Access to higher education, job mismatch, and wage penalties in
Thailand

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การเข้าถึงการศึกษาในระดับอุดมศึกษา, ความไม่สอดคล้องทางการศึกษาและความแตกต่างของ
รายได้ที่เกิดจากความไม่สอดคล้องทางการศึกษาในประเทศไทย

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การศึกษานี้ศึกษาความสัมพันธ์ของแรงงานที่อาศัยอยู่ในพื้นที่ที่ใกล้เคียงกับสถาบันอุดมศึกษากับการเพิ่มขึ้นของความน่าจะเป็นในการเข้าศึกษาในระดับปริญญาตรี, การทำงานต่ำกว่าระดับการศึกษา และความไม่สอดคล้องกันแนวในนอนระหว่างสาขาวิชาที่แรงงานจบการศึกษาและอาชีพของแรงงาน โดยใช้ข้อมูลจากการสำรวจภาวะการทำงานของประชากรในปี 2558 และ 2559 ของสำนักงานสถิติแห่งชาติและข้อมูลจากกระทรวงแรงงาน ซึ่งพบว่าแรงงานที่อาศัยอยู่ในจังหวัดที่มีมหาวิทยาลัยที่ศึกษาหรือมีมหาวิทยาลัยราชภัฏมีแนวโน้มที่จะเข้าถึงการศึกษาในระดับปริญญาตรีได้มากกว่า แต่จะมีโอกาสในการเกิดการทำงานต่ำกว่าระดับการศึกษาน้อยกว่า นอกจากนี้เรายังพบว่าจังหวัดที่มีมหาวิทยาลัยจะมีโอกาสในการเกิดความแตกต่างของรายได้ที่เกิดจากการทำงานต่ำกว่าระดับการศึกษามาก และในการวิเคราะห์เชิงคุณภาพชี้ให้เห็นว่าความต้องการหางานของแรงงานในระดับปริญญาตรีในกรุงเทพมหานครมักเกิดปัญหาความไม่สอดคล้องกันของสาขาวิชาและอาชีพ ส่วนของภูมิภาคต่างๆ ยังมีความสอดคล้องกับความต้องการแรงงานในประเทศไทยอยู่บ้าง

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Access to Higher Education Job Mismatch and Wage Penalties

Palita Saripan : Access to higher education, job mismatch, and wage penalties in Thailand. Advisor: Asst. Prof. Dr. JESSICA MARY VECHBANYONGRATANA

This study considers whether close proximity to higher education institutions increases the probability of earning a bachelor's degree, overeducation, and horizontal mismatch between degree and occupation. Using data from the 2015 and 2016 Labor Force Survey of the National Statistical Office of Thailand, and jobs data from the Ministry of Labor, we find that individuals living in provinces with research or Rajabhat universities are more likely to earn a bachelor's degree, but does not increase the probability of being overeducated for their job. In addition, we find larger overeducation penalties in provinces with universities. Finally, qualitative analysis shows that demand for bachelor's degree fields is relatively consistent with the supply of graduates in some regions. But in Bangkok, there is a horizontal mismatch problem.

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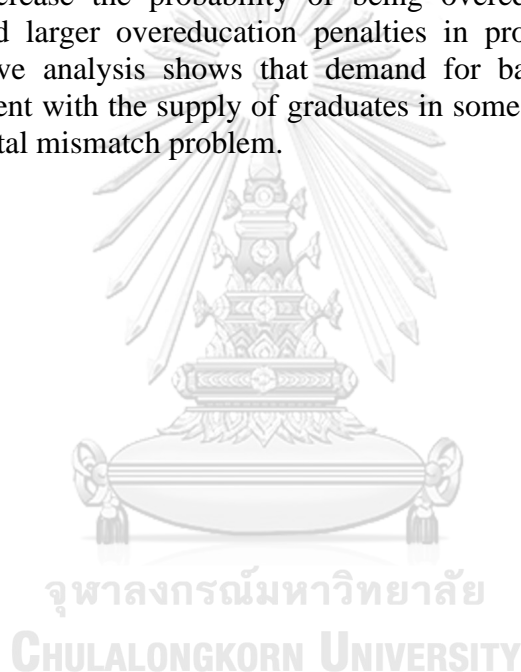
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Chapter 1
Introduction

1.1 Introduction

Higher education is important for developing the human resources of each country. When people have higher education, they can develop themselves into efficient workers, which will help lead a country to greater prosperity. This is why Thailand has focused on developing its education system, including postsecondary education. Although the Ministry of Education provides significant funding for higher education, there are still gaps in access to education. Many low-income people cannot gain access to university education. Although public universities have been established across the country, some provinces still do not have publicly funded universities, limiting access to a significant portion of the population.

Growth in Thailand's industrial and service sectors has caused an increase in demand for workers with higher education. However, there has been even faster growth in the number of university graduates with the expansion of Thailand's university system (Paweenawat & Vechbanyongratana, 2015). The growth of labor demand for university workers is slower than the growth of supply, contributing to a vertical mismatch problem, also known as overeducation, where workers have qualifications higher than needed for their work. Also, workers face a horizontal mismatch problem, where workers graduate from one field of study and work in a job that requires another field of study.

This thesis considers three interrelated questions. First, did the significant increase in investments in universities increase access to higher education? Specifically, do we see a higher incidence of bachelor degree completion in the provinces that have research

universities or Rajabhat universities? Second, are vertical and horizontal education-occupation mismatch systematically different between workers who live in provinces with a university where the job market may be more diverse? Finally, are wage penalties associated with vertical mismatch different in provinces with and without universities?

1.2 Objective

The objectives of this thesis are: 1) to estimate the probability of completing a bachelor's degree given local access to a university; 2) determine whether vertical mismatch rates are different between provinces with universities and provinces without universities; and 3) estimate the overeducation wage penalties for bachelor degrees graduates in provinces with and without the universities; and 4) describe horizontal degree – occupation mismatch across different regions in Thailand.

1.3 Expected Benefits

This research results will increase awareness about how access to universities increases educational opportunities and the potential for vertical and horizontal mismatch for university graduates. Moreover, this research will be beneficial for the further development of the higher education system and can inform future education policy in Thailand.

Chapter 2
Background & Literature review

2.1 Background

The first modern school was established at The Grand Palace in 1871 and marked the beginning of the rapid expansion of education. Over the twentieth century, the government has worked to develop its human capital by establishing schools and compulsory education. In the year 1918, King Rama VI enacted the School Act for all children to get the education. In 1921, he beginning the Primary Education Act into, which is the first primary compulsory education by forcing children aged 7-14 years to study and live in school without paying tuition fees (Sanook, 2013). In August 1990, the compulsory education was expanded from 6 to 9 years. Primary schools were established in every district in 1918, while secondary schools expanded to every district after the Third Five-year Economic and Social Development Plan (1971 – 1976).

The development of tertiary education started more slowly, but has accelerated in the past few decades. Chulalongkorn University (CU) was the first university in Thailand established by King Rama VI. Formerly, the institution was used to train civil servants, but on March 26, 1916, King Rama VI changed Chulalongkorn's status to a university with broader education programs, including political science, medicine, engineering, and liberal arts and sciences (Chulalongkorn University, 2 0 1 9) . The second university in Thailand is Thammasat University established by Dr. Pridi Banomyon on June 27, 1934. Kasetsart University (KU), established on February 2, 1943 by Luang Ingkhasikasikan, Luang Suwan Vajokkasikij and Phra Chuangkasetsinlapakan, is Thailand's third university, and first university focused on agriculture (Kasetsart University, 2 0 1 2) . Mahidol University was established as a medical university in 1943 as well, and has remained one of the leading medical universities in Thailand (Mahidol University, 2017)

The 1960s saw the establishment of several regional universities, as well as universities specializing in various career training. In the north of Thailand, Chiang Mai University (CMU) was founded in January 1964, under a Royal Charter granted by His Majesty King Bhumibol Adulyadej (ChiangMai University, 2019). In the northeast of Thailand, the first university in this region is Khon Kaen University (KKU established in 1964, specializing in engineering and agriculture (KhonKaen University, 2019). The Prince of Songkla University (PSU) is the first university in southern Thailand established on September 22, 1967 (Prince of Songkla University, 2019). The government allowed private universities to be established soon after. The first private institution of higher education in Thailand is Krirk University established on May 28, 1970.

"Rajabhat" institutions are public higher education institutions originally established as teacher training schools in the central region and the provincial areas of the country. The first teacher training school was established on October 12, 1892 and was renamed to the Primary School Teacher Training School on May 15, 1918 (Phranakhon Rajabhat University, 2015) which has 17 places (Office of the Council of State, 1975). King Bhumibol Adulyadej (Rama IX) conferred the "Rajabhat" name on February 14 1992. Rajabhat Universities are higher education institutions for the development of local community with the aim to provide academic education, teacher training and research for the benefit of society, produce teachers and promote teachers' academic standing. There are currently 38 Rajabhat universities in Thailand as shown in Table 1 (Office of the Council of State, 2004).

Table 1 The Rajabhat Universities in Thailand

No.	University	Founded	Main campus
1	Phranakhon Rajabhat University	1892	Bangkok
2	Bansomdejchaopraya Rajabhat University	1896	Bangkok
3	Nakhon Ratchasima Rajabhat University	1913	Nakhon Ratchasima
4	Songkhla Rajabhat University	1919	Songkhla
5	Thepsatri Rajabhat University	1920	Lopburi
6	Nakhon Sawan Rajabhat University	1922	Nakhon Sawan
7	Udon Thani Rajabhat University	1923	Udon Thani
8	Chiang Mai Rajabhat University	1924	Chiang Mai
9	Maha Sarakham Rajabhat University	1925	Maha Sarakham
10	Phetchaburi Rajabhat University	1926	Phetchaburi
11	Pibulsongkram Rajabhat University	1926	Phitsanulok
12	Valaya Alongkorn Rajabhat University	1932	Bangkok
13	Yala Rajabhat University	1934	Yala
14	Nakhon Pathom Rajabhat University	1936	Nakhon Pathom
15	Uttaradit Rajabhat University	1936	Uttaradit
16	Suan Sunandha Rajabhat University	1937	Bangkok
17	Chandrakasem Rajabhat University	1940	Bangkok
18	Rajanagarindra Rajabhat University	1940	Chachoengsao
19	Ubon Ratchathani Rajabhat University	1947	Ubon Ratchathani
20	Dhonburi Rajabhat University	1948	Bangkok
21	Muban Chom Bung Rajabhat University	1954	Ratchaburi
22	Nakhon Si Thammarat Rajabhat University	1957	Nakhon Si Thammarat
23	Sakon Nakhon Rajabhat University	1964	Sakon Nakhon
24	Buri Ram Rajabhat University	1971	Buriram
25	Lampang Rajabhat University	1971	Lampang
26	Phuket Rajabhat University	1971	Phuket
27	Rambhai Barni Rajabhat University	1972	Chantaburi
28	Chiang Rai Rajabhat University	1973	Chiang Rai
29	Kamphaeng Phet Rajabhat University	1973	Kamphaeng Phet
30	Kanchanaburi Rajabhat University	1973	Kanchanaburi
31	Loei Rajabhat University	1973	Loei
32	Phetchabun Rajabhat University	1973	Phetchabun
33	Suratthani Rajabhat University	1973	Surat Thani
34	Surin Rajabhat University	1973	Surin
35	Phranakhon Si Ayutthaya Rajabhat University	1985	Phra Nakhon Si Ayutthaya
36	Chaiyaphum Rajabhat University	1997	Chaiyaphum
37	Sisaket Rajabhat University	1997	Sisaket
38	Roi Et Rajabhat University	2001	Roi Et

Source: Office of the Council of State (2004)

In the Thai education system, students do not select a field of study in primary school or junior high school. In high school level students must choose one of two tracks: the science program or the language-arts program. However, the most mismatch problems are caused by the selection of the fields in higher education level.

