Employment of Immigrants and Firm's Competitiveness: Evidences from Thai Manufacturers

[1]Pungpond Rukumnuaykit and [2]Piriya Pholphirul
[1]College of Population Studies, Chulalongkorn University,
[2]Graduate School of Development Economics,
International College of National Institute of Development Administration (ICO NIDA),
NIDA, Bangkok, Thailand

Abstract: This study, uses a firm-level survey to examine the economic impacts of foreign migrants on Thai firms. Estimations show that an increase in unskilled migrant workers should cause a drop in labor productivity, a reduction of a firm's probability of R&D investment and a reduction of skills training. These negative impacts are based on evidence of increased use of labor-saving technology whereby the employment of unskilled immigrants encourages firms to rely on cost competiveness based on low production costs rather than value-added (or long-term) competitiveness, such as R&D investment and skills development. Even though immigration benefits, Thai producers by allowing them to maintain price competitiveness by lowering wage costs, this is merely a short-term benefit and one that jeopardizes long-term economic development.

Key words: Immigration, competitiveness, long-term development, Bangkok, Thailand

INTRODUCTION

Thailand is a good example of a migration receiving country in which her economic level is still classified as a developing country. Surrounded by less developed countries which are Cambodia, the Lao PDR and Myanmar, the number of immigrants into Thailand from neighboring countries is expected to increase very rapidly. This prediction is based on the current widening income disparities between Thailand and its neighbors. Such disparities are slowing the growth of the Thai workforce, leading to a higher demand for cheap labor in particular economic sectors. Most formal and informal migrants come from Cambodia, the Lao PDR and Myanmar. These migrants are mostly of working age with low-level skills and little education. There is no doubt that the wages paid to these migrants are lower than those paid to Thai workers but the migrants are still paid more than what they would earn in their own countries. Consequently, there are opportunities in Thailand for migrant workers who are actively working in and looking for jobs in some of the service sectors and in sectors that require only low-skilled labor, such as fishing, agriculture, construction and manufacturing.

International research on migration has been documenting the economic benefits and costs of immigration. The benefits can be to the migrants themselves to their households back in their native countries, as well as to their new communities and the

labor market. As for the costs, most empirical studies suggest that immigration does indeed reduce native wages, even though this effect might be small. However, since all most such studies have been carried out in developed countries, the relevance of these studies to a developing country, such as Thailand is questionable. The real impact of immigration on Thailand as a major host country in the region is still hotly debated not yet measured. Therefore, assessing the economic impacts of immigrants in Thailand would be worthwhile and of potential usefulness to other developing countries.

Immigration issues are always among the foremost of current economic and political concerns. Sanderson (2013) examines whether immigration promotes economic development in host countries. Using cross-national data for up to 122 countries, immigration flows are found to raise aggregate living standards in the long term. However, this contribution is not uniformly beneficial for all sample countries. This study, however aims examining this contribution by using firm-level data in Thailand. In that case, the analysis can be classified into the 7 propositions.

P_1; immigration and production: International immigrants to Thailand help to increase the labor supply for producing more economic output as measured by the Gross Domestic Product (GDP). This is particularly true in sectors and industries with labor-intensive production

Corresponding Author: Pungpond Rukumnuaykit, College of Population Studies, Chulalongkorn University, Bangkok, Thailand

where incomplete information in the labor market can cause uncertainty about output production and can result in market failures. At the firm level, employing migrants helps to stabilize the labor supply in these sectors to fill some vacancies and to prevent uncertainties about production. Apart from economic activity, labor shortages are problems that are crucial in a non-economic (non-tradable) household's activities, such as domestic work. Even, so employing migrant domestic workers not only helps the Thai household to alleviate these problems but also allows Thai workers, especially women to participate in the labor market, partly alleviating labor shortage problems in some specific sectors.

P₂; immigration and productivity: Productivity means doing things more efficiently and is measured as the output per unit of input. Productivity is the measurement of the offspring of human creativity and the primary source of the economic well-being. The relationship between immigration and productivity is unclear, however. It may be the case that immigrants can closely substitute for some groups of native workers, for example low-skilled migrants substituting for low-skilled natives which could result in a decrease in wages. On the other hand, a positive relationship may result when low-skilled immigrants complement high-skilled natives. Therefore, an overall increase in labor productivity may occur.

P₃; immigration and labor cost: According to the Microeconomic Production Theory of Profit Maximization, producers tend to switch to cheaper production inputs. The lower cost of employing migrant labor provides more labor for labor-intensive production, as long as the marginal benefit of employing migrant workers exceeds the marginal cost. The result is a higher quantity of output with lower costs of production. As domestic firms in Thailand have to maintain their competitiveness, they seek to benefit from paying lower wages to low-skilled immigrants in order to maintain price competitiveness when exporting products to global markets.

P₄; immigration and competitiveness: Competitiveness can be measured along different dimensions. In the context of comparative advantage, price or cost competitiveness is the ability of a firm to produce and market products at lower unit costs than its competitors do. Value-added competitiveness is defined, as the ability to achieve and maintain a level of labor productivity higher than that of competitors. It is mandatory to measure the overall competitiveness by balancing price/cost competiveness with value-added competitiveness and to measure whether employing foreign immigrants deters competitiveness.

P₅; immigration and innovation: Since, the long-term productivity of a firm is determined by its innovation and upgrading of technology, innovation is a positive sum game that develops new fields of value creation and positively spills over to a national level. Even though, employing unskilled migrants may help a firm to save some labor costs, on the other hand it may possibly blunt incentives to invest in new technology. Employing cheap labor from aboard is a kind of labor-saving technology that slows down long-term productivity improvement and results in the deterioration of international competitiveness. This notion emphasizes long-term and value-added competiveness for a firm to be able to compete with others by adopting superior technology rather than by competing on price.

P₆; immigration and skill development: An increase in labor migration to Thailand helps to speed up the shift of more Thai workers to higher-skilled jobs. When the supply of labor is greater due to increased numbers of immigrants who fill low-skilled jobs vacated by local workers, Thai workers are unavoidably pushed into higher-skilled positions. According to economic growth theory, an individual's increased skill level received from training can improve not only individual productivity but also that of co-workers and other firms through knowledge spillovers resulting in increasing technological levels and productivity. The importance of these external effects is hard to assess but might be measurable in the long run when skill development proves to be another key toward productivity and value-added competitiveness. This is the competitiveness structure of porter's competitive advantage as determined by personal productivity.

P₇; immigration and foreign/domestic investment: An influx of migrants increasing the labor supply in Thailand would raise the marginal product of capital and the return on investments, thereby attracting foreign direct investment. Foreign investors would find Thailand attractive due to the cheaper wages paid to migrant workers. On the other hand, lower wages may induce firms to substitute labor for capital and thus reduce foreign direct investment of capital. Similarly in the case of domestic investment, employing immigrants would clearly increase profits among Thai firms and encourage more domestic investment.

Figure 1 shows the linkages between the overall impacts of immigration on productivity and competitiveness based on the 7 propositions.

This study explains the implications of firm-level data from Thai manufacturers in the context of migration.
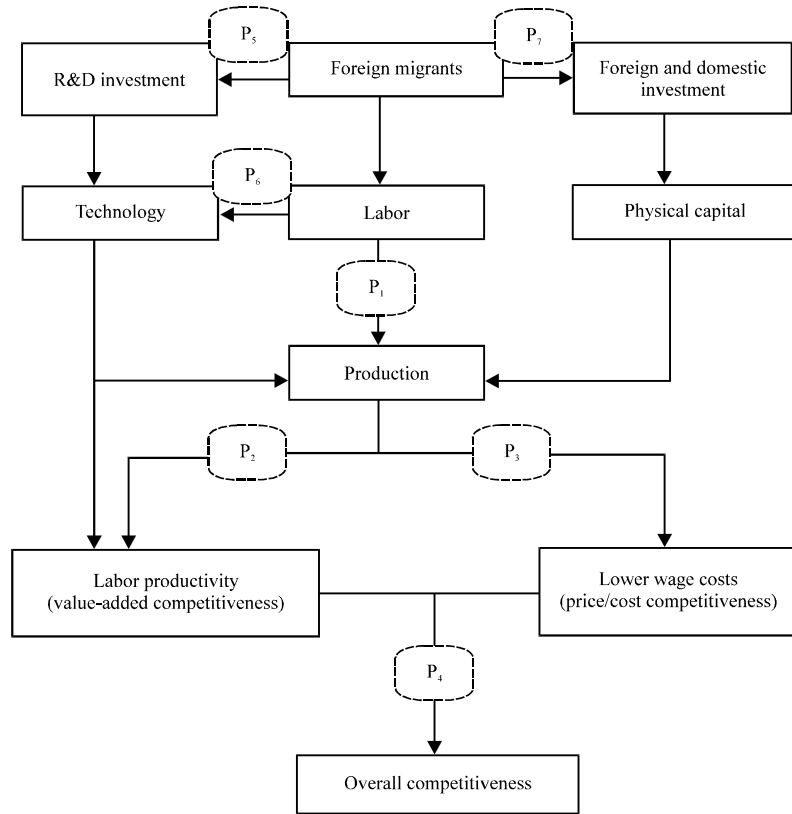
Fig. 1: Proposition framework of employing migrant and competitiveness

Research analyzes the direct economic consequences of immigration which will be examined at the firm-level by focusing on manufacturing firms in 8 industries, as listed in Fig. 2:

- Food processing
- Textiles
- Garments
- Automotive parts
- Electronics and electrical appliances
- Rubber and plastics
- Furniture and
- Machinery and equipment

The analysis will be conducted by using the Productivity and Investment Climate Survey (PICS). This study concludes this report and provides policy recommendations.

