รายงานวิจัยฉบับสมบูรณ์

ความสำเร็จในอาชีพระหว่างสายสามัญและสายอาชีพ

A Comparison of Career Success
Between Graduates of academic and vocational education

ดร. อรรฆยา เซ็นเครือ

ภาควิชาเศรษฐศาสตร์

คณะบริหารธุรกิจ เศรษฐศาสตร์และการสื่อสาร

สนับสนุนโดย

งบประมาณรายได้มหาวิทยาลัยนเรศวร

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Executive Summary

1. Introduction

Today, around 60 per cent of students follow the general education programs. The ratio between general graduates and vocational graduates is 65:35 in 2008 (Table 1). The labor market has faced the problem of labor shortage in vocational education, that is, firms face excess demand for vocational workers. The government has realized the importance of this matter and undertook various strategies attempting to improve the number and the quality of vocational education graduates, especially in the field of science and technology. Given the urgency of the issue, successive governments have made great efforts to rebalance the imbalance with measures to promote vocational education enrollments and achieve targeted ratio between vocational and academic graduates of 60:40.

The issue of economic returns associated with two diverse upper-secondary educational tracks (AE and VE) evokes questions of whether a relation exists between certain labor-market outcomes and a chosen educational track; and whether the outcomes are more favorable to one educational track over the other.

Empirical works about earnings between vocational and academic education in Thailand are available (Moenjak and Worwick, 2003; Srinang, 2014) and found that the return to schooling for upper secondary vocational graduates are higher than for upper secondary general graduates. Surprisingly, although vocational graduates receive higher returns than academic graduates, there is still a shortage of vocational graduates in Thailand. This paper added other labor market outcomes, unemployment risk and below-average income risk, to find out the reasons why more student continue to study general education than vocational education in Thailand.

2. Objectives

This research investigates the influence of upper-secondary educational tracks: academic (AE) and vocational education (VE), on three labor-market outcomes: unemployment risk, monthly earnings and below average-income risk, using regression models. The research utilizes the 2010 - 2015 Labor Force Survey data by the National Statistical Office of Thailand.

The research samples are individuals aged 15 – 60 years who graduated upper secondary education and whose information on parental education is available.

3. Methodology

This research used the 2011 - 2015 Labor Force Survey (LFS) data by the National Statistical Office (NSO) of Thailand. This paper was focused on individuals aged 15-60 years at the time of survey. The samples used in the first-step probit analysis were restricted to those individuals who reported having upper-secondary vocational or upper-secondary general education as the highest level of education, with complete parental education data. In the second-step evaluation of the earnings and below-average-income risks, the samples were further restricted to those who reported their earnings and were employed at the time of survey.

4. Research Result

The unemployment risk of the VE graduates was higher than that of the AE graduates in the unemployment risk model. This could be explained by the nature of academic education that emphasizes the general skills, which results in more job opportunities for the AE graduates, as opposed to vocational education which emphasizes the specific work skills.

In the earnings model, the monthly income of the vocational graduates was higher than that of the academic graduates. More specifically, the VE graduates' earnings were 10% higher than the AE graduates', consistent with Moenjak & Worwick (2003); Srinang (2014); Hawley (2004). The regression of the income risk model showed that the vocational graduates were less likely to suffer from the below-average-income risk. This could be explained by the readily-deployable skills of the vocational graduates.

5. Suggestions

Due to the nature of vocational education which emphasizes the specific work skills, the VE graduates had a higher unemployment risk than the AE. However, the VE graduates earned more than the AE graduates, at the same level of education. To attract more lower-secondary students to pursue upper-secondary vocational education, the government and other stakeholders, including the Ministry of Education, vocational institutions, school alumni, and
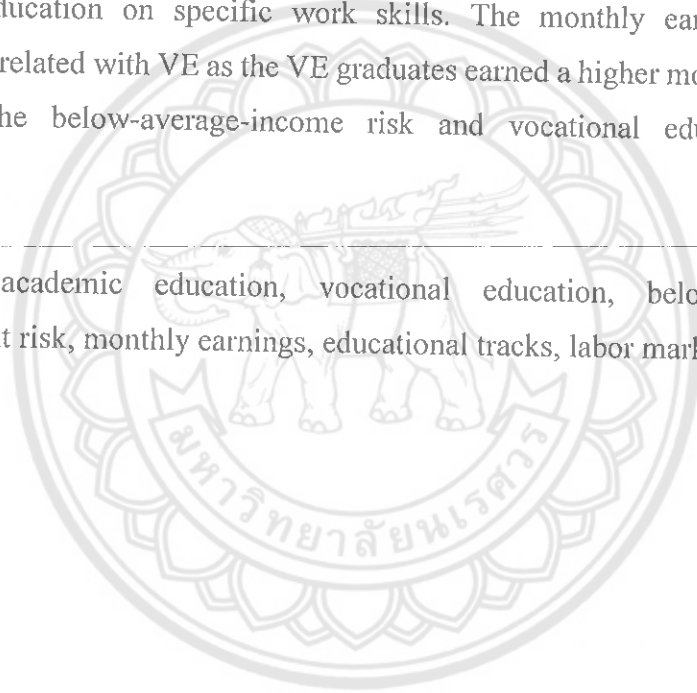
the media, must address the issue of street brawls. In addition, vocational curriculum should be routinely reviewed and updated to improve the quality of VE graduates to meet changing labor-market demands through a school-and-private sector collaboration. This would improve the perception of the general public toward vocational education. The public should also be made more aware of the higher economic return of vocational education.