2.2 Job Mismatch Problems in Thailand

Thailand currently has both vertical and horizontal education-occupation mismatch for bachelor degree graduates. According to (Pholphirul, 2017), job mismatch problems cause both private and social costs, including the reduction of labor productivity from hiring labor who cannot work to their potential, labor shortage problems, opportunity costs of labor's major mismatch, or waste of education budget that produces graduates that do not meet the needs of the labor market.

Chantapong and Lertpeintham (2018) anlyze both demand and supply of educated workers. The results indicate that Thailand has a qualification mismatch problem. It means that the demand for labor at the bachelor's degree level is less than the supply of bachelor's degree graduates in the market. From Figure 1, there are currently 37.5 million people employed, of which 16 percent are the workers who with a bachelor's degree. The current demand for labor with a bachelor's degree is 15 percent, but the supply of new labor market entrants with a bachelor's degree is 63 percent (Chantapong & Lertpeintham, 2018).
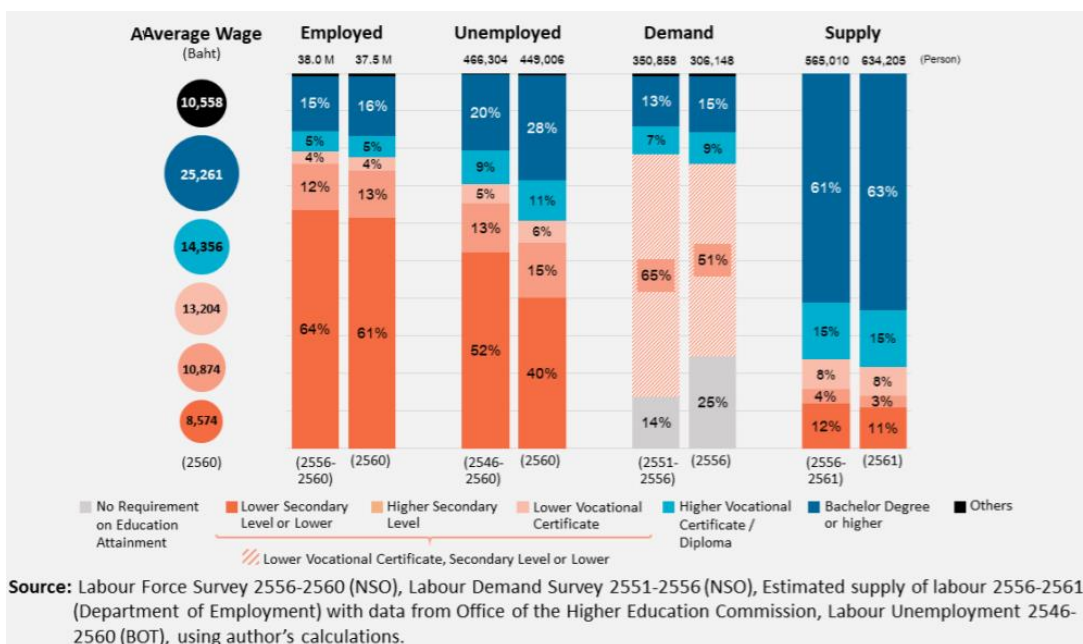
Figure 1 Qualification Mismatch in Thai Labor Market
Source: Chantapong and Lertpeintham (2018)

There is horizontal mismatch, where the field of postsecondary study does not match the occupation. Thai people are in favor of study in social science (The Department of Employment, 2016). Figure 2, using data from the office of the Higher Education Commission (OHEC), indicates that the proportion of students who graduated in Science, Technology, Engineer and Mathematics (STEM) is 21 percent, which is less than demand for labor in this field at 41 percent (Chantapong & Lertpeintham, 2018).
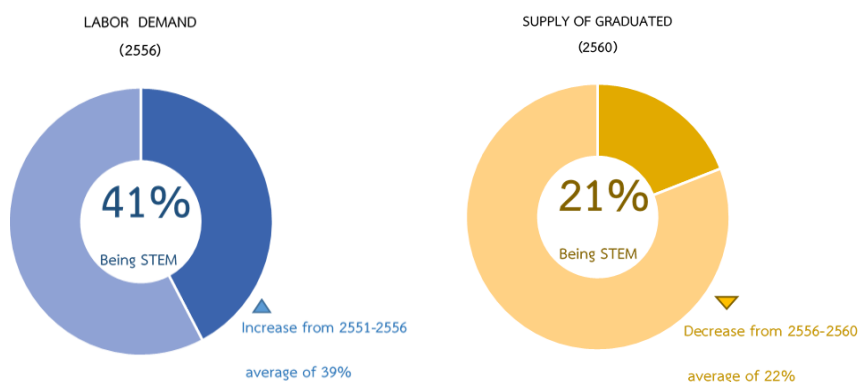
Figure 2 Field of Study Mismatch in Thai labor Market
Source: Chantapong and Lertpeintham (2018)

High school students have to choose the faculty to match to demand in the labor market to avoid to be unemployment (MarketingOops, 2017). However, this can be difficult given Thailand's university admission system. Now in Thailand, there is the Thai University Central Admission System for selection high school students to admission to the universities. The students have to know themselves what occupation they want to pursue and then they have to prepare themselves for this admission process. However, high school students often do not know what they want to be, are forced by their parents to study a certain subject, or want to learn in the same faculty with their friends etc. These patterns lead to job mismatch problems after graduation. Also, if students cannot gain admission to their first choice of program, they may be forced to study a field in which they do not plan to work after graduation. Once a student has started a bachelor's degree program, it is difficult to change faculty and degree program.

2.3 Literature Review

We can separate mismatch problems into two types. The first is vertical mismatch in other words, the mismatch between education level of labors and the education level that job require (Kim & Park, 2016). The second is horizontal mismatch, which is the mismatch of workers' field of study in college and their jobs (Kim & Park, 2016). When making the decision to invest in education, the costs are compared against the benefits. In areas where there are few schools, transport and time costs can make education prohibitively expensive. Previous empirical work on Thailand shows that closer proximity to schools is associated with people completing more or higher levels of education. For example, Chankrajang and Muttarak (2017) find a positive relationship between the number of primary school teachers and formal education enrolment and attainment. Another study by Warunsiri and McNown

(2010) find that provinces with local universities and/or teacher training colleges (i.e. Rajabhat universities) decreases the cost of higher education, which increases average years of schooling. Similar to these studies, the present study will determine if the presence of a university increases the likelihood of earning a bachelor's degree.

2.3.1 Vertical Mismatch

Theory

Overeducation, or vertical mismatch, refers to workers who work in jobs that require less education than they have achieved. Measurement of overeducation can be done either subjectively or objectively (Pholphirul, Khong-ngern, & Thowladda, 2016)

1) Subjective measures use questionnaires to ask workers' opinions on whether the level of education they achieved is enough for their occupation. this similar to Job Analysis which focus on the matching of the level of education and job postings (Hartog, 2000).

2) Objective measures often come from the data itself. is comparing the mode of period of study in each occupation with the labor's level of education who work in these occupations. This objective measure is difference from the study of Cohn and Ng (2000) which use the mean of period of study in each occupation with the labor's level of education who work in these occupation. If the labors have years of school more than mean+1 standard deviation, it implies that they have higher level of education that job require (Over-education). If the labors have years of school less than mean-1 standard deviation, it implies that they have higher level of education that job require (Under-education). For example, a worker's level of education might be compared to the modal level of education for an occupation, which is taken as the level of education that "matches".

Earlier Empirical Studies

The vertical mismatch problems, in other words, overeducation and undereducation. Lin and Wang (2005) examine the incidence and wage effect of overeducation and they found that workers who have many years of experience were much more likely to be undereducated and workers who have few years of experience were much more likely to be overeducated, similar to Cohn and Ng (2000) and Hung (2008). The overeducation affect to wage penalty (Di Pietro & Urwin, 2006).

Some studies find that wage penalties may not be related to skill mismatch (Kim & Park, 2016), while others find a relationship between skill mismatch and wage penalties. Robst (2007) finds that mismatched workers earn lower wages due to low ability. This result seems to be consistent with Nordin, Persson, and Rooth (2010) who find that wage penalties are due to lack of skill and low investments in job training and workshops. Moreover, attaining necessary skills help temporary employees find full-time employment, but there is no evidence that it helps mismatched workers move to matched occupation over time, making wage penalties seem permanent.

Nordin, Persson, & Rooth (2010) also look at gender differences. They find that there are differences in the income penalties between American and Swedish men, but there is no difference in penalties between American and Swedish women. Moreover, they found the relationship between specific skills and wage penalties for Sweden women, but not for Swedish man.

Empirical Studies on Developing Economies including Thailand

There are many studies covering many time periods and country contexts addressing issues of overeducation and associated wage penalties, including Thailand. One study estimates the effect of vertical mismatch and horizontal mismatch on wages for female college graduates in Taiwan, finding that wage penalties of skill mismatch were slightly less than wage penalties for overeducation (Tao & Hung, 2014). This result is similar to Pholphirul (2017), Varakamin (2016), Satimanon (2017), and JaneKiatfu (2017). JaneKiatfu (2017) found that the cause of the negative impact on wages is due to overeducation and a mismatch between field of study and field of work. In Thailand in 2006, overeducated workers made up about 6.27 percent of workers, which increased to 8.51 percent by 2011 (Senkrua, 2015). The largest group of overeducated workers is between 31- 40 years old, married, and male (JaneKiatfu, 2017). In contrast, women in general have a higher probability to be overeducated than men (Senkrua, 2015).