MATERIALS AND METHODS

Immigration and firm-level data: Researchers use manufacturing firm-level data to examine the 7 propositions mentioned earlier. Researchers used the
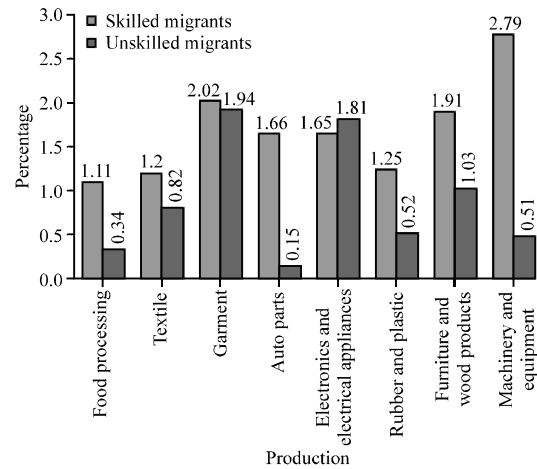

Fig. 2: Percentage increase of production (operation revenue) from 10% increase of labor from employing immigrants; Adopted from World Bank (2008)

Productivity and Investment Climate Survey (PICS) data which is firm-level data funded by the Royal Thai Government with technical assistance from the World Bank. The Productivity and Investment Climate Survey

(PICS) was carried out by the Foundation for Thailand Productivity Institute (FTPI) under the supervision of the Ministry of Industry with technical assistance from the World Bank on survey design and implementation. Technical Advisory Committees were composed of representatives from the World Bank, the Ministry of Industry, the National Economic and Social Development Board, the Bank of Thailand, the National Statistics Office and other agencies. The data were collected in two rounds of surveys. The first round was conducted between March, 2004 and February, 2005 and surveyed 1,385 manufacturing establishments. The second round was conducted between April and November, 2007 and surveyed 1,043 manufacturing establishments. About 426 manufacturing firms participated in both surveys. The survey covered 6 regions of Thailand (North, Central, Bangkok and vicinity, East, upper and lower Northeast and South) and 9 industries based on ISIC classifications (food processing, textiles, garments, automobile components, electronic components, electrical appliances, rubber and plastics, furniture and wood and machinery and equipment).

Survey results showed a substantial increase in the number of unskilled immigrant workers from 0.31% in 2004 to 4.19% in 2007. The largest increases came from those unskilled immigrants working in the food processing industry (from 0.63-11.04%), the garment industry (from 0.07-7.65%), the textile industry (from 0.15-3.78%) and furniture and wood products (from 0.84-4.73%). Thus, there was clearly a sharp increase in the employment unskilled migrants in labor-intensive sectors during the period of 2004-2007. On the other hand, the proportion of skilled migrants in garments, food processing, textiles and electronics and electrical appliances increased only slightly from 0.33% in 2004 to 0.92% in 2007. Researchers understand that this figure, especially for the year 2004 should be biased downward since firms may not report the true numbers of employed migrants and probably reported only documented ones.

There is evidence showing that Thai firms decided to employ more immigrants, especially unskilled immigrants in labor-intensive sectors during 2004-2007. First of all, the largest migrant registration campaign took place in 2004 from an effort to obtain more precise estimates of the number of irregular immigrants in Thailand. The Ministry of the Interior was assigned to be responsible for registering migrants from Myanmar, Laos and Cambodia who had been working in Thailand for at least 1 year. There was no fee involved in the process, so this was an incentive for 1,284,920 migrants to get registered. The Ministry of Labor, on the other side was responsible for

Table 1: Percentage of migrants employed in each industry

Industries	2004		2007	
	Skilled migrants	Unskilled migrants	Skilled migrants	Unskilled migrants
Food processing	0.04	0.63	1.31	11.04
Textile	0.30	0.15	1.13	3.78
Garment	0.05	0.07	2.12	7.65
Auto parts	1.14	0.10	0.77	0.50
Electronics and electrical appliances	0.30	0.16	1.15	1.05
Rubber and plastics	0.56	0.46	0.18	2.72
Furniture and wood products	0.03	0.84	0.28	4.73
Machinery and equipment	0.09	0.01	0.64	0.26
Average	0.33	0.31	0.92	4.19

Computed from PICS Data (2004 and 2007)

registering employers who wished to employ migrants to register migrants and to obtain work permits for them. As a result, 248,746 employers registered (Rukumnuaykit, 2008). Secondly, the MoUs signed between Thailand and their neighboring countries (the Lao PDR in October, 2002, Cambodia in May, 2003 and Myanmar in June, 2003) helped facilitate employing immigrants by the recruitment process to fill vacancies requested by the registered employers. From late 2005, Thailand requested 51,105 workers from Laos and 17,470 from Cambodia. However, the Lao PDR and Cambodia were able to provide only 3,418 and 570 workers, respectively representing lower targets for the fresh new recruitment under the MoU. From 2006 to August, 2007, the demand for the admission of foreign workers increased to 60,890 for the Lao PDR and 36,733 for Cambodia. As of 2007, there were 14,150 workers recruited from these 2 countries. However, the implementation of the MOU and national verification of Myanmar's citizens in Thailand requires intensive cooperation from the government of Myanmar (Rukumnuaykit, 2008). Thirdly in 2005, the Thai government allowed registered migrants to stay in Thailand for another year. As a result in 2006, the Ministry of Labor issued work permits to 705,293 migrant workers and approved a migrant quota of 1,226,106 migrants. In December 2006, the cabinet decided to allow migrants whose work permits would expire in 2007 to stay and work in Thailand for another year. As a result, work permits were issued to 535,732 migrant workers in June, 2007. Even though, the percentage of employed immigrants reported by the PICS survey did not represent the actual number of immigrants working in Thailand but instead was biased downward, the number showed an increasing trend of Thai firms employing immigrants (Table 1).

Immigrants were concentrated in Bangkok and Vicinity where the income level is relatively higher than in other regions. Apart from Bangkok, unskilled migrants are relatively more concentrated in the Northern and the Southern regions close to Myanmar (Table 2).

Table 2: Percentage of immigration employment by region

Regions	Skilled migrants	Unskilled migrants
Bangkok and Vicinity	3.63	9.02
North	0.78	2.39
Central	0.32	1.07
East	0.52	0.59
South	0.07	5.22
Northeast	0.21	0.14

Table 3: Percentage of migrants employed by firm size

| No. of employees | 2004 | | 2007 | |
	Unskilled migrants	Skilled migrants	Unskilled migrants	Skilled migrants
<50	0.173	0.035	4.000	0.392
50-200	0.377	0.531	3.500	0.739
200-500	0.547	0.344	5.846	1.610
>500	0.075	0.342	4.636	2.146

Computed from PICS data (2004 and 2007)

By firm size, larger firms tend to employ more unskilled immigrant workers. Firms with between 200-500 employees seem to employ the largest share of unskilled immigrants as compared to firms of other sizes. This can mean that firms with a big pool of workers may be labor-intensive firms that prefer to save on wage costs by employing cheap unskilled immigrants. Larger percentages, at about 2.146% of skilled immigrants are more likely to be concentrated in larger firms having >500 employees (Table 3).

To quantify the impacts of employing immigrants on productivity and competitiveness, this study examines the 7 propositions at the firm level.

Immigration, competitiveness and productivity

Immigration and firm-level production: As discussed in the previous study, a positive contribution of immigrants was found to both the overall economy and various sectors. Since, employing migrants helps stabilize the labor supply in each industry and prevents uncertainties in a firm's production, the economic contribution of immigrants to industry-specific levels can be measured by the estimation of basic production functions using immigrants as additional labor employment. Here, migrant workers are assumed to be as productive as Thai workers. Nevertheless, using provincial data to estimate a production function, Potipiti and Kulkolkarn (2010) found that an immigrant is equal to 0.58 Thai workers. The World Bank (2008) estimates the GLS production function by using the PICS data. Using a log-scale of operation revenue as the dependent variable, lists of independent variables are:

- Skilled labor
- Unskilled labor
- Intermediates
- Capital

If foreign immigrants are assumed to be perfect substitutes for Thai laborers, the estimated coefficients of both skilled labor and unskilled labor can be used as a good proxy in quantifying the contributions Thai firms receive from employing additional immigrants. Survey results from the Asian Research Center for Migration (ARCM, 2000) at Chulalongkorn University indicate that migrants are not perfect substitutes to Thai workers, since they are not treated equally in terms of wage compensation. Interviews with 6,000 employers in 50 provinces indicate that migrants should be paid on average around 70% as much as Thai workers. The lower wages of migrant workers, therefore implies lower productivity than that of Thai workers. The estimated coefficients from the GLS production function from table of the World Bank (2008) report can be used to explain the case that when there is 10% accruing to skilled labor from employing skilled immigrants, the firm's output (operative revenue) should increase by 2.76% in machinery, 2.02% in garment and 1.91% in furniture and wood industries. Similarly, if a 10% increase of unskilled labor is assumed to come from employing unskilled immigrants, the firm's output should increase by 1.94% in the garment industry, 1.81% in electronics and electrical appliances and 1.03% in furniture and wood products.

It is certain that skilled migrants who are more productive, contribute to more production (revenue) compared to unskilled migrants, as a lack of a skilled labor force was one of the most important causes of job vacancies. However, since majority of migrants are unskilled and should not be treated equally as Thai workers, the impacts of employing unskilled migrants on production (operation revenue) in this case may be over-estimated. The survey reports this as a key reason for numerous job vacancies. Over 40% of firm managers reported that vacancies arise because many applicants lack the basic skills or technical skills that firms require and that many vacancies are hard to fill due to the poor quality of the labor force (World Bank, 2008). Even though, employing skilled immigrants give firms an option to increase their capacities, at least in the short run they operate below full capacity if they cannot find enough competent and experienced workers. World Bank (2008) reports that nearly 20% of firms in the garment and machinery and equipment industries indicated shortages of capable staff, as a key reason for capacity underutilization. This is why, an increase of employing additional skilled migrants would be contributing the most to both sectors (0.279% in the machinery and equipment industry and 0.202% in the garment industry).

Immigration and competitiveness measures: While migrants contribute to production in all levels (economy-wide level, sectoral level and firm level), it is still doubtful whether hiring immigrants helps improve competitiveness among Thai firms, especially those competing in the global market. There are a few studies explaining how Thai firms make use of opportunities to search for low-wage workers by employing international migrant workers to enhance their cost competitiveness. For example Kura *et al.* (2004), analyzed a case in the shrimp production sector in which unskilled migrant workers are concentrated in the shrimp-peeling jobs. Since, Thailand is among the world's leading shrimp exporters with a market share of 16%, surpassing any other country in the region, the Kura study claims that the competitiveness of the shrimp industry depends on shrimp producers continuing to pay low wages to workers which is facilitated by their hiring many immigrant workers. Kohpaiboon (2009) examined the impact of Myanmar immigrants on Thai clothing factories in Tak province (a major Thailand-Myanmar cross-border province). There are a number of Thai export-oriented small and medium enterprises in the clothing industry that have established factories near the border to gain access to low-wage immigrants from Myanmar and thus benefit in terms of cost competitiveness. Kulkolkarn (2009) extends the analysis by comparing productivity differences between textile firms employing and those not employing immigrants. She finds an insignificant productivity difference between those firms. The intuitive explanation to this result is that the lack of a difference in productivity is due to the lack of skilled workers in the textile industry in Thailand in which low-skilled labors are generally concentrated. Using also survey of Thai firms, Pholphirul (2013) find that a firm that pays 10% more in unskilled wages (relative to total labor cost) in the previous year can be expected to employ 1.6% more unskilled labor. This is particularly true in the labor-intensive sector, such as the garment industry in which higher wages paid to unskilled laborers forces firms to hire more unskilled immigrants from abroad. Estimated coefficients of unskilled workers' wages show that garment firms are more likely to employ 6.5% more unskilled migrants when they pay about 10% higher wages for unskilled workers relative to the total labor costs incurred the previous year. Besides, in order to avoid paying for the fringe benefits (social security, education, accommodation and transportation) textile firms tend to employ skilled immigrants. Estimated coefficients of skilled worker's fringe benefits show that textile firms are more likely to employ 46.1% more of skilled migrant share when they pay about 10% more for unskilled fringe benefits relative to total labor costs incurred the previous year.