ABSTRACT

This research investigates the influence of diverse upper-secondary educational tracks: academic (AE) and vocational education (VE), on three labor-market outcomes: unemployment risk, monthly earnings, and below-average-income risk. The research used the 2011 – 2015 Labor Force Survey data by the National Statistical Office of Thailand. The samples were upper-secondary graduates aged 15 – 60 years with complete parental education data. The probit result showed that individuals with tertiary-educated parents were more likely to pursue vocational education. After correcting for self-selection, the regression result indicated that vocational education was significantly positively correlated with the unemployment risk. More specifically, the unemployment risk was higher for VE graduates due to the emphasis of vocational education on specific work skills. The monthly earnings were significantly positively correlated with VE as the VE graduates earned a higher monthly income than the AE graduates. The below-average-income risk and vocational education were negatively correlated.

Keywords: academic education, vocational education, below-average-income risk, unemployment risk, monthly earnings, educational tracks, labor market outcomes

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Chapter 1

Introduction

1.1 Introduction

Education is crucial to a country's social, economic, cultural and technological development. In Thailand, compulsory education consists of six years of primary education (grades 1-6) and three years of lower secondary education (grades 7-9). Upper secondary education (grades 10-12) is optional and subsidized whereby learners are presented with two alternative educational tracks: academic and vocational education. Specifically, upon completing lower secondary education, students who wish to further their study could pursue either one of the two upper secondary educational tracks: academic (AE) and vocational education (VE). Figure 1 illustrates the education system in Thailand.

In essence, primary education aims to develop basic skills in literacy and numeracy in young children and to assist them in developing an understanding of the world, thereby enabling them to live harmoniously and participate as active members in society. Secondary education meanwhile is to equip learners with knowledge and skills appropriate for their ages, needs, interests and aptitudes. Technical and vocational education (TVE) begins at the senior high school grade where students are divided into either general or vocational education. Vocational education tends to have some theoretical training but mostly hands-on training. Academic education, on the other hand, focuses on reading material, being told information, and discussing material in groups.

Today, around 60 per cent of students follow the general education programs. The ratio between general graduates and vocational graduates is 65:35 in 2008 (Table 1). The labor market has faced the problem of labor shortage in vocational education, that is, firms face excess demand for vocational workers. So, the government is endeavouring to achieve an equal balance between general and vocational education. Chalamwong, Y. (2011) has revealed that there will be an increase in demand for labor with vocational education. More than 200,000 workers will be needed, especially in the area of science and technology over the next five years due to expansion in industries such as automotive and parts, where there are plans to double their production capacity in this country. The government has realized the importance of this

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matter and undertook various strategies attempting to improve the number and the quality of vocational education graduates, especially in the field of science and technology. Given the urgency of the issue, successive governments have made great efforts to rebalance the imbalance with measures to promote vocational education enrollments and achieve targeted ratio between vocational and academic graduates of 60:40.