Conceptual Framework
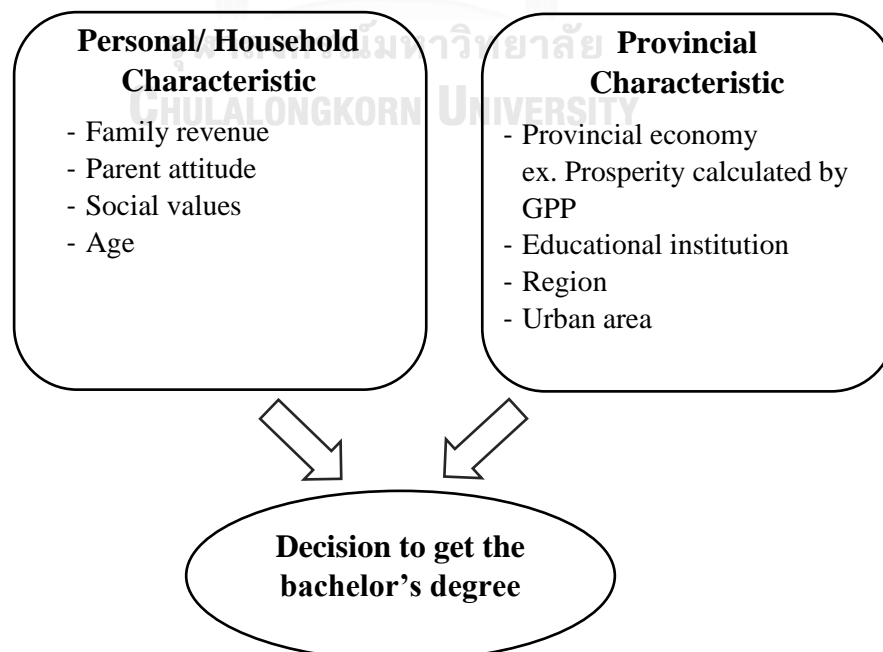
Figure 3 the factor of the decision to get the bachelor's degree

Figure 3 indicates that people decide to study in higher education depend on personal/household characteristic, as well as the economic situation where they live. The personal/household characteristics include family revenue, parent attitude, social values, and age. Family revenue is an important factor for this decision because most workers who are from low-income families do not study in higher education. The attitude of their parents also affects the decision to study. Parent who do not see the importance of continuing in higher education may make access to bachelor's degrees for their children difficult. However, in general Thai society values higher education and believes that the higher the education, the higher the salary. With the increase of age, the demand for higher education will decrease. The location characteristics include the provincial economy (measured by the per capita gross provincial product (GPP)), educational institutions, region of the country, and urban residence. The provinces with higher economic per capita income (GPP) implies that people in these provinces have higher income and thus more opportunity to access higher education. The municipal areas and prosperous cites may have more schools and teachers than the local areas, as well as more diverse labor markets. Thus, access to higher education depends on whether the worker lives in a municipality and lives in a rural area. From the previous empirical work, the provinces with local universities and/or teacher training colleges (i.e. Rajabhat universities) decreases the cost of higher education, which increases average years of schooling (Warunsiri & McNown, 2010). So, the number of workers with a bachelor degree depends on the area with the universities because they improve the access to higher education. Similarly, Chankrajang and Muttarak (2017) find a positive relationship between the number of primary school teachers and formal education enrolment and attainment.

From Figure 4, The probability of overeducation mismatch depends on the worker's age because from Paweenawat and Vechbanyongratana (2015) finds that the workers with the highest incidence of overeducation are younger cohorts. Senkrua (2018) finds that women have a higher probability of overeducation than men and JaneKiatfu (2017) finds married male are more likely to be overeducated workers. So, we think that gender and marital status of the worker affect the incidence of overeducation. Figure 4 shows the factors that affect the overeducation mismatch problem.
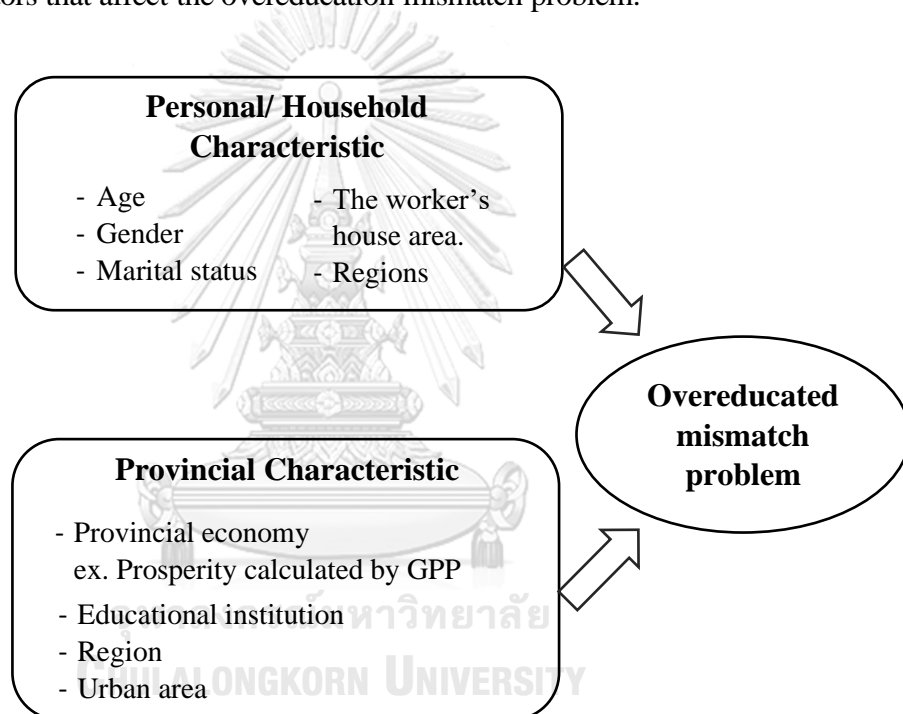
Figure 4 the factor of Overeducated mismatch problem
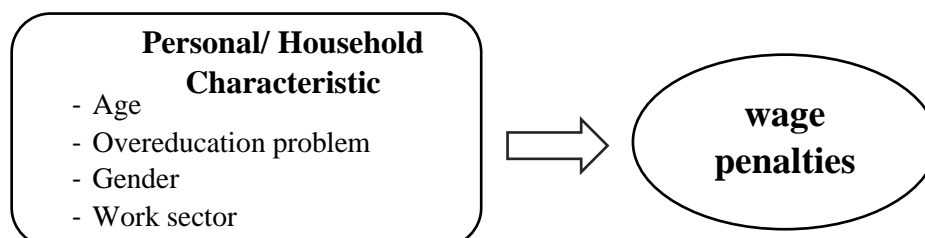
Figure 5 the factor of overeducated wage penalties

Satimanon (2017) found that the cause of the negative impact on wages is overeducation. Comparing the monthly income of the workers who work under their level of education (overeducated) and the normal worker who works at their level of education, the overeducated worker has lower wages when they work in the private sector (JaneKiatfu, 2017). So, the overeducated workers have higher wage penalties than normal. Moreover, the worker's gender will affect to the wage penalties because it is easier for men to find jobs than women. So, overeducated male workers face less wage penalties. Female and the younger workers will face the larger penalties (Paweenawat & Vechbanyongratana, 2015) because the new entrants into the labor market will face lower wage and minimum wage following Figure 5.

2.3.2 Horizontal Mismatch

Theory

In contrast to vertical mismatch, horizontal mismatch refers to workers who graduate from one field of study, their degree program does not match with their present career. (Somers, Cabus, Groot, & van den Brink, 2019) separate the measurement of Horizontal mismatch to the subjective measure and objective measure. They definite that "the subjective approach measures the educational requirements for a job based on employees' self-report on the other hand, the objective method determines the educational requirements for an occupation using an expert or by assigning occupational codes for statistical purposes to educational fields."

Earlier Empirical Studies

A pioneering paper by Robst (2007) focuses on the relationship between college major and occupation. He finds that 55 percent of American workers reported that their work was related to their field of study. The income penalty for mismatch of field of education (horizontal mismatch) seems to be larger than the income penalty for

overeducation and undereducation (vertical mismatch) (Nordin et al., 2010). In addition, the income penalty for horizontal mismatch may be increased by the university or college education in Sweden. and if we have a better matching between field of study and job then it can decrease or increase the penalty (Kim & Park, 2016).

Empirical Studies on Developing Economies including Thailand

For the case of Thailand, the Ministry of Labor Thailand defines necessary educational background in each occupation. Using these designations, a recent study by Pholphirul (2017) finds that horizontal mismatch is found to be more of a problem in some fields and not others. For example, graduates in physical sciences have high levels of horizontal mismatch, but the graduates in fields of Health sciences and Education have the lowest levels of horizontal mismatch (Pholphirul, 2017). Senkrua (2015) finds that degree fields that lead to specific jobs (i.e. health, science or engineering) have lower incidences of horizontal mismatch than general fields (i.e. social science or humanity) in Thailand.

Conceptual Framework

Chosen degree fields

- Parent attitude
- Gender
- Student preference
- Admission System

Degree filed mismatch

Provincial Characteristic

Labor market
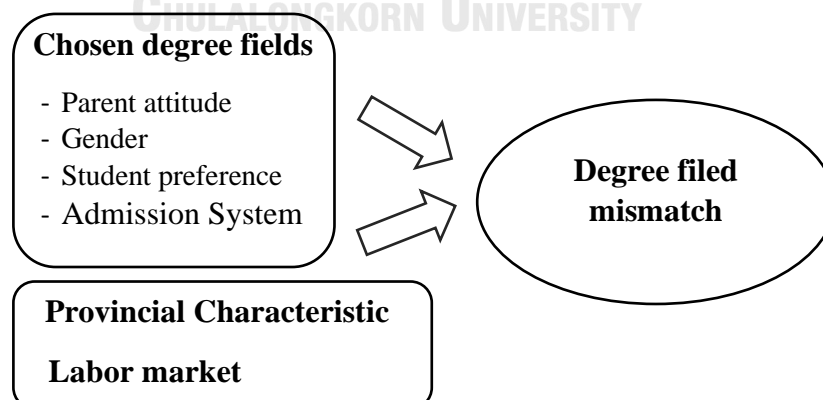
Figure 6 the factor of Degree filed mismatch

When the students need to choose degree fields at the bachelor's degree level, there are several factors that determine this decision. The most important factors are the admissions system and student preferences. Students have to prepare themselves for the admission process, although sometimes they do not know which degree field to choose and/or do not know what they want to be in the future. If students cannot gain admissions to their first choice of program, they may be forced to study a field in which they do not plan to work after graduation and it is difficult to change faculty and degree program. Some occupations prefer to women more than men, meaning that gender affects the chosen degree fields following Figure 6.