Although, a number of studies mentioned claim the reason, Thai firms employ unskilled migrants is due mainly to cheap wages, those studies are limited to only specific sectors (textile, shrimp and clothing) and/or only a specific province (Tak province). It is still doubtful whether hiring immigrants help to enhance productivity and competitiveness. But, using the PICS firm-level data would help measure more precisely the impacts of employing immigrant workers on productivity and competiveness among Thai firms ranging across industries and geographic areas.

There are several approaches to measuring productivity and competitiveness by using dependent variables. First, competitiveness can be measured in terms of value-added competitiveness which is driven by technological change and improvement of labor skills. Labor productivity is therefore an indication of this competitiveness measure as calculated by the firm's production value divided by number of workers employed. The second competitiveness measure has a common link to price/cost competitiveness in the labor market. Since, labor costs account for a large share of the cost of production, understanding how labor costs change over time is crucial for explaining the relative price of competitiveness. Average wage per worker will be used, as a price/cost competitiveness measure calculated by the total wage expenditure divided by the total number of employed workers in each firm. The average wage is computed to measure how firms should be able to reduce their labor costs from the employment of (unskilled) immigrants, particularly in the labor-intensive sector. Nevertheless, competitiveness of the real (production) sector is often measured by a low level of nominal (average) wages and an increase in labor productivity the unit labor cost calculated as the ratio of wage rate to labor productivity which could be a particularly useful measurement of overall competitiveness. For example, Pholphirul (2005) for computing unit labor costs and Pholphirul and Rukumnuaykit (2010) for using unit labor costs to measure a country's competitiveness gained from migrant workers. The unit labor costs rise when compensation and benefits rise faster than labor productivity. The lower the value of unit labor cost, the more competitiveness of the firm.

By comparing migrant-employing firms with firms not employing migrants for the year 2007, it can clearly be seen that firms employing unskilled migrants were able save around 20% of the average wages paid to their employees as compared to firms not employing unskilled migrants in the year 2007, since average wages paid by unskilled migrant-employing firms are 80,929 Baht/person/year

Table 4: Labor productivity, average wage and unit labor cost for migrant-employing firms and firms not employing migrants

Competitiveness variables	Firms	Unskilled migrants	Skilled migrants
2004			
Labor productivity	Migrant-employing firms	1,568,561	1,840,124
(Baht/person/year)	Firms not employing migrants	1,193,534	1,159,362
Average wage	Migrant-employing firms	78,352	118,018
(Baht/person/year)	Firms not employing migrants	95,336	93,954
Unit labor cost	Migrant-employing firms	0.050	0.064
(Unit)	Firms not employing migrants	0.080	0.081
2007			
Labor productivity	Migrant-employing firms	1,906,003	2,339,142
(Baht/person/year)	Firms not employing migrants	5,876,270	5,748,277
Average wage	Migrant-employing firms	80,929	131,894
(Baht/person/year)	Firms not employing migrants	102,375	93,298
Unit labor cost	Migrant-employing firms	0.042	0.056
(Unit)	Firms not employing migrants	0.017	0.016

Computed from PICS data (2004 and 2007)

while those paid by firms not employing migrants are 102,375 Baht/person/year, migrant-employing firms on average are able to reduce their wage costs by approximately 1-(80,929/102,375) = 0.209 or about 20%. Employing unskilled migrants benefit firms, especially those engaging in labor-intensive production by saving a substantial amount of wage costs and thus being able to remain price competitive. Even though, employing unskilled migrants clearly benefits Thai firms in terms of saving on wages and maintaining their price/cost competitiveness, at the same time their value-added competitiveness, measured by labor productivity, deteriorates. Firms employing unskilled migrants in 2007 were on average about 67% less productive than firms not employing unskilled migrants. In 2007, since labor productivity of unskilled migrant-employing firms was 1,906,003 Baht/person/year while that of firms not employing migrants was 5,876,270 Baht/person/year, firms with unskilled migrants were less productive than firms without unskilled migrant by 1-(1,906,003/5,876,270) = 0.675 or about 67.5%. This large deterioration of labor productivity compared to gains from a reduction of wage expenditure clearly explains the loss of overall competitiveness (measured by unit labor cost) (Table 4).

Nevertheless, using only average figures from data tabulation cannot be totally convincing given the large variations among firms in terms of their location, type of industry, production intensity, use of technology and so on. But, using simple econometrics and controlling for these variations should make the results more convincing and reliable. The 3 competitiveness/productivity variables mentioned earlier were calculated in the following ways.

Labor productivity: Log-scale of a firm's production value (in Baht) divided by the number of employees.

Average wage: Amount of wages and salary of production workers divided by the number of employees measured in Baht/person/year.

Unit labor cost: Log-scale of the average wage divided by labor productivity. The independent variables were divided into 2 groups as follows.

Migration variables
Share of skilled migrants: Percentage of skilled migrants employed by a firm divided by the total number of skilled workers employed in production.

Share of unskilled migrants: Percentage of unskilled migrants employed by a firm divided by the total number unskilled workers employed in production.

Border provinces: Constructed to be = 1, if a firm was located in a province sharing borders with 3 migrant source countries, namely; Myanmar, Cambodia and the Lao PDR.

The 2 more variables were created by multiplying skilled/unskilled migrant shares in a dummy border province to analyze the difference between employing skilled/unskilled migrants by a firm located in a border province compared to one located in a non-border province. Skilled workers are classified as technicians involved directly in the production process or at a supervisory level and whom management considers to be skilled. Unskilled workers are classified as persons involved in the production process and whom management considers to be unskilled. Researchers use similar competitiveness control variables as does the World Bank (2008) as follow:

Control variables:
- Computer control; percentage of production machinery controlled by computer
- Firm age; number of years, since a firm commenced operations in Thailand
- Firm size; size of a firm as measured by log-scale of the number of persons employed
- Capacity utilization; percentage of output a firm actually produced relative to the maximum amount that could be produced

- Capital-labor ratio; amount of machinery and equipment rented or owned by a firm divided by the total number of employees

The capital-labor ratio is added apart from other independent variables shown by the World Bank (2008). It comes from the theory of comparative advantage that a firm with relatively higher capital-labor ratio (or capital-intensive production) should be more productive. On the other hand, a firm with lower capital-labor ratio (or labor-intensive) should have lower wage (per worker) expenditure. The 3 competiveness measurements earlier, namely:

- Labor productivity
- Average wage
- Unit labor cost, may largely depend on industry specifics, such as higher capital or machinery per worker, better skills of workers, enhanced technology and specifically, location

The 6 regional dummy variables were constructed to distinguish the location of individual firms: North, Central, Bangkok and Vicinity, East, Northeast and South. In addition, 8 industry codes were constructed based on the 4-digit ISIC: Food processing, textile, garment, auto parts, electronic and electrical appliance, rubber and plastics, wood products and furniture and machinery and equipment. The survey only focused on the manufacturing industry. The impacts of migrants on agriculture and fisheries, services, construction and domestic works cannot be analyzed here. The upper Northeast region was merged with the lower Northeast and the electronic components industry was merged with the electrical appliance industry due to the limited sample sizes in both regions and industries.

Researchers also created a domestic exporter dummy which was defined to be equal to 1 if the sum of the ratio of direct export and indirect export to total sales was >10% and the percentage of the firm owned by private sector foreign companies was <10%. The domestic exporter dummy explains, how a domestic firm engaging in the export market will make use of employing migrants to gain competiveness in the global market. This definition of domestic export dummy comes from the World Bank (2008). A simple tabulation shows how domestic exporting firms are more likely to employ unskilled migrants than non-exporting firms. This result is consistent with the statement above in that domestic exporting firms may prefer to maintain price competitiveness in global markets by employing cheaper unskilled migrants. On the other hand, skilled immigrants are more likely to be employed in non-exporting Thai firms (Table 5).

Using the technique of ordinary least squares with the time dummy 2007 shows that labor productivity

Table 5: Percentage of firms employing migrant workers exporting firms and non-exporting firms

Exporting/ non-exporting firms	2004		2007	
	Unskilled migrants	Skilled migrants	Unskilled migrants	Skilled migrants
Domestic exporting firm	0.418	0.030	5.943	0.726
Non-exporting firm	0.342	0.777	2.883	1.306

Computed from PICS Data (2004 and 2007)

increases in a bigger and older firm that utilizes more capacity and uses computers in the production process with positive and significant estimated coefficients on labor productivity. A firm with 10% more computer-controlled production processes is around 3% more productive. While a firm that is one year older would be 0.7-0.8% more productive, labor productivity was also found to be higher in larger firms; each 10% increase in size makes a firm 0.55% more productive. In addition, a firm with 10% more in capital utilization is 4-5% more productive. Even though, labor productivity can be improved in a bigger and older firm that utilizes more capacity and uses controlled computers in production, those firms would need to spend more on wages in order to employ highly skilled workers. The regressions showed that a firm that uses 10% more controlled computers in production has to pay 2,606 Baht more in average wages per worker each year. A 10% increase of capacity utilization also raises average wage by 4,202 Baht/person/year.

The regressions show that a firm employing 10% more unskilled migrants will face a drop of its labor productivity by around 5%. On the other hand, a firm employing 10% more skilled migrants will be 28% more productive. The results are straightforward and consistent with what was found in the previous study, namely that employing additional highly skilled or low-skilled migrants should help to either improve or worsen, respectively labor productivity among Thai firms. In addition, a firm located in a border province with 10% more skilled workers was found to be 19% less productive than a firm employing those skilled migrants in non-border provinces. This result can be explained by the fact that immigrants with higher skills are usually more concentrated in populous provinces. For example, those who live in the Vicinity of Bangkok, the central region and the Eastern region enjoy higher wages than those in border provinces. Regarding, the geographical income disparity the contribution from those skilled immigrants to a firm's productivity should be higher than those who work and live in border provinces.