The low enrollments in VE programs in Thailand are attributable to: (1) poor reputations associated with small groups of Thai vocational students who often engage in mass street brawls between rival schools, which acts as a deterrent to parents to enroll their offspring in VE programs; (2) higher social status attached to academic education in relation to vocational education; (3) a "misguided" preconception that AE investment returns are higher than those of VE.
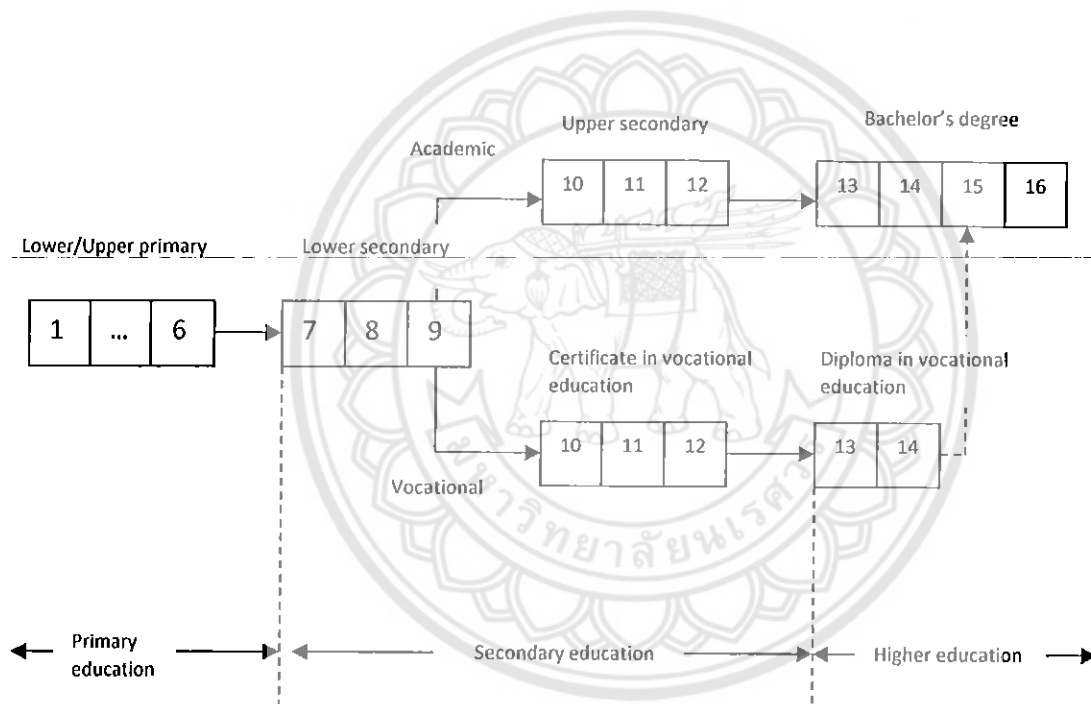
Figure 1 Schematic of Thailand's educational system

Table 1 The number and ratio of upper-secondary graduates to vocational graduates

year	number of upper-secondary graduates			percentage of academic graduates	percentage of vocational graduates
	academic	vocational	total		
1992	125,886	117,670	243,556	52	48
1993	136,191	129,011	265,202	51	49
1994	150,083	138,981	289,064	52	48
1995	173,082	153,000	326,082	53	47
1996	197,286	170,202	367,488	54	46
1997	243,526	176,965	420,491	58	42
1998	277,128	193,136	470,264	59	41
1999	295,213	206,145	501,358	59	41
2000	332,028	170,499	502,527	66	34
2001	347,169	145,980	493,149	70	30
2002	352,324	170,104	522,428	67	33
2003	344,860	160,910	505,770	68	32
2004	325,424	142,510	467,934	70	30
2005	319,250	158,943	478,193	67	33
2006	316,277	160,250	476,527	66	34
2007	306,821	163,152	469,973	65	35
2008	308,103	167,994	476,097	65	35

Source: www.nesdb.go.th

The issue of economic returns associated with two diverse upper-secondary educational tracks (AE and VE) evokes questions of whether a relation exists between certain labor-market outcomes and a chosen educational track; and whether the outcomes are more favorable to one educational track over the other. According to Psacharopoulos (1994), a tertiary education offers more advantages over a lower-level education, particularly in economic returns. Nevertheless, recent research reveals that returns on education vary between different types of

education, even in the same education level. Weber (2003), El-Hamidi (2006) and Sakellariou (2003) reported higher returns on education for vocational than academic graduates. Bennell (1996a, 1996b) documented higher rates of return on vocational education than general education and refuted existing presumptions that academic education generates a higher return than vocational study. In addition, Lauer & Steiner (2001) and Teal & Kahyarara (2008) found higher labor market returns for academic education than for vocational education in Germany.

Specifically, this research investigates the influence of upper-secondary educational tracks: academic (AE) and vocational education (VE), on three labor-market outcomes: unemployment risk, monthly earnings and below average-income risk, using regression models. The research utilizes the 2010 - 2015 Labor Force Survey data by the National Statistical Office of Thailand. The research samples are individuals aged 15 – 60 years who graduated upper secondary education and whose information on parental education is available.

