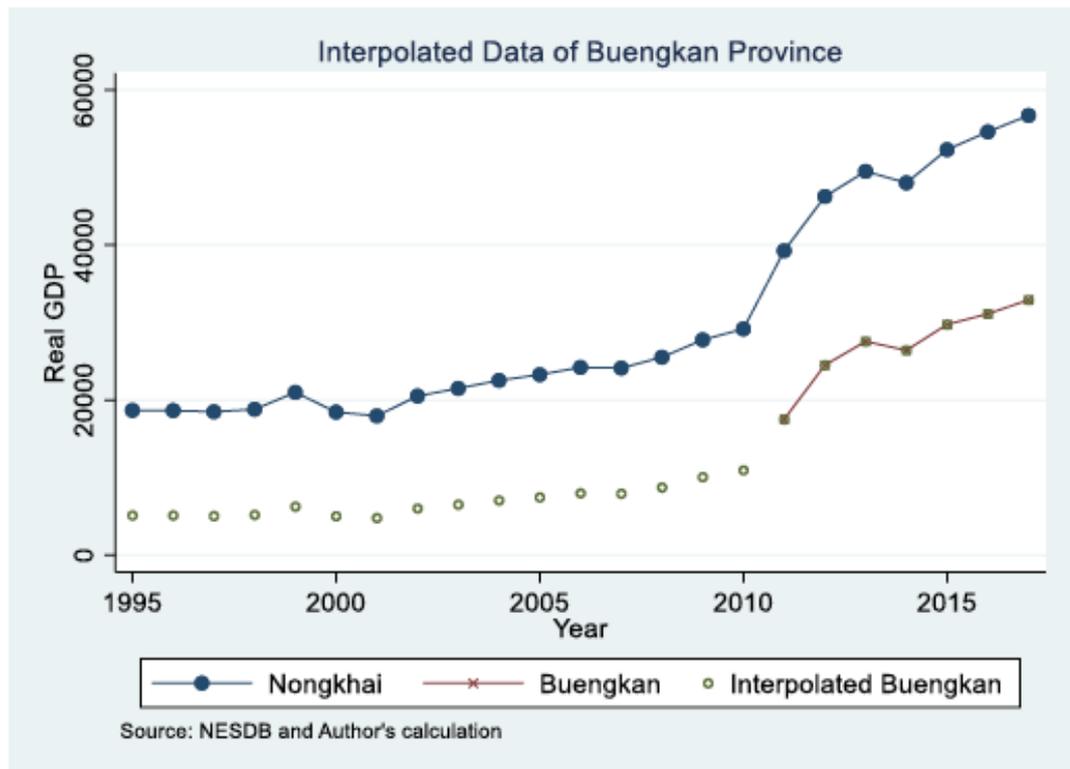
Appendix 4.1 Unit root test results

Variables	lag	Augmented Dickey-Fuller Test		Phillips-Perron Test		Dickey-Fuller GLS Test	
		With Trend	Without Trend	With Trend	Without Trend	With Trend	Without Trend
lnIMM	1	-3.780** (0.018)	-1.513 (0.527)	-5.062*** (0.000)	-2.824* (0.055)	-2.749 (lag 1)	1.489 (lag 3)
ΔlnIMM	1	-7.437*** (0.000)	-7.522*** (0.000)	-8.622*** (0.000)	-8.744*** (0.000)	-2.221 (lag 3)	-1.024 (lag 3)
lnUNEMP	3	-1.157 (0.919)	-1.341 (0.610)	-2.491 (0.333)	-2.629* (0.087)	-1.352 (lag 2)	-1.042 (lag 2)
ΔlnUNEMP	3	-3.822** (0.016)	-3.707*** (0.004)	-9.027*** (0.000)	-8.942*** (0.000)	-8.059*** (lag 1)	-7.950*** (lag 1)
lnGDP	4	-4.223*** (0.004)	-0.078 (0.952)	-5.995*** (0.000)	-1.068 (0.728)	-2.455 (lag 4)	0.551 (lag 4)
ΔlnGDP	4	-3.283* (0.069)	-3.296** (0.015)	-8.601*** (0.000)	-8.765*** (0.000)	-2.173 (lag 3)	-0.917 (lag 3)
lnAGRI	4	-2.293 (0.438)	-1.031 (0.742)	-4.708*** (0.001)	-3.118** (0.025)	-1.501 (lag 4)	-1.175 (lag 4)
ΔlnAGRI	4	-2.277 (0.447)	-2.360 (0.154)	-8.350*** (0.000)	-8.517*** (0.000)	-1.778 (lag 3)	-0.932 (lag 3)
lnURBAN	4	-2.134 (0.527)	-1.723 (0.419)	-2.615 (0.273)	-1.980 (0.295)	-1.619 (lag 4)	-0.057 (lag 4)
ΔlnURBAN	4	-1.670 (0.764)	-1.197 (0.675)	-13.760*** (0.000)	-11.167*** (0.000)	-2.301 (lag 3)	-2.545** (lag 3)
lnEDU_tertiary	3	0.388 (0.997)	-2.818* (0.056)	-0.977 (0.947)	-2.746* (0.066)	-0.458 (lag 2)	0.386 (lag 1)
ΔlnEDU_tertiary	3	-4.284*** (0.003)	-3.240** (0.018)	-8.472*** (0.000)	-7.556*** (0.000)	-5.834*** (lag 1)	-5.401*** (lag 1)

Note: *, **, *** indicate significance at critical value of 10%, 5%, and 1% level.