Even though, employing unskilled immigrants was found to reduce overall productivity among Thai firms, the practice nonetheless helps Thai firms to save on wage expenditures. Regressions revealed that on average, approximately 5,748 Baht/worker/year could be saved by Thai firms that employed an additional 10% of

Table 6: Immigration impact on labor productivity, average wage and unit labor cost

Independent variables	Labor productivity (log scale)	Average wage (Baht)	Unit labor cost (log scale)	Labor productivity (log scale)	Average wage (Baht)	Unit labor cost (log scale)
Migrant variables						
Share of skilled migrants (%)	0.014 (0.010)	887.159 (1,195.947)	-0.003 (0.009)	0.028 (0.017)*	884.797 (2,015.711)	-0.013 (0.016)
Share of unskilled migrants (%)	-0.005 (0.003)*	-564.029 (328.360)*	-0.001 (0.003)	-0.008 (0.007)	-682.353 (846.049)	0.002 (0.007)
Border provinces = 1	-0.066 (0.081)	7,222.49 (9,413.034)	0.034 (0.074)	-0.098 (0.119)	17,342.51 (14,085.509)	0.117 (0.109)
Skilled migrant x border provinces	-0.019 (0.012)*	-1,001.66 (1,366.142)	0.009 (0.011)	-0.027 (0.020)	-404.381 (2,314.145)	0.02 (0.018)
Unskilled migrant x border provinces	0.001 (0.005)	-57.625 (598.685)	0.001 (0.005)	-0.006 (0.011)	-640.464 (1,276.358)	-0.001 (0.010)
Competitiveness/productivity control variables						
Computer control (%)	0.003 (0.001)***	260.587 (113.974)**	0.001 (0.001)	0.001 (0.001)	69.384 (154.060)	0.001 (0.001)
Firm age (# years)	0.007 (0.003)***	725.768 (308.445)**	-0.003 (0.002)	0.008 (0.004)**	762.478 (442.119)*	-0.003 (0.003)
Firm size (log scale)	0.055 (0.021)***	-3,360.29 (2,426.801)	-0.012 (0.019)	0.012 (0.030)	-3,312.97 (3,516.169)	0.021 (0.027)
Capacity utilization (%)	0.005 (0.001)***	420.15 (151.837)***	-0.002 (0.001)**	0.004 (0.002)**	307.829 (222.152)	-0.003 (0.002)
Capital-labor ratio (Baht)	0.001 (0.000)***	0.17 (0.015)***	0.001 (0.000)***	0.001 (0.000)***	0.159 (0.017)***	0.001 (0.000)***
Region (Bangkok and Vicinity)						
North	-0.069 (0.120)	1,379.03 (13,977.299)	-0.112 (0.109)	0.107 (0.157)	1,808.27 (18,575.962)	-0.177 (0.144)
Central	0.198 (0.074)***	-4,217.54 (8,613.198)	-0.22 (0.067)***	0.222 (0.117)*	-12,581.59 (13,896.412)	-0.273 (0.108)**
East	0.455 (0.094)***	15,054.35 (10,960.020)	-0.278 (0.086)***	0.37 (0.136)***	-4,934.72 (16,182.054)	-0.254 (0.125)**
South	0.979 (0.098)***	-3,723.38 (11,415.063)	-1.083 (0.090)***	0.768 (0.133)***	-26,457.26 (15,706.442)*	-0.926 (0.122)***
Northeast	-0.365 (0.113)***	-14,664.75 (13,193.971)	0.083 (0.103)	-0.177 (0.167)	-28,835.17 (19,795.874)	-0.024 (0.153)
Industry (Food processing)						
Textile	-0.047 (0.096)	-22,071.32 (11,211.428)**	-0.074 (0.088)	0.068 (0.133)	-50,274.11 (15,774.808)***	-0.279 (0.122)**
Garment	-0.629 (0.100)***	-26,195.52 (11,578.310)**	0.397 (0.091)***	-0.609 (0.127)***	-32,584.89 (15,082.947)**	0.42 (0.117)***
Auto parts	-0.04 (0.104)	-3,650.23 (12,114.167)	-0.092 (0.095)	0.083 (0.141)	-39,097.07 (16,702.754)**	-0.323 (0.129)**
Electronics and electrical appliances	0.264 (0.098)***	3,858.82 (11,336.284)	-0.206 (0.089)**	0.421 (0.126)***	-16,360.56 (14,949.382)	-0.382 (0.116)***
Rubber and plastic	0.07 (0.089)	-33,551.51 (10,346.572)***	-0.32 (0.081)***	0.148 (0.121)	-46,497.76 (14,319.419)***	-0.427 (0.111)***
Furniture and wood products	-0.611 (0.105)***	-28,794.19 (12,222.443)**	0.405 (0.096)***	-0.561 (0.145)***	-40,800.00 (17,239.938)**	0.313 (0.134)**
Machinery and equipment	-0.123 (0.116)	-22,498.06 (13,472.777)*	0.033 (0.106)	-0.215 (0.168)	-44,723.62 (19,869.903)**	0.016 (0.154)
Year (2004) and domestic export dummy						
Year 2007	0.392 (0.055)***	15,069.19 (6,428.858)**	-0.264 (0.050)***	0.206 (0.087)**	17,437.92 (10,274.879)*	-0.085 (0.080)
Domestic export	-	-	-	-0.14 (0.075)*	-19,282.70 (8,848.494)**	0.045 (0.069)
Skilled migrant x domestic export	-	-	-	0.005 (0.027)	-457.574 (3,204.790)	-0.008 (0.025)
Unskilled migrant x domestic export	-	-	-	0.001 (0.009)	334.641 (1,099.472)	-0.002 (0.009)
Constant	12.297 (0.151)***	66,283.28 (17,534.375)***	-1.624 (0.138)***	12.837 (0.228)***	108,476.52 (27,007.511)***	-1.866 (0.209)***
Observations	2,378	2,384	2,372	1,220	1,224	1,219
R²	0.23	0.09	0.17	0.21	0.11	0.17

Standard errors in brackets; *,**,***Significant at 10, 5 and 1%, respectively

unskilled migrants. These results are straightforward enough to confirm a comparative advantage Thai firms should receive from hiring cheaper migrant workers. There is enough convincing evidence that a number of small and medium enterprises setting up factories in border provinces do so in order to obtain access to a pool of low-wage migrants from neighboring countries. Lower productivity can be a big obstacle to producing value-added goods and focusing on quality improvement. Labor productivity in the domestic exporting firms was found to be around 14% less productive than non-exporting firms but their average wage was also found to be lower (about 19,283 Baht/person/year) than non-exporting firms as well. However, employing migrants in domestic export firms has no significant effect on improving or reducing productivity and competitiveness among Thai firms. Therefore, there is no doubt as to why unit labor cost which is the ratio comparison between

average wage and labor productivity should be the best gauge of competitiveness and shows no significant impacts on Thai firms hiring immigrants. Even though, there is no significant effect from employing migrants on unit-labor costs, the estimated coefficients of the dummy year 2007 implies that labor productivity among Thai firms has increased by 39.2% and the average wage has risen by 15,069 Baht per year from 2004-2007. A decrease of 26.4% of unit labor costs implies that Thai firms became more competitive over the period 2004-2007 (Table 6).

It can thus be concluded that even though, employing immigrants and paying them subsistence wages helps Thai firms by reducing wage costs, it tends to slow down productivity improvement as entrepreneurs become accustomed to the availability of cheaper foreign migrants. Even though, cheaper would seem to benefit Thai firms, it has to be accepted that there will be lower

productivity. On the other hand, employing skilled migrants or more educated workers would be one of the best options for improving overall productivity.

Immigration, innovative investment and skills development: In general, economic discussions of comparative advantage, competitiveness is measured by the relative cost of production. However in the modern business world, particularly at the firm and industry levels, competitiveness is achieved by the ability to create differentiated capabilities needed to sustain profitability and long-term growth. Many studies indicate that such capabilities are built up from substantial innovative investment. Innovation is a positive sum game that develops new fields of value creation that benefit not only business but also the rest of society.

Even though, employing unskilled migrants helps to improve a firm's cost competitiveness by saving on labor costs, employing unskilled migrants might blunt the firm's incentives to invest in innovation or may discourage the training of workers. Firms employing cheap labor from other countries adopt a kind of labor-saving technology that slows down productivity improvement and reduces global competitiveness in the long run (Martin, 2007). Even though, employing unskilled migrants suggests the possibility of firms slowing down their technological improvement, Acemoglu (1998) explains using the case of the rapid increase in college graduates in the US in the 1970s that a high proportion of skilled workers in the labor force implies a large market size of skill-complementary technologies and encourages faster upgrading of the productivity of skilled workers. An increase in the supply of skilled migrants reduces skill premiums in the short-run but it induces skill-based technology change and increases in skill premiums later on.

Among relevant studies done in Thailand, Kohpaiboon (2009) argues for less concern about adverse effects on technological progress from employing Myanmar migrants in clothing factories in Tak province. This result is consistent with Bryant (2006) who uses the 2003 Thai Agriculture census to reject the hypothesis that farms in districts with many migrants possibly use less labor-saving technology. Still, empirical evidence to back up these claims is sorely lacking and more empirical research ought to be undertaken. Therefore, impacts of employing migrants have been estimated for both the probability and the quantity of R&D investment among Thai firms by using the same list of independent variables used earlier. Lists of dependent variables measuring innovative/R&D investment are as follows:

- Prob (machine upgrade); constructed to be = 1 if a firm reports that it has upgraded machinery and equipment in the 2 years before the survey period

- Prob (R&D); constructed to be = 1 if a firm has positive expenditure on R&D
- R&D expenditure; amount (Baht) of R&D expenditure a firm reported in the year of the survey

Researchers found that employing unskilled migrants, especially those from neighboring countries does not improve productivity and value-added competitiveness in the long run but rather helps Thai firms save on the cost of production because of lower wage expenditures. Probit regression was estimated for the first two innovative/R&D dependent variables, Probit (machine upgrade) and Probit (R&D) in order to quantify the probability of a Thai firm investing in R&D with a series of control variables and shares of migrant workers. The estimated results show that a 10% increase in unskilled migrants even though, this significantly increases the probability of upgrading machines by 2%, reduces a firm's probability of investing in R&D by approximately 4%. This impact is even stronger in firms located in border provinces where the probability of firms having upgraded their machines within the previous 2 years is about 5% lower than firms located in non-border provinces after the border firms employed 10% more unskilled immigrants. These results show what happens when a firm located in a border area adopts a labor-saving technology strategy by relying on unskilled immigrants. The decision to employ unskilled migrants blunts the firm's incentives to invest in innovation which would slow down productivity improvement and jeopardize global competitiveness in the long run.