Chapter 3
Overeducated Mismatch Problem

3.1 Data

This paper uses the data from The Labor Force Survey of the National Statistical Office of Thailand in 2015 and 2016 to answer the research questions. The sample consists of workers who graduated with a bachelor's degree and focuses on the labor who are of working age and are young enough to have the opportunity to attend a Rajabhat University when they became universities in 2004. We compare the sample in the provinces that have large research institutions, the provinces with Rajabhat universities, and the provinces that do not have universities.

Table 2 Summary statistic of overeducation by region

Dependent Variable:	Mean	Std. Dev.	Description
Bangkok Metrophil			
Overeducation Indicator	0.116	0.321	Dummy = 1 if the labor is overeducated
Provinces with Research University	1	0	Dummy = 1 if the province with RU
Province with Rajabhat University	1	0	Dummy = 1 if the province with RJB
Urban Area Indicator	1	0	Dummy = 1 if the labor live in municipality
Female Indicator	0.59	0.492	Dummy = 1 if the labor with female
Age	25.656	2.114	Age of workers
Real GPP	385.474	9.385	The Real Gross Provincial Product
Year	0.519	0.500	The year of survey
Observations			1202
Central Region			
Overeducation Indicator	0.133	0.339	Dummy = 1 if the labor is overeducated
Provinces with Research University	0.096	0.294	Dummy = 1 if the province with RU
Province with Rajabhat University	0.359	0.48	Dummy = 1 if the province with RJB
Urban Area Indicator	0.553	0.497	Dummy = 1 if the labor live in municipality
Female Indicator	0.585	0.493	Dummy = 1 if the labor with female
Age	25.736	2.18	Age of workers
Real GPP	209.194	187.758	The Real Gross Provincial Product
Year	0.515	0.500	The year of survey
Observations			4512

Dependent Variable:	Mean	Std. Dev.	Description
Northern Region			
Overeducation Indicator	0.144	0.351	Dummy = 1 if the labor is overeducated
Provinces with Research University	0.164	0.370	Dummy = 1 if the province with RU
Province with Rajabhat University	0.484	0.500	Dummy = 1 if the province with RJB
Urban Area Indicator	0.638	0.481	Dummy = 1 if the labor live in municipality
Female Indicator	0.577	0.494	Dummy = 1 if the labor with female
Age	25.758	2.175	Age of workers
Real GPP	62.786	24.627	The Real Gross Provincial Product
Year	0.512	0.500	The year of survey
Observations		2494	
North-eastern Region			
Overeducation Indicator	0.175	0.380	Dummy = 1 if the labor is overeducated
Provinces with Research University	0.134	0.341	Dummy = 1 if the province with RU
Province with Rajabhat University	0.551	0.498	Dummy = 1 if the province with RJB
Urban Area Indicator	0.686	0.464	Dummy = 1 if the labor live in municipality
Female Indicator	0.567	0.496	Dummy = 1 if the labor with female
Age	25.84	2.206	Age of workers
Real GPP	40.048	15.434	The Real Gross Provincial Product
Year	0.504	0.500	The year of survey
Observations		2426	
Southern Region			

Dependent Variable:	Mean	Std. Dev.	Description
Overeducation Indicator	0.147	0.353	Dummy = 1 if the labor is overeducated
Provinces with Research University	0.406	0.491	Dummy = 1 if the province with RU
Province with Rajabhat University	0.384	0.487	Dummy = 1 if the province with RJB
Urban Area Indicator	0.596	0.491	Dummy = 1 if the labor live in municipality
Female Indicator	0.628	0.483	Dummy = 1 if the labor with female
Age	25.994	2.138	Age of workers
Real GPP	109.784	39.551	The Real Gross Provincial Product
Year	0.503	0.500	The year of survey
Observations			2414

Table 2 reports summary statistics for overeducation by region in Thailand. In the **Bangkok Metropolitan Area**, the sample size of Bangkok is 1,202 people, 59 percent of whom are women with an average age of 26 years old. Bangkok has both research and Rajabhat universities and about 12 percent of workers are overeducated. For **Central region**, the sample size is 4,512 people, of which 59 percent are women and the average age is 26 years old. Overeducated workers make up about 13 percent of the sample. Ten percent of provinces in the central region have research universities 36 percent have Rajabhat Universities. About 55 percent of workers live in municipalities.

In **Northern region**, the sample size is 2,494 people, of which 14 percent are overeducated. The workers are 58 percent female and have an average age of 26 years old. About 16 percent of the sample lives in provinces with research universities and

percent of the sample lives in provinces with Rajabhat universities. The workers who live in municipalities make up about 64 percent.

In the **North-eastern region**, the sample size is 2,426 people where 57 percent are women and the average age is 26. The workers who live in municipalities are about 69 percent. Overeducated workers make up about 18 percent of the sample. About 13 percent of the sample live in provinces with Rajabhat Universities.

In the **Southern region**, the sample size is 2,414 people with 63 percent women and an average age of 26 years old. About 15 percent of the sample are overeducated. About 41 percent of the workers live in provinces with research universities and 38 percent with Rajabhat Universities. Workers who live in municipalities are about 59 percent.

Table 3 Summary Statistics of the Main Variables

Variables	Mean	Std. Dev.	Description
Provinces with Research University	0.257	0.437	Dummy = 1 if the province with RU*
Province with Rajabhat University	0.483	0.500	Dummy = 1 if the province with RJB*
Overeducation Indicator	0.144	0.350	Dummy = 1 if the labor is overeducated
Urban Area Indicator	0.643	0.479	Dummy = 1 if the labor lives in municipality
Female Indicator	0.588	0.492	Dummy = 1 if the labor with female
Age	25.801	2.173	Age of workers
Married Indicator	0.388	0.487	Dummy = 1 if the labor is single
The number of public universities	1.687	0.985	The number of universities
Public Indicator	0.209	0.407	Dummy = 1 if the labor work in public sector
Real GPP	147.608	151.532	The Real Gross Provincial Product

Variables	Mean	Std. Dev.	Description
Distance	3.967	3.226	The distance from Bangkok to other provinces.
Year Indicator	0.511	0.500	The year of survey
Central Region	0.346	0.476	Dummy = 1 if Central
Northern Region	0.191	0.393	Dummy = 1 if Northern
Northeastern Region	0.186	0.389	Dummy = 1 if Northeastern
Southern Region	0.185	0.388	Dummy = 1 if Southern
Bachelor's Degree	0.577	0.494	Bachelor's Degrees
Wage	16717.38	58925.85	Monthly total wage of labor

Note: Sample size is 13,048. Sample size of wage is 7,906.
Source: Labor Force Survey, The National Statistical Office of Thailand (2015,2016)

Table 3 reports summary statistics for the variables used in the regression analysis. The sample size is 13,048 but the sample size of wage is 7,906. There are the people who live in the provinces with Research universities about 25.7 percent and live the provinces with Rajabhat University about 48.3 percent. There are the people who live in central region about 34.6 percent, northern about 19.1 percent, northeastern about 18.6 percent, and Southern about 18.5 percent. The probability of overeducated is about 14.4 percent. The workers who are female about 58.8 percent, single people about 38.8 percent, work in public sector about 20.9 percent, lives in municipality about 64.3 percent, graduate with bachelor degree about 57.7 percent. The workers have average age about 26 years. The average wages are about 16,717.38 baht. The average Real Gross Provincial Product (Real GPP) is about 147.61 percent. The average distance from Bangkok to other provinces is about 4 kilometer and the average number of public universities in each province have about 2 institutions from Table 4.

Table 4 The number of public universities in each province

Province	The number of public universities
Bangkok Metropolis	22
Central Region	
Ang Thong	0
Chachoengsao	1
Chai Nat	0
Chanthaburi	3
Chon Buri	4
Kanchanaburi	2
Lopburi	2
Nakhon Nayok	0
Nakhon Pathom	5
Nonthaburi	2
Pathum Thani	2
Phetchaburi	2
Phra Nakhon Si Ayutthaya	2
Prachin Buri	1
Prachuap Khiri Khan	1
Ratchaburi	2
Rayong	1
Sa Kaeo	2
Samut Prakan	0
Samut Sakhon	1
Samut Songkhram	0
Saraburi	0
Sing Buri	0
Suphan Buri	2
Trat	1
Northern Region	
Kamphaeng Phet	2
Chiang Rai	2
Chiang Mai	4
Tak	1
Nakhon Sawan	2
Nan	1
Phichit	1
Phitsanulok	2
Phetchabun	2
Phrae	2

Province	The number of public universities
Mae Hong Son	1
Lampang	2
Sukhothai	0
Lamphun	0
Uttaradit	1
Uthai Thani	1
Phayao	1
Northeastern Regions	
Kalasin	2
Khon Kaen	2
Chaiyaphum	1
Yasothon	1
Nakhon Phanom	1
Nakhon Ratchasima	2
Buriram	3
Bueng Kan	0
Maha Sarakham	2
Mukdahan	1
Roi Et	2
Loei	1
Sisaket	1
Sakon Nakhon	2
Surin Province	2
Nong Khai	1
Nong Bua Lamphu	1
Udon Thani	2
Ubon Ratchathani	2
Amnat Charoen	1
Southern Regions	
Krabi	1
Chumphon	1
Trang	3
Nakhon Si Thammarat	3
Narathiwat	2
Pattani	2
Phang Nga	1
Phatthalung	1
Phuket	2
Yala	2
Ranong	1

Province	The number of public universities
Songkhla	5
Satun	1
Surat Thani	2

Source: The Office Of The Higher Education Commission (2015)

3.2 Method

Incidence of Bachelor Degrees

We first estimate the incidence of gaining a bachelor's degree based on whether or not the individual's province has a research university (RU) or Rajabhat university (RJB), holding individual characteristics constant. We estimate the following probit regression, we predict the association between the presence of a university and the completion of a bachelor's degree to be positive.

$$Pr(Bachelor) = f(RU, RJB, Urban, Female, Age, Region, GPP, Dis, Year)$$

Where

- GPP is the Real Gross Provincial Product
- Dis is the distance from Bangkok to other provinces.

The dummy variable

- $Bachelor$ is the labor graduated in bachelor degrees.