1.2   Background : The importance of education in promoting growth

In Thailand the past economic performance was driven primarily by rapid accumulation of physical capital, gains in labor, and favorable institutional and policy environments. With aging population, Thai economy instead has derived its growth from productivity improvement. According to the human capital theory, investment in human capital leads to productivity improvement and eventually economic growth. Besides, there exist many forms of investment in human capital, some of which are formal education, on-the-job training, health, and migration.

Most studies attach great importance to formal education as a major determinant of productivity improvement. Ammar et. al. (2011) states that education is an important factor in society, economy, and politics. In addition, education is believed to reduce income inequality in the long run. Nipon et al. (2011) state that education embodies both individual and social benefits. Individual benefits are reflected in the form of higher earnings, and on the social benefits education can generate positive externalities in that: (1) there are social connections among employees in the same industry whereby low-educated workers who work in an industry with a large number of high-educated workers would have higher productivity than low-educated workers who work with few high-educated workers; (2) a city with a concentration of

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high-educated residents will have high economic growth (Lucas, 1988); (3) technology-intensive investment is higher in the city heavily populated by highly educated individuals; and (4) there are non-monetary benefits associated with education, e.g., good health, low poverty, and low crime rate.

Investing in education is crucial to greater productivity, growth, and technological development. Compulsory education, a period of education (9 years) that is required of every person, is divided into 6 years of primary education (Pratom1-6) followed by 3 years of lower secondary (Matthayom 1-3). Free education is extended to upper secondary education (Mattayom 4-6). Primary education aims to develop basic skills in reading, writing, and arithmetic in young children as well as to assist them in developing an understanding of the world around them, enabling them to live harmoniously and participate as active members in society. So, governments throughout the world should make education compulsory for all children. Secondary education is designed to provide students with knowledge and working skills suitable for their ages, needs, interests, and aptitudes. Students who have completed the lower level of secondary education and wish to continue their studies may do so at the upper secondary level or at vocational schools.

Students at vocational schools typically receive more hands-on, career-minded education than students at traditional schools. Individuals are given the opportunity to explore and identify potential career goals, and are provided with the resources needed to achieve them. University education is available to students who have completed the upper secondary level of education (Table 2). University education leads to an increase in earning capacity, a broader range of opportunities, and a more rewarding career.

The Ministry of Education reports that in 2013, roughly 11.2 million children were enrolled in basic education from pre-school to upper secondary level: 1.8 million in pre-primary education, 4.9 million in primary education and 4.5 million in secondary education (Office of the Permanent Secretary, 2014). In 2013, 2.41 million students attended some form of higher education, 90% of them in undergraduate programmes (Table 3).

Employers prefer university graduates because a higher educational qualification generally demonstrates the skills and qualities valued by them. UNESCO/OECD (2002) states that tertiary education being the best level of education for economic growth even though income inequality will increase in the future. Chaiyuth (2008) reports that education has

different external effects varying with the level of education. That is, the external benefit of investing in tertiary education is the growth in economy as highly-educated workers are innovative and able to absorb new technology with ease. At the other end, investment in primary education has a poor effect on economic growth but its strongest values lie in non-monetary benefits, e.g., good health and low crime rates.

There is extensive evidence of the economic benefits of investing in higher education. Individuals who attend higher education have higher average earnings, are more employable, and are less likely to experience poverty than individuals without higher education. Moreover, higher education generates economic benefits to society. Countries with a large labor force of individuals with higher education have higher productivity and higher tax receipts, thereby lowering dependence on public welfare programs. In addition to economic benefits, higher education provides several social benefits. Individuals with higher education tend to have higher standards of living and better well-beings. They also tend to be healthier and are less likely to smoke nor engage in criminal activities. The benefits of higher education extend across generations, i.e., children of parents with higher education are more exposed to reading, have higher cognitive skills, and are better able to concentrate. Finally, higher education promotes nation building because citizens with higher education are more likely to vote, to donate blood, and to participate in community service (World Bank, 2012).

The past Thai government was aware that tertiary education could improve the country's competitiveness and thereby reduce income inequality in the long run. The then Ministry of University Affairs thus in 1992 devised and implemented the national education plan together with the first long-term higher education plan (1990-2004). The emphasis of the two plans was on greater access to higher education by the general public.