Source: Author's calculation

Appendix 5.1 Interpolated graph for a new province of Thailand, Buengkan



Source: Author's calculation

Appendix 5.2 List of provinces in the club classifications

Club 1 (12 provinces)	Bangkok, Samutprakan, Samutsakhon, Nakhonpathom, Prachinburi, Saraburi, Phranakhonsriyuthaya, Chonburi, Chachoengsao, Rayong, Buengkan, and Phuket
Club 2 (42 provinces)	Khonkaen, Udonthani, Loei, Nongkhai, Mukdahan, Nakhonphanom, Sakonnakhon, Nakhonratchasima, Chaiyaphum, Ubonratchathani, Roiet, Buriram, Surin, Mahasarakham, Sisaket, Amnatchareon, Chiangmai, Chiangrai, Lamphun, Nakhonsawan, Kamphaengphet, Uthaithani, Phetchabun, Suratthani, Phangnga, Krabi, Chumphon, Songkhla, Satun, Trat, Chanthaburi, Nakhonnayok, Ratchaburi, Kanchanaburi, Phachuapkhirikhan, Phetchaburi, Samutsongkhram, Singburi, Angthong, Lopburi, Pathumthani, and Nonthaburi
Club 3 (23 provinces)	Kalasin, Yasothon, Nongkhualamphu, Lampang, Uttaradit, Maehongson, Phrae, Nan, Phayao, Phitsanulok, Sukhothai, Tak, Phichit, Ranong, Nakhonsithammarat, Yala, Trang, Narathiwat, Phatthalung, Pattani, Sakaew, Suphanburi, and Chainat

Source: Author's calculation

**Appendix 5.3 Summary of Moran's scatter plots of immigration, GPP per capita,
and native employment**

Year	HH	LL	LH	HL
<i>Immigration</i>				
2006	(28 provinces) Bangkok & Vicinity, most Eastern, and some Southern provinces	(33 provinces) Most Northern and Northeastern provinces	(10 provinces) ANG, KRA, NNY, PTL, PHY, PCB, PRB, SKA, SAT, UTN	(5 provinces) KPP, NRS, NSW, SBR, SON
2017	(31 provinces) Bangkok & Vicinity, most Eastern, and some Southern provinces	(32 provinces) Most Northern and Northeastern provinces	(6 provinces) ANG, MHS, PAT, PTL, SAT, UTN	(8 provinces) CHM, LBR, NRS, NSW, PCB, SON, SPB, TAK
<i>GPP per capita</i>				
2006	(16 provinces) Bangkok & Vicinity, and most Eastern provinces	(46 provinces) Most Northern, Northeastern, and some Southern provinces	(10 provinces) ANG, CHU, NNY, NRS, PNG, PCB, SKA, SSO, SAT, TRN	(5 provinces) LPH, PHU, RCB, SON, SRT
2017	(16 provinces) Bangkok & Vicinity, and most Eastern provinces	(46 provinces) Most Northern, Northeastern, and some Southern provinces	(10 provinces) ANG, NNY, NRS, PCB, RAN, SKA, SSO, SAT, TRN, TRA	(5 provinces) LPH, PHU, RCB, SON, SRT
<i>Native employment</i>				
2006	(23 provinces) Bangkok & Vicinity, and most Northeastern provinces	(22 provinces) Most Southern and Eastern provinces	(15 provinces) ANC, LOE, MHS, MDH, NNY, PTN, PTL, PYO, PCH, PRB, SSK, SSO, TRA, UDT, YST	(16 provinces) CHM, CBR, KPP, KCB, LPA, NPT, NSW, NST, NRT, PSN, RBR, SBR, SON, SPB, SRT, TRA
2017	(20 provinces) Bangkok & Vicinity, some Central and some Eastern provinces	(24 provinces) Most Southern provinces	(16 provinces) ANC, ANG, KRA, MHS, NNY, NBL, PAT, PTL, PYO, PBR, PCH, PRB, SKA, SSO, SAT, TRA	(17 provinces) CHM, KPP, KCB, LPA, NSW, NST, PSN, RBR, RYO, SKN, SBR, SSK, SON, SPB, SRT, URT, UDT

Source: Author's calculation