    Set   1 = labor graduated in bachelor degrees.

           0 = labor graduated in others.

- RU is the province

    Set   1 = The provinces have the research universities.

           0 = The provinces don't have the research universities.

- RJB is the province

Set　　1 = The provinces had the Rajabhat universities when workers were 18.

　　　0 = The provinces didn't have the Rajabhat universities when workers were 18.

− *Urban* is The worker's house area.

Set　　1 = Inside the municipality,　0 = Outside the municipality

− *Age* is the worker's age.

Set the worker people who are 22-59 years and 18 years when they became

universities in 2004.

− *Female* is the worker's gender

Set　　1 = female, 0 = male

− *Region*　is The regions of Thailand.

Set　　1 = The south of Thailand, 0 = others

　　　1 = The northeast of Thailand, 0 = others

　　　1 = The north of Thailand, 0 = others

　　　1 = The central of Thailand, 0 = others

− *Year* is the year of data

Set　　1 = 2016, 0 = 2015

Incidence of Vertical Mismatch

It is possible that the probability of overeducation will increase in the provinces. On the other hand, labor markets may be more diverse in provinces with universities, which could reduce the incidence of vertical mismatch.

$$Pr(Mismatch) = f(RU, RJB, Urban, Female, Age, Region, GPP, Dis, Year)$$

Where

The dummy variable

Mismatch is The probability of Vertical Mismatch (Overeducation).

  Set 1 = vertical mismatch (overeducation), 0 = match

And others variables are similar to the model of Incidence of bachelor degrees.

Vertical Mismatch Penalties

  To estimate whether overeducation wage penalties are systematically different between provinces with and without the universities, we run an OLS Mincerian wage regression separately for both types of provinces to estimate the relationship between overeducation and the natural log of monthly labor income.

$$ln\,wage = \alpha_1 + \delta_1 Overedu + \delta_2 Urban + \delta_3 Female + \delta_4 Age + \delta_5 Marital$$
$$+ \delta_6 Public + \delta_7 Region + \delta_8 Age^2 + \delta_9 Num\_U + \varepsilon_1$$

Where

-   *wage* is the monthly labor income.

-   ε_1 is the error term.

The dummy variable

-   *Overeducated* is the probability of overeducated.

  Set 1 = The labor who is overeducated

      0 = The labor who is not overeducated.

-   *Age* is the worker people who are 22-59 years and 18 years when they became universities in 2004.

-   *Urban* is the worker's house area.

  Set 1 = Inside the municipality

      0 = Outside the municipality

- *Marital* is the worker's marital status.

    Set   1 = single, 0 = others

- *Female* is the worker's gender

    Set   1 = female, 0 = male

- *Public* is the sector that labor work in.

    Set   1 = The labor work in public sector

            0 = The labor work in private sector.

- *Region* is the regions of Thailand.

    Set   1 = The south of Thailand, 0 = other regions

            1 = The northeast of Thailand, 0 = other regions

            1 = The north of Thailand, 0 = other regions

            1 = The central regions, 0 = other regions

- *Num_U* is the number of the public universities in each province.

Table 5 The Expected Sign

Variable	Coefficient Sign	Definition	Reference
The Incidence of Bachelor Degrees			
RU	>0	The worker lives in the province with the research university has more opportunity to access to higher education.	
RJB	>0	The worker lives in the province with the Rajabhat university has more opportunity to access to higher education.	Warunsiri and McNown (2010)
GPP	>0	The worker lives in the province with high real GPP has more opportunity to access to higher	

Variable	Coefficient Sign	Definition	Reference
		education.	
Urban	>0	The worker's house is inside the municipality has more opportunity to access to higher education.	
Female	>0 or <0	The worker is female has more opportunity to access to higher education.	
Age	>0	The worker is younger has more opportunity to access to higher education.	
Region	>0	The worker lives in central region has more opportunity to access to higher education.	
The Incidence of Overeducation			
RU	>0 or <0	The worker lives in the province with the research university has more or less opportunity to face overeducation.	
RJB	>0 or <0	The worker lives in the province with the Rajabhat university has more or less opportunity to face overeducation.	
GPP	<0	The worker lives in the province with higher real GPP has less opportunity to face overeducation.	
Urban	>0	The worker's house is inside the municipality has more opportunity to face overeducation.	
Female	>0 or <0	The worker is female has more or less opportunity to face overeducation.	Senkrua (2018), JaneKiatfu (2017)

Variable	Coefficient Sign	Definition	Reference
Age	>0 or <0	The worker is younger has more or less opportunity to face overeducation.	Paweenawat and Vechbanyongratana (2015), Jainkiatfu (2018)
Region	>0	The worker lives in central region, has more opportunity to face overeducation.	
The Penalty of Vertical Mismatch			
Overedu	>0	The worker faced overeducated has more income penalties.	(Di Pietro & Urwin, 2006) , Satimanon (2017)
Urban	>0	The worker's house is inside the municipality has more income penalties.	Pholphirul (2017)
Female	>0 or <0	The worker is female has more or less income penalties.	Varakamin (2016), Nordin, Persson and Rooth (2010), Paweenawat & Vechbanyongratana (2015)
Age	>0 or <0	The worker is 22-59 years old has more or less income penalties.	(Paweenawat & Vechbanyongratana, 2015)
Public	>0	The worker work in the public sector has more income penalties.	JaneKiatfu (2017)
Num_U	>0 or <0	The worker lives a province has more universities has more or less income penalties.	
Region	>0	The worker lives in central region has more income penalties.	Pholphirul (2017)

Table 5 shows the expected signs of each variable according to previous literature. Warunsiri and McNown (2010) find that provinces with Rajabhat universities decreases the cost of higher education, which increases average years of schooling. Thus, we expect that workers who live in the province with Rajabhat

universities have more opportunities to finish a bachelor's degrees. It is unclear from previous research whether men or women are more likely to finish a bachelor's degree. Senkrua (2015) finds that women are more likely to finish higher education, but in contrast, JaneKiatfu (2017) finds that men are more likely to have a bachelor's degree. From JaneKiatfu (2017) found that the most of overeducate labors is between 31- 40 years but Paweenawat and Vechbanyongratana (2015) found that the workers with the highest incidence of overeducation are younger cohorts. So, the younger worker may have more or less opportunity to face overeducation.

Wage penalties are expected to be associated with overeducation. Work by Di Pietro & Urwin (2006) and Satimanon (2017) finds the cause of the negative impact on wages is overeducation, causing workers facing overeducation to have more income penalties. Nordin, Persson, & Rooth (2010) said that there is the difference in the income penalty of American and Swedish men but did not find the difference in American and Swedish women. Previous work shows that younger workers will face the lager penalties (Paweenawat & Vechbanyongratana, 2015). The overeducated worker has lower wage when they work in private sector (JaneKiatfu, 2017). So, the worker work in the public sector has more income penalties. We see Pholphirul (2017) add living outside municipalities and region indicator to his study so we will add it to find the relationship between them and wage penalties.

3.3 Results

The Result of Vertical Mismatch Problems

Table 6 and Table 7 reports the regression results of overeducated problems.

Table 6 Regression Results for Determinants of Bachelor Degree Completion, and Overeducation

Dependent Variable:	(1) Bachelor's Degree	(2) Overeducated
Provinces with Research University	0.028	0.001
	(0.029)	(0.015)
Province with Rajabhat University	0.055***	0.009
	(0.022)	(0.011)
Urban Area Indicator	0.080***	0.008
	(0.012)	(0.007)
Female Indicator	0.201***	0.005
	(0.010)	(0.008)
Age	0.023***	0.011***
	(0.002)	(0.003)
GPP	-0.0002984 ***	-.0000752*
	(0.0000787)	(0.0000422)
Year of survey Indicator	0.003	0.010**
	0.008	(0.005)
Region Controls	Yes	Yes
Pseudo R-Square	0.064	0.010
Observations	13,048	13,048

Notes: *** $p<0.01$ ** $p<0.05$ * $p<0.1$; Coefficients reported as marginal effects at the mean for probit regressions (columns 1 and 2); Standard errors are reported in parentheses.

Source: Authors' calculations from the Thai Labor Force Survey (2015,2016)

Table 6 shows that in provinces with the research universities, the probability to complete a bachelor's degree is no different than for provinces without universities. However, individuals in provinces with Rajabhat universities are about 5.5 percent more likely to finish a bachelor's degree than provinces without. The female labors

have more probability to access higher education about 20 percent and younger labors has about 2.3 percent. The individuals live inside the municipality can access to higher education more than outside about 8 percent which corresponds to the distances that near Bangkok. The higher real gpp provinces have less the opportunities to finish bachelor degree about 0.0298 percent (which has hardly no effect about the access to bachelor degree). This suggests that having a university in close proximity to one's home, which theoretically decreases the cost of higher education, does in fact increase access to higher education. Given that provinces with Rajabhat universities increase the likelihood of gaining higher education, it is of interest if we see higher levels of vertical mismatch in these provinces. The results in column (2) indicate that there is no difference in the incidence of overeducation in provinces that have universities and those that do not, even though the presence of a Rajabhat university increases the probability of getting a bachelor's degree. Moreover, the younger labors have more opportunities to face overeducation about 1.1 percent. The sample workers in 2016 of surveys have more probability to face the overeducation about 1 percent. The summary statistics suggest that 14 percent of bachelor degree holders are overeducated. The next analysis determines whether overeducated bachelor degree holders have larger in the province with the research and Rajabhat universities.