There is, also evidence of labor-saving technology in labor-intensive firms, such as those in the textile and garment industries. In the textile industry, an additional 10% increase in unskilled migrants is found to reduce the probability of a firm investing in R&D by 2.1%. On the other hand, in the garment industry an additional 10% increase in skilled migrants raises the probability R&D investment by 54%. This phenomenon is also seen in firms in the rubber and the plastics industries in which a 10% increase in unskilled migrants will reduce the probability of investment in R&D by 12%, especially for those firms located in non-border provinces (Table 7).

Interestingly, for Thai firms producing capital intensive goods, such as auto parts and those that employed 10% more skilled immigrants, a decrease of 40% was seen in the probability that they would upgrade their machinery while R&D expenditure decreased by around 20 million Baht per year. The explanation for these results might be that although, the majority of laborers in

Table 7: Immigration and R&D investment

Independent variables	Upgraded machine in the last 2 years (marginal effect)	R&D (marginal effect)	R&D expenses (Baht)
Migrant variables			
Share of skilled migrants	0.002 (0.005)	0.002 (0.003)	-9333.135 (46,689.161)
Share of unskilled migrants	0.002 (0.001)*	-0.004 (0.002)**	-1,521.55 (12,723.746)
Border provinces	-0.035 (0.033)	0.011 (0.023)	191,479.65 (367,128.167)
Skilled migrant x border provinces	-0.005 (0.005)	-0.028 (0.020)	-1,109.56 (53,333.747)
Unskilled migrant x border provinces	-0.005 (0.002)**	0.004 (0.002)*	1,597.90 (23,320.622)
Competitiveness/productivity control variables			
Computer control	0.002 (0.000)***	0 (0.000)	6,655.77 (4,447.119)
Firm age	-0.002 (0.001)	0.001 (0.001)	-4,049.00 (12,033.627)
Firm size	0.083 (0.008)***	0.035 (0.006)***	294,522.05 (94,617.965) ***
Capacity utilization	0.001 (0.000)	0.001 (0.000)	-816.356 (5,924.621)
Capital-labor ratio	0 (0.000)	0 (0.000)	3.319 (0.580)***
Constant	-	-	-1527722.054(684,197.979)**
Observations	2,389	2,389	2,389
R^2	0.03	0.03	0.03

Standard errors in brackets; *,**,***Significant at 10, 5 and 1% respectively; Controlled for region dummy, industry dummy and year dummy

capital-intensive sectors, such as auto parts are relatively more highly skilled compared to workers in other industries, immigrants who are treated as skilled laborers, using the survey's definition have considerably fewer skills than do native laborers. There is no doubt that there exists evidence of a labor-saving technology strategy (by employing skilled immigrants rather than unskilled immigrants) in relatively capital-intensive sectors, such as auto parts.

In conclusion, it is likely that labor immigration can discourage investment in innovation on the part of Thai firms. The evidence is relatively obvious in labor-intensive firms, such as textiles, garments and rubber and plastics all of which largely rely on a cheap wage strategy, rather than innovative and value-added strategies. Employing low-skilled immigrants benefits firms by making them more cost competitive by putting off implementation of labor-saving technology. On the other hand, employing skilled or educated migrants is complementary to technological progress and encourages firms to innovate more quickly. Employing skilled immigrants helps enhance labor productivity overall through technological progress and knowledge transfer which contributes to value-added competitiveness and higher standards of living in the long run. The result is consistent with empirical studies found among the OECD countries. Skilled migrants can bring broader economic benefits including a higher rate of innovation. The US, for example has been able to attract migrant talent through the quality of its education (universities) and substantial contributions to the knowledge-base have been made by those foreign students and scientists.

Immigration and skills development: Even though, employing unskilled immigrants can discourage investment in production innovation which in turn can reduce labor productivity in the long run, the employment

Table 8: Percentage of firms providing skills training migrant-employing firms and firms not employing migrants

Competitiveness variables	Firms	Unskilled migrants	Skilled migrants
2004			
Percentage of firms providing training	Migrant-employing firms	74.34	73.30
	Firms not employing migrants	75.00	88.76
2007			
Percentage of firms providing training	Migrant-employing firms	74.72	72.25
	Firms not employing migrants	76.36	90.85

Computed from PICS data (2004 and 2007)

of immigrants can also enhance labor productivity more directly by accelerating the shift of Thai workers to higher-skilled positions. This can be easier for workers in innovative-related sectors. One possible reason for this shift might be that when the labor supply increases due to the employment of more immigrants to fill low-skilled jobs, the Thai workers will be unavoidably pushed into higher-skilled positions (Table 8).

To take a snapshot for the analysis, researchers estimate the probable impacts of immigration from the probability that factories provide formal training programs for their employees or send their workers for training to a skills development institute. However, the simple tabulation shown in Table 9 does not reflect any significant differences between migrant-employing firms and firms not employing migrants in providing either in-house training or training at skills development institutes. About 74-76% of both migrant-employing firms and firms not employing migrants that provide training courses for their employees but there are many more training courses provided by firms employing non-skilled migrants than by those employing skilled migrants.

Probit estimation also revealed no significant impacts from employing either skilled immigrants or unskilled immigrants on the probability of firms providing skill training for their workers, except for firms located in

Table 9: Immigration and probability of firms providing training programs

Variables	Total	Food processing	Textiles	Garments	Auto parts	Electronics and appliances	Rubber and plastics	Furniture	Machinery and equipment
Migrant variables									
Share of skilled migrants (%)	0.001 (0.004)	0.016 (0.031)	-0.003 (0.006)	-0.015 (0.028)	0.001 (0.001)	-	-0.014 (0.021)	-0.028 (0.060)	0.032 (0.057)
Share of unskilled migrants (%)	0.001 (0.001)	0.001 (0.001)	-0.003 (0.004)	-0.001 (0.003)	0.001 (0.001)	-	0.003 (0.003)	0.002 (0.006)	-
Border provinces = 1	-0.019 (0.031)	0.047 (0.061)	-0.248 (0.114)**	-0.137 (0.123)	0.001 (0.002)	0.008 (0.075)	0.01 (0.080)	-0.138 (0.122)	0.15 (0.121)
Skilled migrant x border provinces	0.001 (0.005)	-	-	-0.069 (0.071)	-	-	-	-	-0.012 (0.153)
Unskilled migrant x border provinces	-0.003 (0.002)*	-0.002 (0.002)	0.035 (0.051)	0.045 (0.038)	-0.001 (0.004)	-	-0.017 (0.023)	-	-
Competitiveness/productivity control variables									
Computer control (%)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.002)	0.001 (0.000)	0.001 (0.001)	-0.001 (0.001)	-0.002 (0.003)	0.001 (0.002)
Firm age (# years)	0.001 (0.001)	-0.002 (0.002)	0.001 (0.003)	0.002 (0.004)	0.001 (0.000)	-0.001 (0.002)	0.002 (0.002)	0.006 (0.005)	0.002 (0.005)
Firm size (log scale)	0.159 (0.009)***	0.052 (0.017)***	0.201 (0.030)***	0.24 (0.031)***	0.002 (0.004)	0.077 (0.020)***	0.208 (0.022)***	0.247 (0.042)***	0.194 (0.054)***
Capacity utilization (%)	0.001 (0.001)*	0.002 (0.001)*	0 (0.002)	-0.001 (0.002)	0 (0.000)	0.001 (0.001)	0.001 (0.001)	-0.003 (0.002)	0.002 (0.002)
Capital-labor Ratio (Baht)	0.001 (0.001)	0.001 (0.001)**	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)***	0.001 (0.001)***	0.001 (0.001)***
Year, 2007	0.076 (0.019)***	0.118 (0.045)***	-0.015 (0.073)	0.063 (0.059)	0.002 (0.004)	-0.034 (0.055)	0.027 (0.046)	0.196 (0.082)**	0.031 (0.097)
Industry (Processing food)	yes	-	-	-	-	-	-	--	
Observations	2,388	279	310	324	223	246	487	218	172

Standard errors in brackets; Controlled for Industry Dummy; *,**,*** Significant at 10, 5 and 1%, respectively

border provinces where firms employing 10% more unskilled workers seem to have about 3% less probability of providing training programs. This result is similar to evidence that was found of a labor-saving technology strategy. That is, employing unskilled migrants might be expected to blunt the firm's incentives to enhance worker's skills by providing such training programs. Employing cheap labor from abroad is adopting a kind of labor-saving technology which, however reduces workers' capabilities, improvements in productivity and global competitiveness in the long run. Indeed, quantifying the impacts of immigrants on skill development requires a long-term series of data, since skills development is a way of building human capital which cannot be accomplished overnight. Thus, a long-term series of data is required to measure the long-term impacts of immigration and skills development for both natives and migrants.

Immigration and foreign/domestic investment: Besides the impacts on productivity and technological progress, there are different channels by which migration and foreign direct investment are related. Kulkolkarn (2008) used a basic heckcher-olin theoretical approach to discover that immigrants may either increase or decrease foreign investment. The theoretical debates on substitutability or complementarity are far from settled from the empirical point of view. Some studies investigate both direct and indirect evidence that the relationship should be one of substitutability in particular between FDI and unskilled immigrants. For example, results from Noorbakhsh *et al.* (2001) and Asiedu (2002) emphasize that the level of human capital is a significant attraction for FDI. Higher levels of human capital (both Thai workers and foreign workers) help boost the location advantage of a country. Kinoshita (1998) explains that the determinants of FDI in Thailand and other Asian economies can vary, depending on the sizes of firms. Data on Japanese FDI in Asia reveal that small firms are induced to invest in low-cost labor and sufficient infrastructure. On the contrary, large and medium-sized firms are driven by market size, quality of labor and their competitor's investment strategies.

There are a number of scenarios explaining the linkages of immigration and FDI. First of all, skilled labor and FDI may possibly reinforce each other through the complementary effect. Skilled immigration should favor growth-enhancing technological transfer in host countries through the network effect, thus boosting foreign capital inflows. Secondly, an influx of migration that increases the labor supply in Thailand would possibly cause a marginal production of capital and return on investments to be raised and thus attract foreign direct investment. Thirdly, the lower wages paid to migrants can be another channel to attract foreign investors who are seeking cost-saving production to precede their technological superiority as they enter and produce in Thailand.

Since, the direct measure of FDI inflows into a particular industry is not available in the PICS data, a firm's percentage of foreign ownership was used as a proxy for FDI. In reality, the foreign ownership can be considered a good presumption in identifying the level of

FDI engagement in different operations. By identifying FDI categories instead of FDI amounts, the Directory of Corporate Affiliations (Pholphirul, 2009) classifies the FDI operations in terms of foreign ownership as follows:

- Subsidiary; a chartered business operating abroad and owned by the parent company at 50% or more
- Affiliation; a chartered business operating abroad and owned by the parent company at <50%
- Joint venture; a business operating abroad in which the parent firm shares responsibility and ownership with one or more other companies
- Division/branch; an internal unit of a parent company operating abroad but not incorporated

In this case, using the percentage of foreign ownership is a good proxy for determining FDI operations in terms of subsidiaries or affiliations. Higher percentages of foreign ownership explain roles undertaken by foreign firms (parent firms) relative to Thai firms. While much empirical research measures FDI as the net monetary flow percentage of GDP, the percentage of foreign ownership is used, here as a proxy for an FDI variable to capture the operation.

The simple Table 10 shows a higher percentage of foreign ownership for firms employing unskilled migrants than firms employing skilled migrants. The reverse is found with for firms not employing migrants. Here, the percentages of foreign ownership are found to be much higher for firms employing skilled migrants than for those employing unskilled migrants.

Estimated results after controlling for a number of dependent variables show a significant effect in determining foreign ownership. There is evidence of a positive relationship or complementary effect between employing skilled migrants and the probability of foreign ownership. A 10% increase in skilled migrant employees will increase a firm's foreign ownership by about 22.9%. The reverse is true in the case of unskilled migrants where employing 10% more unskilled migrants reduces foreign ownership by around 2.3%. The complementary effects of skilled migrants and FDI inflows are also prominent in a range of sectors. For example, a 10% increase in unskilled immigrants was found to have significant impacts on increasing a firm's foreign ownership (or FDI) by about 58.2% in food processing firms, 13.5% in textiles, 31.3% in the garment industry, 89.8% in auto parts and 44.3% in rubber and plastics. Employing 10% more unskilled migrants also reduces foreign ownership by 3.3% in the food processing industry. Intuitively, even though the

Table 10: Percentage of foreign ownership for migrant-employing firms and for firms not employing migrants

Foreign ownership (%)	Unskilled migrants	Skilled migrants
2004		
Migrant-employing firms	16.95	13.38
Firms not employing migrant	22.98	61.41
2007		
Migrant-employing firms	24.44	13.24
Firms not employing migrant	11.66	62.57

Computed from PICS data (2004 and 2007)

cost of labor has always been a major determinant of FDI inflow, there is strong evidence supporting the argument that foreign direct investors are likely to be concerned more with the quality of labor and not just its cheaper cost.

The same argument can be used to account for domestic investment. Evidence from the macroeconomic simulation model clearly supports the argument that firms should gain from employing migrant workers and can thereby expect higher profits. There may also be a dynamic effect in which firms with higher profits may have an incentive to re-invest in the next period. A number of probit models were employed to predict the probability of Thai firms making a substantial increase in investment in order to increase capacity or improve product quality in the case that more immigrants were employed. For rubber and plastics firms, an 8% higher probability to increase their investments was found given a 10% increase in unskilled immigrants. On the other hand, for machinery and equipment firms employing skilled migrants reduces the probability of making an investment. Researchers also calculated the correlation between the capital-labor ratio and the percentage of migrant workers employed. This clearly supports the results explained by the regression. The coefficients of correlation between the capital-labor ratio and the percentage of unskilled migrants employed is -0.126 and the coefficients of correlation between the capital-labor ratio and the percentage of skilled migrants employed is -0.141. This shows that employing more immigrants is less likely to reduce capital per worker through less investments being made (Table 11).

In conclusion, using firm-level data for the manufacturing sector shows that employing unskilled immigrants should benefit Thai firms by reducing labor costs, stabilizing production and maintaining price competitiveness. But, relying on unskilled migrants can also incur costs from adopting a kind of labor-saving technology strategy and thus lowering labor productivity. The evidence is clear for labor-intensive firms, such as textiles and garments which rely on low-wage foreign workers to reduce their wage expenditures in order to set competitive prices. On the other hand, employing skilled or educated migrants complements technological progress by encouraging firms to invest more quickly in

Table 11: Immigration and probability of domestic investment

Variables	Total	Food	Textiles	Garments	Auto parts	Electrical	Rubber	Furniture	Machinery
Migrant variables									
Share of skilled migrants (%)	-0.003	0.003	-0.004	0.013	0.03	0.003	0.017	-0.071	-0.145
	(0.005)	(0.015)	(0.007)	(0.036)	(0.037)	(0.015)	(0.027)	(0.153)	(0.083)*
Share of unskilled migrants (%)	0.001	-0.002	-0.008	-0.005	0.011	-	0.008	-0.002	0.064
	(0.001)	(0.002)	(0.006)	(0.004)	(0.020)	-	(0.004)**	(0.003)	(0.049)
Border provinces = 1	-0.051	-0.104	-0.142	-0.129	0.049	0.039	-0.096	-0.085	0.057
	(0.038)	(0.099)	(0.102)	(0.107)	(0.099)	(0.118)	(0.102)	(0.108)	(0.152)
Skilled migrant x border provinces	0.003	-0.016	0.018	-	-0.028	0.144	-	-	0.22
	(0.006)	(0.041)	(0.089)	-	(0.038)	(0.105)	-	-	(0.181)
Unskilled migrant x border provinces	-0.006	-0.001	-	-	-0.054	-	-	-0.005	-
	(0.003)*	(0.005)	-	-	(0.068)	-	-	(0.011)	-
Competitiveness/productivity control variables									
Computer control (%)	0.002	0.001	0.003	0.001	0.001	0.002	0.002	0.005	0.002
	(0.000)***	(0.002)	(0.001)***	(0.001)	(0.001)	(0.001)	(0.001)**	(0.003)*	(0.002)
Firm age (# years)	-0.004	-0.005	0	-0.01	0.001	-0.001	-0.003	-0.012	-0.004
	(0.001)***	(0.003)*	(0.003)	(0.004)**	(0.003)	(0.004)	(0.003)	(0.005)**	(0.006)
Firm size (log scale)	0.082	0.049	0.064	0.104	0.085	0.072	0.091	0.119	0.151
	(0.010)***	(0.026)*	(0.029)**	(0.029)***	(0.027)***	(0.025)***	(0.024)***	(0.038)***	(0.054)***
Capacity utilization (%)	0.002	0.004	0.002	0.003	0.001	0.001	0.003	0.002	0.001
	(0.001)***	(0.002)**	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)***	(0.002)	(0.002)
Capital-labor ratio (Baht)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Region (Bangkok and Vicinity)									
North	-0.055	-0.085	-0.141	0.153	-	-0.126	-	0.01	-
	(0.058)	(0.119)	(0.196)	(0.165)	-	(0.137)	-	(0.140)	-
Central	-0.021	0.068	0.054	0.197	0.074	-0.021	-0.039	-0.25	-0.232
	(0.035)	(0.118)	(0.092)	(0.112)*	(0.082)	(0.103)	(0.072)	(0.086)***	(0.134)*
East	-0.104	-0.12	0.061	-0.009	-0.134	-0.048	-0.017	-0.291	-0.404
	(0.044)**	(0.148)	(0.165)	(0.185)	(0.108)	(0.131)	(0.097)	(0.084)***	(0.130)***
South	-0.088 (0.046)*	-0.134 (0.101)	0.292	-	-	-	-0.116 (0.065)*	0.237 (0.192)	-
Northeast	-0.043	0.145	(0.128)**	0.061	0.084	-0.455	-0.125	-0.193	-
	(0.053)	(0.169)	-	(0.129)	(0.131)	(0.128)***	(0.128)	(0.110)*	-
Year 2007	-0.114	0.113	-0.085	-0.049	-0.094	-0.204	-0.182	-0.122	-0.372
	(0.026)***	(0.078)	(0.079)	(0.064)	(0.065)	(0.085)**	(0.055)***	(0.078)	(0.097)***
Industry (Processing food)	Yes	-	-	-	-	-	-	-	-
Observations	2367	280	309	311	247	314	475	219	175

Table 12: Immigration and percentage of foreign ownership

Variables	Food processing	Textiles	Garments	Auto parts	Electronics and appliances	Rubber and plastics	Furniture	Machinery and equipment
Migrant variables								
Share of skilled migrants (%)	5.824	1.352	3.134	8.976	1.104	4.429	39.934	0.447
	(1.224)***	(0.388)***	(1.325)**	(2.665)***	(1.020)	(0.983)***	(8.569)***	(1.017)
Share of unskilled migrants (%)	-0.327	-0.29	-0.166	-0.656	0.021	-0.319	-0.114	4.106
	(0.151)**	(0.247)	(0.268)	(0.849)	(0.380)	(0.265)	(0.147)	(2.655)
Border provinces = 1	0.001 (4.699)	-1.679 (4.842)	0.114 (5.491)	-4.687 (8.713)	3.48 (8.170)	-9.68 (5.490)*	1.888 (4.543)	-10.981 (9.681)
Skilled migrant x border provinces	72.814	6.313	-3.208	-8.301	-2.437	-3.431	-22.472	5.012
	(45.446)	(3.649)*	(1.342)**	(2.682)***	(4.006)	(1.017)***	(12.749)*	(6.017)
Unskilled migrant x border provinces	0.675	-1.616	0.126	-2.795	2.513	0.135	-0.041	83.649
	(0.308)**	(2.024)	(0.310)	(6.783)	(2.762)	(0.735)	(0.238)	(29.625)***
Competitiveness/productivity control variables								
Computer control (%)	-0.089 (0.075)	0.039 (0.048)	0.086 (0.067)	0.069 (0.083)	0.048 (0.074)	-0.031 (0.052)	-0.004 (0.091)	0.064 (0.099)
Firm age (# years)	-0.23 (0.142)	-0.008 (0.126)	-0.143 (0.184)	-0.694 (0.259)***	-0.598 (0.281)**	-0.58 (0.155)***	0.052 (0.184)	-1.017 (0.345)***
Firm size (log scale)	1.562 (1.180)	0.198 (1.202)	3.418 (1.226)***	8.077 (2.207)***	13.411 (1.664)***	3.908 (1.356)***	-0.074 (1.414)	10.683(3.007)***
Capacity utilization (%)	0.044	0.186	0.064	0.042	0.214	0.083	-0.01	-0.142
	(0.073)	(0.080)**	(0.088)	(0.138)	(0.118)*	(0.075)	(0.078)	(0.132)
Capital-labor ratio (Baht)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)***	(0.001)***	(0.001)***	(0.001)***	(0.001)***	(0.001)***	(0.001)***	(0.001)***
Year 2007	8.753 (3.633)**	0.848 (3.587)	2.919 (3.103)	-0.137 (5.744)	8.963	7.282 (3.227)**	8.758 (3.385)**	0.816 (6.908)
Constant	6.325 (8.870)	-8.683 (6.496)	-14.903 (8.676)*	-17.218 (13.452)	-52.835 (10.947)***	-8.415 (7.434)	1.123 (8.803)	-7.947 (13.213)
Regional dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	247	265	260	229	302	385	189	145
R^2	0.19	0.16	0.14	0.37	0.47	0.23	0.26	0.29

Standard errors in brackets; *,**,***Significant at 10, 5 and 1%, respectively

innovation. However, employing unskilled migrants jeopardizes long-term economic development by hampering investment in innovation and skills development. Foreign direct investors, as well as Thai investors are concerned with the quality of labor and migrant workers and not merely their cost (Table 12).