Table 7 Regression Results for Determinants of Overeducation Wage Penalties

	(1) Provinces with Research University	(2) Province with Rajabhat University	(3) Provinces with University	(4) Provinces without University
Dependent Variable:	Ln(wage)	Ln(wage)	Ln(wage)	Ln(wage)

Overeducation Indicator	-0.153**	-0.154***	-0.108**	-0.160***
	(0.041)	(0.034)	(0.044)	(0.041)
Urban Area Indicator	0.012	0.071**	0.003	0.065**
	(0.044)	(0.029)	(0.054)	(0.032)
Female Indicator	-0.098***	-0.076***	-0.114***	-0.059*
	(0.026)	(0.026)	(0.021)	(0.032)
Age	0.159*	0.046	0.136	-0.025
	(0.090)	(0.103)	(0.137)	(0.135)
Age2	-0.003	-0.000	-0.002	0.001
	(0.002)	(0.002)	(0.003)	(0.003)
GPP	0.001**	0.001***	0.003	0.001***
	(0.000)	(0.000)	(0.003)	(0.000)
Year of survey Indicator	0.012	0.025**	0.016	0.032
	(0.013)	(0.012)	(0.012)	(0.024)
Public Indicator	-0.043	-0.024	-0.047	-0.016
	(0.041)	(0.030)	(0.057)	(0.032)
Number of Universities Indicator	0.046	0.048**	0.094	0.120**
	(0.030)	(0.019)	(0.129)	(0.051)
Constant	7.023***	8.321***	6.455**	9.256***
	(1.156)	(1.265)	(2.095)	(1.762)
Region Controls	Yes	Yes	Yes	Yes
R-Square	0.212	0.195	0.132	0.194
Observations	1266	1987	983	1240

Notes: *** p<0.01 ** p<0.05 * p<0.1; Coefficients reported as marginal effects at the mean for probit regressions (columns 1 and 2); Standard errors are reported in parentheses.
Source: Authors' calculations from the Thai Labor Force Survey (2015,2016)

Table 7 The workers who are overeducated have lower wage penalties in provinces with universities at about 11 percent compared to overeducated workers in provinces without universities at 16 percent. Even though there is no difference in the probability of being overeducated in provinces with and without universities, the wage penalties are lower in those with universities. From the result of column (3)

and (4), there are wage penalties about 15 percent in both Research and Rajabhat university. The workers who live inside the municipality in provinces with Rajabhat universities has wage penalties about 7 percent but in provinces without universities are about 6.5 percent. The public and private sector has no effect to wage penalties. The male worker who live in provinces with both universities have the highest wage penalties about 11 percent more than female, in provinces with Research universities about 10 percent, in provinces with Rajabhat universities about 8 percent, and in province without the universities about 6 percent. the number of universities in each province with the universities are not affect to the wage penalties in provinces with both universities.

Chapter 4
Degree fields mismatch problem
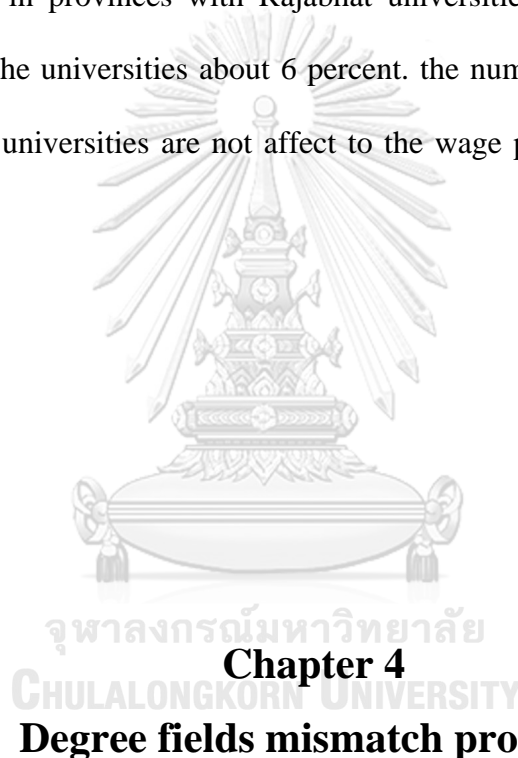
4.1 Data

For the qualitative analysis of horizontal mismatch, we use data from the Smart Job Center of the Department of Employment to understand current labor demand for bachelor degree students in Thailand and separate to each degree follow Table 7, 8 and calculate the percentage of labor demand in each region by

$$\frac{\textbf{The number of labor in group}_i}{\textbf{All of labors in region}_a} \times \textbf{100}$$

The data from Smart Job Center of the Department of Employment has the limit of the number of advertise jobs because the employer must submit a form to the department for job recruitment. So, there are limit of the labor demand. And use the data from The Labor Force Survey of the National Statistical Office of Thailand in 2016 to find the new graduated labor in each degree. we calculate the percentage of labor supply in each region which are calculated from Figure 7 to Figure 14. We focus on the labors who are 22 to 29 years. Using the stata to run the data of degree from The Labor Force Survey by each region.

4.2 Degrees Fields

In this paper we use the information from the National Statistical Office to separate the degree fields. Following Table 7 shows the ISCED 2011 Fields of Education. There are 0 General programs 1 Education; 2 Humanities and Arts; 3 Social Sciences, business and law; 4 Science; 5 Engineering, manufacturing and construction; 6 Agriculture; 7 Health and welfare; and 8 Services.

Table 8 ISCED 2011 Fields of Education

ISCED 2011 Fields of Education
0 General programmes
01 Basic programmes
Basic general programmes pre-primary, elementary, primary, secondary, etc.
08 Literacy and numeracy
Simple and functional literacy, numeracy.
09 Personal development
Enhancing personal skills, e.g. behavioural capacities, mental skills, personal organizational capacities, life orientation programmes.
1 Education

ISCED 2011 Fields of Education
14 Teacher training and education science
Teacher training for pre-school, kindergarten, elementary school, vocational, practical, non-vocational subject, adult education, teacher trainers and for handicapped children. General and specialised teacher-training programmes. Education science: curriculum development in non-vocational and vocational subjects. Educational assessment, testing and measurement, educational research, other education science.
2 Humanities and arts
21 Arts
Fine arts: drawing, painting, sculpture; Performing arts: music, drama, dance, circus; Graphic and audio-visual arts: photography, cinematography, music production, radio and television production, printing and publishing; Design; craft skills.
22 Humanities
Religion and theology; Foreign languages and cultures: living or 'dead' languages and their literature, area studies; Native languages: current or vernacular language and its literature; Other humanities: interpretation and translation, linguistics, comparative literature, history, archaeology, philosophy, ethics.
3 Social sciences, business and law
31 Social and behavioural science
Economics, economic history, political science, sociology, demography, anthropology (except physical anthropology), ethnology, futurology, psychology, geography (except physical geography), peace and conflict studies, human rights.
32 Journalism and information
Journalism; library technician and science; technicians in museums and similar repositories; Documentation techniques; Archival sciences.
34 Business and administration
Retailing, marketing, sales, public relations, real estate; Finance, banking, insurance, investment analysis; Accounting, auditing, bookkeeping; Management, public administration, institutional administration, personnel administration; Secretarial and office work.
38 Law

ISCED 2011 Fields of Education
Local magistrates, 'notaires', law (general, international, labour, maritime, etc.), jurisprudence, history of law.
4 Science
42 Life sciences
Biology, botany, bacteriology, toxicology, microbiology, zoology, entomology, ornithology, genetics, biochemistry, biophysics, other allied sciences, excluding clinical and veterinary sciences.
44 Physical sciences
Astronomy and space sciences, physics, other allied subjects, chemistry, other allied subjects, geology, geophysics, mineralogy, physical anthropology, physical geography and other geosciences, meteorology and other atmospheric sciences including climatic research, marine science, volcanology,paleoecology.
46 Mathematics and statistics
Mathematics, operations research, numerical analysis, actuarial science, statistics and other allied fields.
48 Computing
Computer sciences: system design, computer programming, data processing, networks, operating systems – software development only (hardware development should be classified with the engineering fields).
5 Engineering, manufacturing and construction
52 Engineering and engineering trades
Engineering drawing, mechanics, metal work, electricity, electronics, telecommunications, energy and chemical engineering, vehicle maintenance, surveying.
54 Manufacturing and processing
Food and drink processing, textiles, clothes, footwear, leather, materials (wood, paper, plastic, glass, etc.), mining and extraction.
58 Architecture and building
Architecture and town planning: structural architecture, landscape architecture, community planning, cartography; Building, construction; Civil engineering.
6 Agriculture

ISCED 2011 Fields of Education
62 Agriculture, forestry and fishery
Agriculture, crop and livestock production, agronomy, animal husbandry, horticulture and gardening, forestry and forest product techniques, natural parks, wildlife, fisheries, fishery science and technology.
64 Veterinary
Veterinary medicine, veterinary assisting.
7 Health and welfare
72 Health
Medicine: anatomy, epidemiology, cytology, physiology, immunology and immunohematology, pathology, anaesthesiology, paediatrics, obstetrics and gynaecology, internal medicine, surgery, neurology, psychiatry, radiology, ophthalmology;   Medical services: public health services, hygiene, pharmacy, pharmacology, therapeutics, rehabilitation, prosthetics, optometry, nutrition;   Nursing: basic nursing, midwifery; Dental services: dental assisting, dental hygienist, dental laboratory technician, odontology.
76 Social services
Social care: care of the disabled, childcare, youth services, gerontological services;   Social work: counselling, welfare not elsewhere classified (N.E.C.)
8 Services
81 Personal services
Hotel and catering, travel and tourism, sports and leisure, hairdressing, beauty treatment, and other personal services: cleaning, laundry, dry-cleaning, cosmetic services, domestic science.
84 Transport services
Seamanship, ship's officer, nautical science, air crew, air traffic control, railway operations, road motor vehicle operations, postal service.
85 Environmental protection
Environmental conservation, control and protection, air and water pollution control, labour protection and security.

ISCED 2011 Fields of Education
86 Security services
Protection of property and persons: police work and related law enforcement, criminology, fire-protection and firefighting, civil security; Military.

Source: The United Nations Educational & Scientific and Cultural Organization (2014)

4.3 Method

Incidence of Horizontal Mismatch

For horizontal mismatch, we use the data from the Smart Job Center of the Department of Employment to find whether current demand for workers with bachelor's degrees of 5 regions in Thailand that with and without universities by separated the worker into 8 groups follow Table 8 shows the fields of education of ISCED 2011 to match with the actual distribution of degrees for recent graduates in the Thai Labor Force Survey (2016).