Endogeneity of migrant labor: One potential problem when estimating the effects of migrants on the performance of firms is the endogeneity of the proportion of migrants hired by the firms. One can expect that the proportion of migrants is not an exogenous variable due to selectivity based on past performance or characteristics of the firms. A firm that is more productive and more technologically advanced tends to offer higher salaries relative to less productive firms, as well as possibly, higher fringe benefits to attract skilled immigrants. At the same time, low-productivity firms may choose to hire less productive, unskilled immigrants to save costs. This endogeneity problem may also arise in the case of FDI when the entry of multinational enterprises tends to create better employment opportunities with better paying jobs, thereby creating employment opportunities for immigrants also. Qualified and professional workers from abroad can be recruited more quickly from foreign firms than from domestic ones.

To investigate this endogeneity problem in the data, researchers took only firms that were surveyed in both 2004 and 2007 and looked for any pattern of relationship between outcome variables in 2004 and the percentage change of migrants employed during 2004-2007 (Table 13). Researchers found no evidence of such selection for neither shares of unskilled and skilled migrants.

Nevertheless, researchers attempted to find an instrumental variable for the shares of skilled and unskilled migrants for a robustness check of the previous results. Finding a good instrument for migrant share is a challenge here because any variable from the firm survey can in theory, affect the outcome variables beyond its effects through migrant share. However, if researchers consider the benefits of the panel characteristics of the data, researchers can think of one good instrument. Here, migrant share in 2004 can be used as an instrumental variable for migrant share in 2007. One can expect that migrant share in 2004 in the same firm would affect migrant share in 2007 through past experience, performance and migrant network but researchers would not expect that migrant share in 2004 would affect firms' performance and other outcome variables in 2007 beyond its effects through migrant share in 2007. Here, researchers assume that the firm's performance or outcomes in 2004 had already incorporated all direct effects of 2004 migrant share.

Table 14 shows that instrumental variables revealed no change in the direction of the effects of migrant shares. However, significance was lost for some variables

Table 13: Correlation between percentage change of migrants employed during 2004-2007 and lists of outcome variables in 2004

Dependent variables	Unskilled migrants	Skilled migrants
Labor productivity	-0.0184	-0.0241
Average wage	-0.0451	-0.0197
Unit labor cost	0.0019	0.0145
Machine upgrade	-0.0884	0.0270
R&D expenses	-0.0285	0.1861
R&D	-0.0358	0.0947
Foreign ownership	-0.0990	-0.0451
Domestic investment	-0.0810	-0.0408
Skills upgrade	-0.0148	0.0327

Computed from PICS data (2004 and 2007)

Table 14: Estimation of all dependent variables using instrumental variables, paneled firms in 2007

Variables	Labor productivity (log scale)	Average wage (Baht)	Unit labor cost (log scale)	Machine upgrade (probability)	R&D (probability)	R&D expenses (Baht)	Skill upgrade (probability)	Foreign ownership (%)	Domestic investment (probability)
Migrant variables									
Share of skilled	0.277	21,623.85	-0.083	-0.011	-0.047	-2262840.575	0.09	0.008	160.283
migrants (%)	(0.405)	(39,129.094)	(0.275)	(0.079)	(0.095)	(3303838.638)	(0.145)	(0.082)	(1,177.660)
Share of unskilled	-0.001	-705.148	-0.011	-0.004	0	11,928.00	-0.001	-0.008	2.088
migrants (%)	(0.018)	(1,722.891)	(0.012)	(0.003)	(0.004)	(145,377.051)	(0.006)	(0.004)**	(17.947)
Border provinces = 1	-0.648	-37,029.97	0.268	-0.021	0.06	7182958.533	-0.258	0.002	-30.688
	(0.617)	(59,468.683)	(0.418)	(0.120)	(0.145)	(5034943.046)	(0.221)	(0.125)	(224.251)
Firm control variables									
Computer	-0.004	168.959	0.004	0.002	0.001	9,622.41	-0.001	-0.001	-2.311
control (%)	(0.006)	(544.526)	(0.004)	(0.001)	(0.001)	(45,257.680)	(0.002)	(0.001)	(17.280)
Firm age	0.011	815.718	-0.006	0.001	-0.001	-115,481.76	0.001	0.001	-0.82
(# years)	(0.015)	(1,477.649)	(0.010)	(0.003)	(0.004)	(124,417.934)	(0.005)	(0.003)	(3.727)
Firm size	-0.062	-6,887.25	0.084	0.031	0.022	466,304.76	0.086	0.116	-41.317
(log scale)	(0.116)	(11,092.704)	(0.078)	(0.023)	(0.027)	(950,833.802)	(0.042)**	(0.024)***	(359.825)
Capacity	0.003	608.335	0.001	0.001	0.002	-7,073.05	0.001	0.001	-1.639
utilization (%)	(0.005)	(480.157)	(0.003)	(0.001)	(0.001)	(40,484.184)	(0.002)	(0.001)	(13.190)
Capital-labor	0.001	0.423	0.001	0.001	0.001	49.305	0.001	0.001	0.001
ratio (Baht)	(0.001)	(0.099)***	(0.001)	(0.001)	(0.001)	(8.301)***	(0.001)	(0.001)	(0.001)
Region (Bangkok and Vicinity)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry (Food processing)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	12.103	33,828.71	-1.8	0.704	-0.02	1348739.005	-0.049	0.179	353.758
	(0.744)***	(73,060.687)	(0.513)***	(0.145)***	(0.175)	(6075060.270)	(0.268)	(0.151)	(2,873.409)
Observations	415	413	413	415	415	415	413	415	293

Standard errors in brackets; *,**,***Significant at 10, 5 and 1%, respectively

from the previous results, such as the effect on competiveness and productivity variables, R&D and expenditure. In this case, it should be noted that the estimation of the effect of migrants using the instrumental variable also has some technical problems. Quite a number of degrees of freedom were lost due to the use of only paneled firms. Also, the estimations of the binary outcome variables use a linear probability model which has its own shortcomings.

RESULTS AND DISCUSSION

This study examines the economic impacts of foreign migrant workers using firm-level survey data in Thailand. The main findings explain how migrant workers have affected Thailand through production, productivity and competitiveness in different aspects. Various methodologies used in this study, provide solid results that explain the 7 propositions for the Thai case as follows.

P₁; immigration and production: International immigrants to Thailand help increase production. An analysis of firm-level data shows that the importance of migrant workers to a particular industry depends on their skill level. Skilled migrants were found to be the major labor component for capital-intensive sectors, such as machinery and equipment, auto parts and electronics and electrical appliances. On the other hand, unskilled migrants are important for relatively labor-intensive industries, such as garments and textiles. The economic benefits of migrant workers for Thailand have increased for almost 2 decades due to the arrival of more cross-border migrants coupled with the need to employ those migrants in particular sectors. This is particularly true in the case of market failure in sectors where information about the labor market is incomplete. This causes uncertainty in terms of output production. Also, at the firm level employing migrants helps stabilize the labor supply in these sectors and prevent uncertainties in production as well as helping to fill job vacancies.

P₂; immigration and productivity: The relationship between immigration and productivity depends first of all on whether migrants are substitutes for or complements to native workers. Estimations from the firm-level data, also suggest another interesting phenomenon by reconfirming that a 10% increase in unskilled migrant workers should cause a drop in the labor productivity by about 5%. On the other hand, a 10% increase in skilled migrant workers helps to enhance labor productivity by about 28%. Even though, the results confirm the negative

impacts of unskilled migrants on overall productivity, this may just be a short-term problem. In the long run, an increase in labor migration to Thailand may help to speed the shift of Thai workers to higher-skilled sectors, especially innovative sectors. When the supply of labor is greater due to more migrants filling low-skilled jobs vacated by local workers, Thai workers are unavoidably pushed into higher-skilled sectors in hi-tech manufacturing, such as computers and electronics, automobiles and auto parts and the innovative service sector.

P₃; immigration and labor cost: Domestic firms in Thailand can save on wage costs by employing low-skilled migrants from neighboring countries. The availability of cheap migrant labor has been viewed, as a factor reducing the opportunities for employment of native workers, as well as reducing their wages. The results confirm the findings of previous studies on migrant workers prompting concerns about their detrimental effects on Thai wages. Previous studies of Thailand include Bryant and Rukumnuaykit (2007) and Kulkolkarn and Potipiti (2007). Bryant and Rukumnuaykit (2007) explain that due to the absence of an employment effect, immigration appears to cause the adjustment of wage reduction rather than employment reduction. A 10% increase in migrant share is found to cause only a reduction of 0.2% in domestic wages. This small effect of wage reduction is similar to that proposed by Kulkolkarn and Potipiti (2007) which confirms that immigration does not reduce the wages of Thai workers. By using firm-level data, regression shows that approximately 5,746 Baht/person/year can be saved by a firm that employs 10% more unskilled migrants. Since, Thailand is a diversified small-open economy benefiting from the export of agricultural and manufactured products, the lower wage costs resulting from migrant labor helps to improve price competitiveness in global markets.