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Table 9 The Matching between The Fields of Study and The Proper Job

Field of studies	Occupation
Education and Teacher training	Teacher, Education Administer, Academicians, Decorator, Audiovisual staff, Technical Specialist
Humanities, Religion and Theology	Teacher, Academicians, Linguist, Author, Interpreter, Foreign Relation Officer
Fine Art and Applied Art	Artisan, Photographer, Sculptor, Painter, Teacher, Decorator, Designer
Jurisprudence (Law)	Lawyer, Police, Revenue Officer, Loan Officer, Land Officer, Attorney, Teacher

Field of studies	Occupation
Social Sciences, Administration, Commercial Communication, and Home Economics	Politician, Almoner, Psychologist, Correspondent, Teacher, Businessman, Plan and Policy Analyst, Fiscal Analyst, Advertiser
Science, Applied Science and Industrial Technology	Teacher, Technical Specialist, Computer Officer, Medical Science Officer, Geologist, Research Analyst
Medicine and Health Sciences	Teacher, Doctor, Veterinarian, Nurse, Pharmacist, Physiotherapist, Radiological Technologist, Psychiatrist
Engineering	Engineer, Construction Controller, Draftsman, Foreman, Teacher, Technician
Architecture and Urban Planning	Architect, Designer, Teacher
Agriculture	Farmer, Agriculturists, Forester, Agricultural and Cooperative Staff, Gardener, Livestock, Farm and Animal Farm Owners
Other Field of Studies	Athlete, Social Worker, Developer, Teacher

Source: The Employment Promotion Division (2016)

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4.4 Result

The Result of Horizontal Mismatch Problems

In the final analysis, we analyze whether the supply of bachelor degrees that are awarded in Thailand match the demand for bachelor degree graduates in the labor market. Labor demand is determined by analyzing current job vacancies in Thailand (5 regions) from Smart Job Center (2020). We classified each job opening advertised specifically for bachelor degree graduates by degrees based on the Ministry of

Labor's career guide (The Department of Employment of The Ministry of Labor, 2016). From Figure 7 to Figure 14 lists the demand and supply for each of the 5 regions of each degree field classified by the International Standard Classification of Education (ISCED) 1-digit codes.
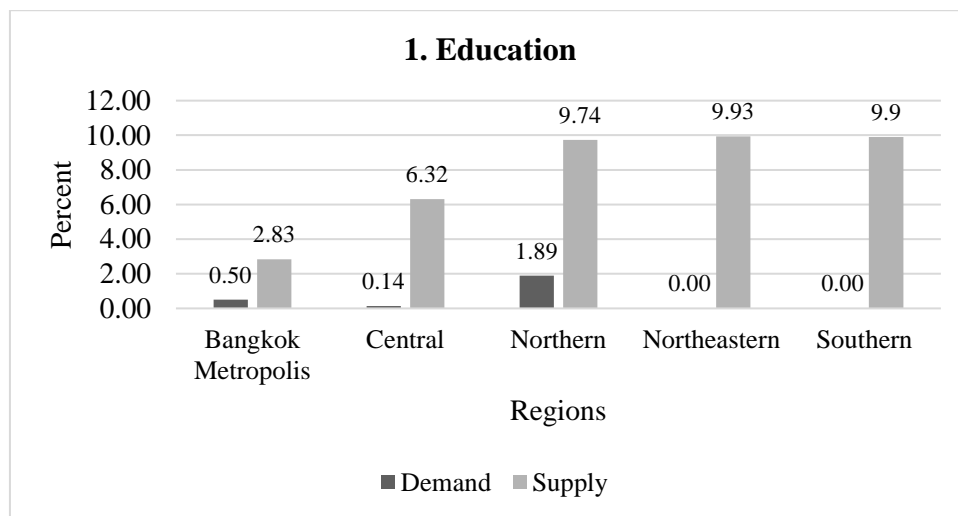

Figure 7 The labor demand and supply in the fields of education

For the supply, the percentage represents the percentage of overall job advertisements in the region that are related to education. For the demand, the percentage refers to the percentage of workers ages 22-29 in the region who have a degree in education, calculated from the Labor Force Survey. We actually see that education jobs are not advertised on Smart Jobs. So, we cannot conclude that there are horizontal mismatch or no problems.
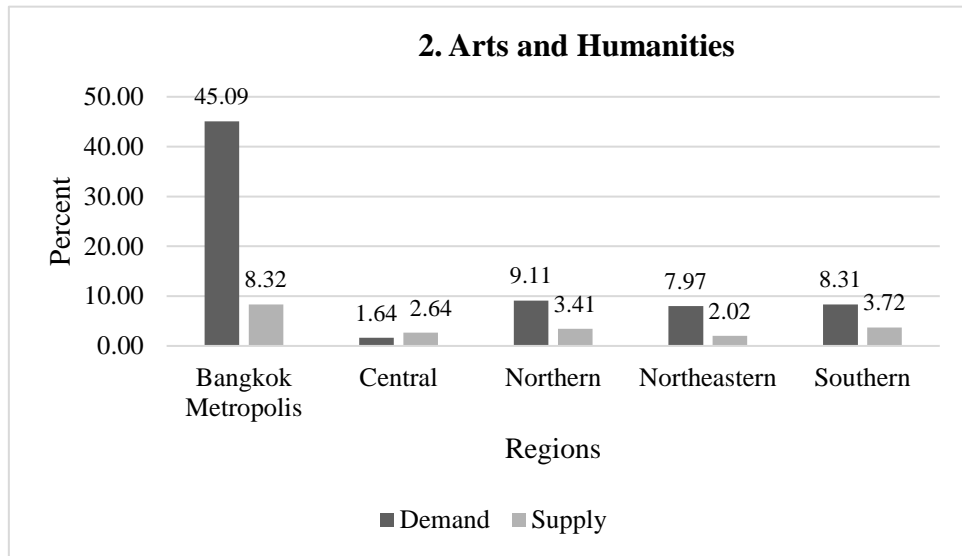
Figure 8 The labor demand and supply in the fields of Arts and Humanities

Figure 8 shows that there is horizontal mismatch problems where labor demand does not match with labor supply in the fields of Arts and Humanities in Bangkok Metropolis. We find that 45 percent of job posts are in this field, while only 8 percent of workers graduate with a humanities degree.

Figure 9 The labor demand and supply in the fields of Social Sciences, Business, and Law

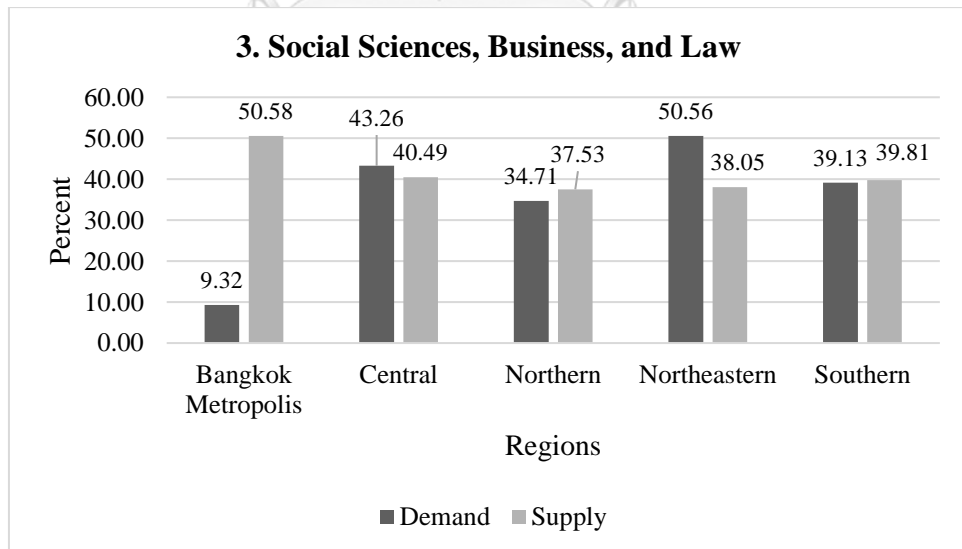In the fields of Social Sciences, Business, and Law from Figure 9, the labor demand is close to the labor supply in each region. However, in Bangkok the demand for bachelor degree graduates is about 9 percent of job ads, which lower than the new graduates, which is about 50 percent. The supply seems larger than the demand in the northeastern region.
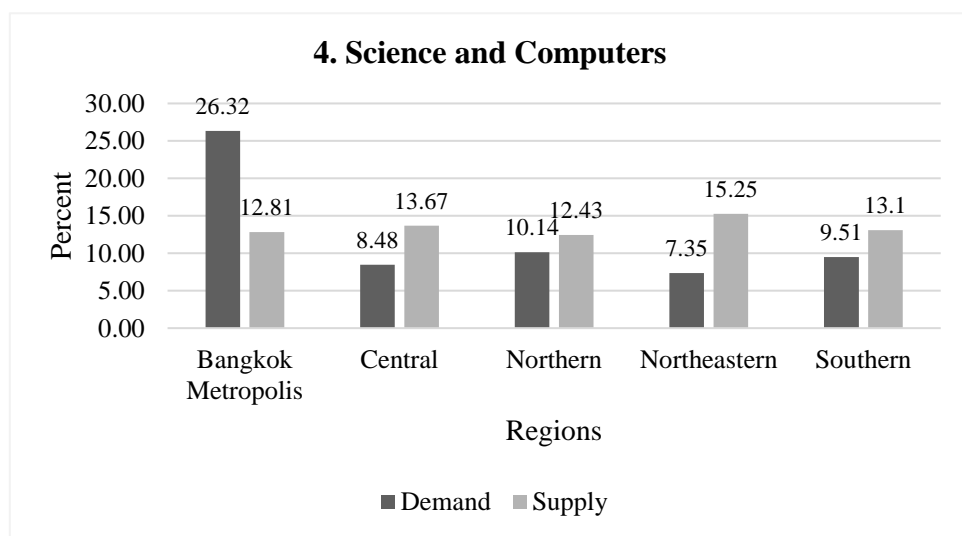
Figure 10 The labor demand and supply in the fields of Science and Computers

From Figure 10, the labor demand is close to the labor supply in each region. But in Bangkok Metropolis, the demand for bachelor degree graduations about 26 percent is higher than the new graduated workers about 13 percent which is the labor shortage problem in this field.

5. Engineering and Manufacturing
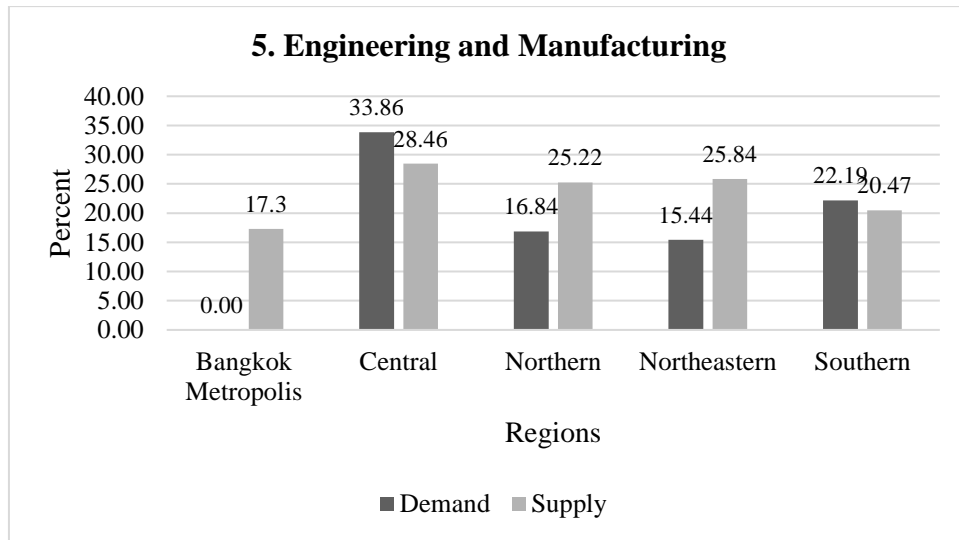
Figure 11 The labor demand and supply in the fields of Engineering and Manufacturing

In the fields of Engineering and Manufacturing from Figure 11, the labor demand is close to the labor supply in each region. However, in Bangkok Metropolis there is no demand for bachelor degree graduates but still has the labor supply about 17 percent.