P₄; immigration and competitiveness: Employing migrant workers, especially unskilled ones, helps firms by saving on wage costs and gaining price competitiveness but overall productivity is found to decrease, especially in sectors where migrant and native workers are close substitutes. Competitiveness can be measured along different dimensions. The Unit Labor Cost (ULC), as the ratio of average wages divided by labor productivity can be used to measure competitiveness. Even though, employing 10% more unskilled migrant workers helps to save wage costs by approximately 5,746 Baht/person/year, this causes a reduction in labor productivity by 5%. Therefore, the regressions from

firm-level data show that employing migrants has no significant impacts on unit labor cost. Even though, Thai businesses might enjoy benefits from maintaining price competitiveness through the employment of cheap foreign workers for a certain period of time, there is no guarantee of maintaining competitive advantage in the long run. In fact, employing unskilled migrant workers may deter overall competitiveness and have negative economy-wide effects, as well as industry/firm-level effects. These results are interesting enough to lead to further discussions among Thai policymakers and related stakeholders about how to implement migration policies so, that such polices are not obstacles but aids to long-term competitiveness.

P₅; immigration and innovation: Even though, employing unskilled migrants may help to improve a firm's cost competitiveness by saving on some labor costs, employing unskilled migrants might at the same time blunt the firm's incentives to invest in innovation or to care much about worker training. Employing cheap labor from abroad is like adopting a kind of labor-saving technology but one that would slow down productivity improvement and diminish global competitiveness in the long run. Results here provide strong support for this argument. In the firm-level data there are 3 dependent variables for measuring a firm's investments in innovation, namely:

- Probability of upgrading machinery and equipment in the previous 2 years
- Probability of positive expenditure on R&D
- Amount of R&D expenditure

Estimated results show that a 10% increase in unskilled migrants tends to reduce a firm's probability of R&D investment by around 4%. This negative impact tends to be even stronger for firms located in border provinces. There is also evidence of labor-saving technology in textile and rubber and plastics firms that reduces their probability for R&D investment by 2.1 and 1.2%, respectively if they have a 10% increase in unskilled migrant workers. On the other hand, garment industry firms show a probability of R&D investment increase of around 54% from employing skilled migrant workers. This result implies, a complementary effect for firms hiring more skilled workers (migrants) and having to invest in high technology. Employing skilled or educated migrants complements technological progress by encouraging firms to innovate more quickly which helps enhance productivity and competitiveness in the long run.

P₆; immigration and skills development: There is an argument that supports the need to shift Thai workers to higher-skilled positions when the supply of labor is greater due more immigrants working in low-skilled positions. However, the estimated results from the firm-level data do not significantly support this argument. In fact, the opposite occurs. A firm located in a border province and employing unskilled migrants can be expected to provide less training (about 3% less probability given a 10% increase in employing unskilled migrants). Nevertheless, this result is similar to what we found as evidence of a labor-saving technology strategy in proposition 5. Employing unskilled migrants might be expected to blunt a firm's incentives to enhance the skills of its workers by providing training programs. Employing cheap labor from abroad is like adopting a kind of the labor-saving technology which would reduce both worker capacity and labor productivity, as well as reduce long-term competitiveness.

P₇; immigration and foreign/domestic investment: A number of studies state that for a host country, immigration and foreign direct investment should be related. There are 2 scenarios: First, an influx of migration, especially of unskilled migrants, would increase the labor supply in Thailand and possibly cause marginal product of capital and return on investments to be raised and thus, attract foreign direct investment. Second, migration of skilled workers would favor growth enhancement through technological transfer which would encourage more foreign investment. Researchers also found that immigrants play a significant role in determining FDI inflows. There is evidence of a positive relationship or a complementary effect between employing skilled migrants and the probability of foreign ownership.

A positive relationship was discovered between immigration and FDI inflows. Using foreign ownership, as proxy for foreign direct investment, a firm will have about 22.9% more foreign ownership given a 10% increase in skilled migrants. The reverse is true in the case of unskilled migrants, however. A 10% increase of unskilled migrants reduces foreign ownership by about 2.3%. Complementary effects of skilled migrants and FDI inflows are also prominent in a range of sectors, for example food processing, textiles, garments, auto parts and rubber and plastics. Increasing employment of unskilled migrants by 10% also reduces foreign ownership by 3.3% in the food processing industry. Intuitively, there is strong evidence supporting the argument that foreign direct investors are more likely to be concerned with the quality of labor instead of its cheaper cost.

A firm employing 10% more skilled migrants will see an increase of 17.2% in foreign ownership. On the other hand, a firm employing 10% more unskilled migrants will

see a 2.9% decrease in foreign ownership. Estimations in this study showed strong evidence that foreign investors in Thailand are concerned about the quality of migrant workers rather than cheap wages. A similar result, also applies in the case of domestic investment. Even though, using the macroeconomic simulation model shows strong evidence of an increase in business income by 21-22%, as compared to the base case of not employing immigrants, the estimated results from the firm-level data show little support for this argument. Firms dealing in rubber and plastics will have about an 8% higher probability of increasing investments from an additional 10% of unskilled immigrants. On the other hand, employing skilled migrants reduces the probability of machinery and equipment firms making investments.

In summary, there are definite economic benefits that migrant workers bring by fulfilling labor market demand but this demand comes mainly in the form of low-skilled jobs that are shunned by native workers. Immigration benefits Thai producers (and foreign producers in Thailand) by helping them reduce wage costs, maintain price competitiveness and attract foreign investors. Although, such economic benefits are evident in the short-term, the contribution of immigration to long-term economic development is still doubtful.

Since, immigration is an important source of economic growth for Thailand, it is necessary for both economic costs and benefits to be properly managed and balanced so that all parties involved benefit. Yet, it is evident that Thailand still lacks this balance due to weak policy implementation. Literature cited in this study claims that immigration causes a slight reduction of the wages of Thai workers, since the majority of migrants are unskilled. In addition, there is the reduction in overall labor productivity and R&D investment by Thai firms, all of which could jeopardize long-term economic development. While benefits and costs of having migrants working in Thailand should be a serious concern, there are many other issues to consider, such as the short-term and long-term prospects. In the long-term, migration policy should be included in national economic and social development planning by taking into account human resources and skills development, demographic transitions and economic development toward a knowledge-based economy. For example, a study by Potipiti and Kulkolkarn (2010) analyzes the potential of using immigrants in alleviating the problem of an aging society in Thailand. Using the solow-ramsy growth model, they found that the aging population will cause a drop in Thailand's GDP (from 2007) by 7 and 14% in 2030 and 2050, respectively and that GDP per capita will decrease by 8 and 15% in 2030 and 2050, respectively. A predicted increase of immigrants by 3.6% will alleviate the problem

by increasing GDP by 4.29 and 12.7% in 2030 and 2050, respectively. The long-term impact of immigrants on Thailand's GDP per capita is still unclear. Therefore, immigrants only alleviate the aging problem by 60%. This is because immigrants are less productive than Thai workers.

CONCLUSION

In summary, there are costs and benefits from employing migrant workers. Thai employers clearly receive short-term benefits through saving on wage costs and filling job vacancies while unskilled Thai workers are likely to suffer a reduction in their wages. The imbalance of cost and benefit recipients (between loss groups and gain groups) may open some room for the Thai government to tax the benefits from employers by imposing some form of migrant levy. Even though, the migrant levy should help in re-distributing income, the Thai government needs to ensure that the levy will pass onto the workers.

Immigration should be an integral part of Thailand's national development strategies consistent with its national economic and social development plan. Thailand still needs to create sound coordination among all governing bodies in achieving not only the cost-benefit balance but also in achieving long-term growth.

REFERENCES

ARCM, 2000. Shortage of laborers in Thailand in 2000. Asian Research Center for Migration, Chulalongkorn University, Bangkok.

Acemoglu, D., 1998. Why do new technologies complement skills? Directed technical change and wage inequality. Q. J. Econ., 113: 1055-1089.

Asiedu, E., 2002. On the determinants of foreign direct investment to developing countries: Is Africa different? World Dev., 30: 107-119.

Bryant, J., 2006. Migrant labour in Thai agriculture: Evidence from the 2003 agricultural census. Nakorn Pathom, Institute for Population and Social Research.

Bryant, J. and P. Rukumnuaykit, 2007. Does immigration to thailand reduce the wages of Thai workers? Labor Migration in the Greater Mekong Sub-Region, The World Bank.

Kinoshita, Y., 1998. Firm size and determinants of foreign direct investment. CERGE-EI Working Paper No. 135. The Center for Economic Research and Graduate Education.

Kohpaiboon, A., 2009. International labour migration and competitiveness: Evidence of Thai clothing industry at the border. Discussion Paper No.18, Faculty of Economics, Thammasat University.

Kulkolkarn, K. and T. Potipiti, 2007. Migration, wages and unemployment in Thailand. Chulalongkorn J. Econ., 19: 1-22.

Kulkolkarn, K., 2008. The effects of immigration and capital inflows. Thammasat Econ. J., 26: 82-102.

Kulkolkarn, K., 2009. Immigration-productivity nexus: Case of Thai garment industry. The Experience of Thai Manufacturing, Managing Globalization.

Kura, Y., C. Revenga, E. Hoshino and G. Mock, 2004. Fishing for Answer: Making Sense of the Global Fish Crisis. World Resource Institute, Washington, DC, USA.

Martin, L.P., 2007. The contribution of migrants workers to Thailand: Towards policy development. International Labour Organization, Bangkok. http://www.ilo.org/public/english/region/asro/bangkok/download/yr2007/fact_migrant07.pdf.

Noorbakhsh, F., A. Paloni and A. Youssef, 2001. Human capital and FDI inflows to developing countries: New empirical evidence. World Dev., 29: 1593-1610.

Pholphirul, P., 2005. Competitiveness, income distribution and growth in Thailand: What does the long-run evidence show? Research Report No. I24, Thailand Development Research Institute, Bangkok.

Pholphirul, P., 2009. On the channels of foreign direct investment to exchange rate pass-through strategies: An analysis from Spatial Panel Data. Int. Bus. Res., 2: 140-158.

Pholphirul, P. and P. Rukumnuaykit, 2010. Economic contribution of migrant workers to Thailand. Int. Migrat., 48: 174-202.

Pholphirul, P., 2013. Immigration, job vacancies and employment dynamics: Evidence from Thai manufacturers. J. Asian Econ., 24: 1-16.

Potipiti, T. and K. Kulkolkarn, 2010. Can immigration alleviate ageing problem in Thailand (in Thai)? Mimeo.

Rukumnuaykit, P., 2008. A synthesis report on labour migration policies, management and immigration pressure in Thailand. International Labour Organization, Bangkok.

Sanderson, M.R., 2013. Does immigration promote long-term economic development? A global and regional cross-national analysis, 1965-2005. J. Ethnic Mig. Stud., 39: 1-30.

World Bank, 2008. Thailand investment climate assessment update. The World Bank, Washington, DC., USA.