6. Agriculture and Veterinary Science
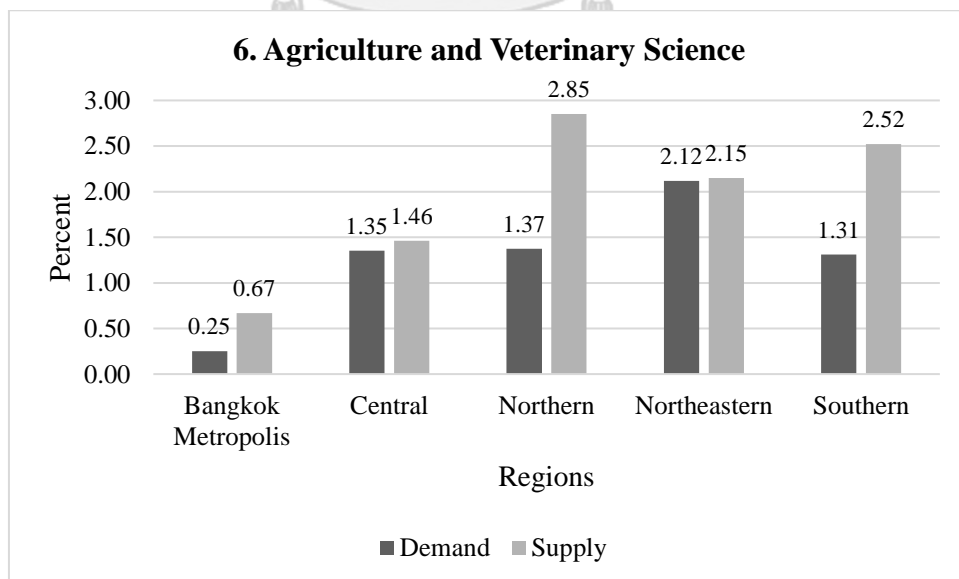
Figure 12 The labor demand and supply in the fields of Agriculture and Veterinary Science

For the fields of Agriculture and Veterinary Science following the Figure 12, the labor demand is close to the labor supply in each region, but in the northern and southern regions there is less demand for bachelor degree graduates at about 1 percent compared to labor supply at about 3 percent.
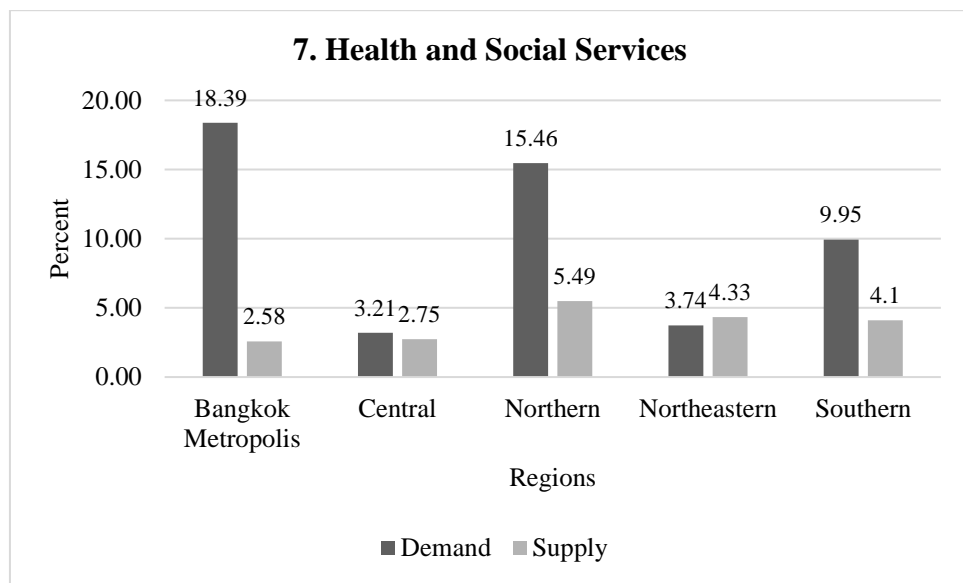
Figure 13 The labor demand and supply in the fields of Health and Social Services

There is a difference is matching between demand and supply of workers in Health and Social Services in Bangkok, Northern, and Southern regions. There seems to be a shortage of worker in Health and Social Services in most regions in Thailand.

8. Personal Services, Transport, and Environmental Protection
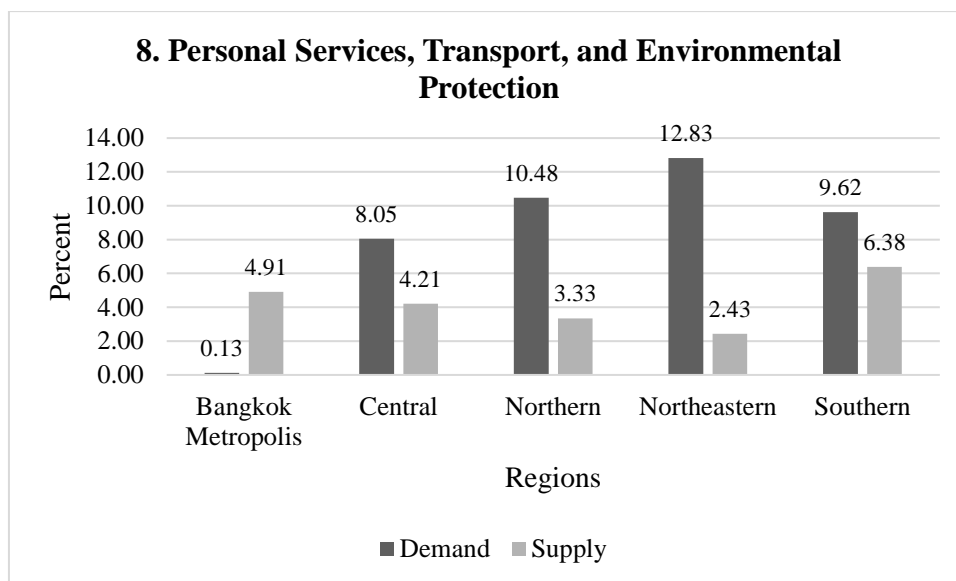
Figure 14 The labor demand and supply in the fields of Personal Services, Transport, and Environmental Protection

From Figure 14 shows that there is the difference of matching between demand and supply labor in the fields of Personal Services, Transport, and Environmental Protection in each region with the exception of Bangkok.

From the results of horizontal mismatch, we fine the most degree mismatch in Bangkok. Next are respectively northern and southern regions. We need more graduates in Bangkok in the fields of arts and humanities, Science and Computers, and Health and Social Services. In the central region, we need more graduate workers in Engineering and Manufacturing and Personal Services, Transport, and Environmental Protection. In the north, we need more graduates in Arts and Humanities, Health and Social Services, Personal Services, Transport, and Environmental Protection degrees. In the northeastern, we need Social Sciences, Business, and Law, and Personal Services, Transport, and Environmental Protection degrees. In the southern region, we need Arts and Humanities, Engineering and Manufacturing, Health and Social Services, Personal Services, Transport, and

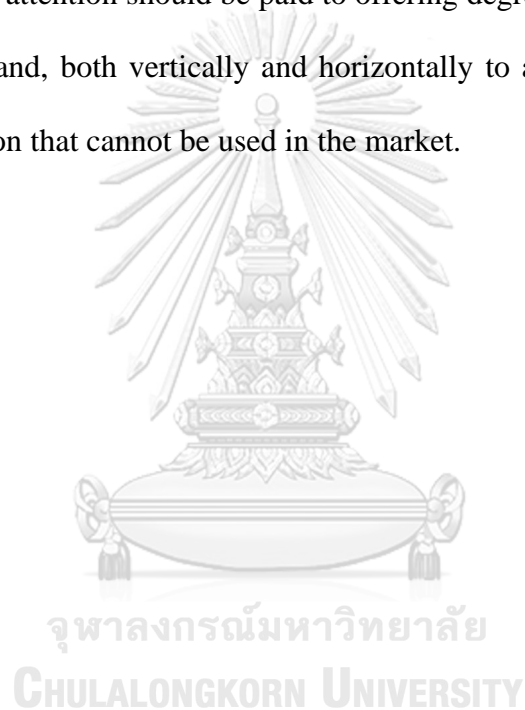Environmental Protection degrees. The analysis suggests that the fields of Social Sciences, Business, and Law has too many graduates in the labor market. In Bangkok, the supply is higher than demand in Personal Services, Transport, and Environmental Protection degrees and there are demand higher than supply in Social Sciences, Business, and Law, and Science and Computers degrees, which difference from others regions.

Conclusions and Suggestions

Provinces with Rajabhat universities have a higher incidence of bachelor's degrees than provinces without universities. This suggests that expanding public higher education across the provinces increases access to university degrees. Although there is an association between access to universities and the probability of earning a bachelor's degree, overeducation is not more prevalent in provinces with universities. However, in the provinces with the research universities. The worker who live near Bangkok have more opportunity to face overeducation and there is the different of the probability of overeducation in 2015 and 2016. The overeducated workers have higher wage penalties than provinces without universities. There is no difference of the number of universities in each province with universities. Finally, we find most horizontal mismatch in Bangkok Metropolis. In the fields of Personal Services, Transport, and Environmental Protection has the highest incidence of horizontal mismatch. There are labor shortage problems in the fields of Engineering and Manufacturing in Bangkok Metropolis, in the fields of Agriculture and Veterinary Science in northern and southern regions, in the fields of Personal Services, Transport, and Environmental Protection in Bangkok Metropolis. And the others have

demand for bachelor degree (labor demand) match with the new graduated workers (labor supply) and there is no difference in the province with and without universities.

From the results, we see that the areas that have universities can increase people's opportunities to study in higher education. Thus, the related department of education should take an active role to develop universities in areas that do not currently have access. And the result shows the labor shortage in each degree by regions. However, attention should be paid to offering degrees that are consistent with labor market demand, both vertically and horizontally to avoid large investments in university education that cannot be used in the market.

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