Table 2 Definitions of Thai Education System

| Level of education	Duration	Description
Pre-elementary level	2-3 years	Aim to nurture and prepare physical, mental, intellectual and emotional skills for students for their further movement on to the elementary education.
Elementary Level (Grade 1 to Grade 6)	6 years	Puts emphasis on basic literacy and numeracy skills and cultivates desirable behavior in student.
Lower Secondary Level (Grade 7 to Grade 9)	3 years	Gears toward developing the students' ethics, knowledge and abilities. Allows the students to explore their needs, areas of interests and aptitudes and enables them to meet their appropriate careers.
Upper Secondary Level (Grade 10 to Grade 12)	3 years	Aim to prepare student to meet the labor market and to promote their entrepreneurship skills. At this stage, students can choose to further study between two tracks 1)Vocational-oriented provided in vocational and technical college for the student who are good at skills 2)Academic track is offered in general education schools for the students who are academically inclined.
Diploma Level	4 years	School offer course for the students who have completed upper secondary education. Aim to develop the learners' knowledge and vocational skills at the semi-skills level and to enable them to initiate their entrepreneurships.

Level of education	Duration	Description
Undergraduate Level	4-6 years	The students, who have completed upper secondary education, take entrance examination and attend course for their Bachelor's degree. As for the students who have been given diploma, after passing entrance examination can take a two year course to pursue their first degree in higher technological and educational institutions.
		Aims to the students' abilities and encourages them to apply theories to a reality of the nation's development so that they can bring their country up to the international challenges.
Graduate Level	1-3 years	Graduate degree offers courses to the learners at the graduate diploma, master degree and doctoral degree levels.
		Aims at stimulating students to specialize and bring theories to practices. The learning process focuses on the learners' broader vision and better perspectives for looking at the world and bringing the nation to the international competition.

Source: Srinang (2014)

Table 3 Number of students in public and private institutions by level of education, 2013

Level of Education	All students	Public schools	Private schools
Total	13,606,743	10,852,675	2,754,068
Pre-primary	1,749,196	1,128,040	621,156
Primary	4,905,460	3,866,397	1,039,063
Lower Secondary	2,391,390	2,080,249	311,141
Upper secondary	2,144,118	1,738,422	405,696
General	1,442,186		
Vocational	701,398		
Other	2,534		
Undergraduate and lower	2,186,822	1,838,428	348,394
Graduate degree	229,757	201,139	28,618

Source: Education in Thailand, UNESCO/OECD (2016)
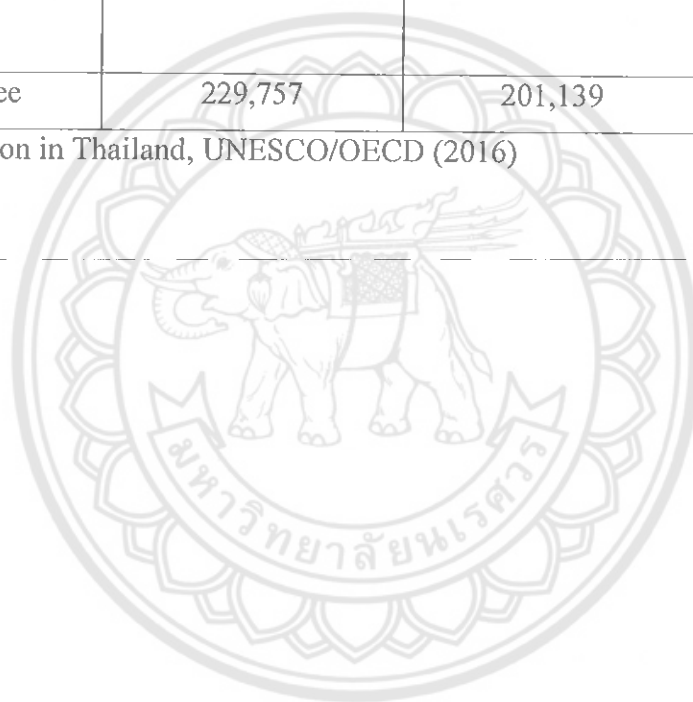
Chapter 2

Literature Review

This chapter reviews empirical studies deem relevant to the scope of this study. The first section provides factors affecting educational choices between academic and vocational education. The second section reviews how educational tracks (academic or vocational education) affect 3 labor market outcomes: wages, unemployment risk, and below-average income risk.

2.1 Factors affecting educational choices between academic and vocational education

Family backgrounds have been of great important in shaping the performance of children in schools worldwide. The relationship between parental resources on the academic performance of children has received a great deal of attention in the economic literature. For instance, a study by Pamela and Kean (2010) stated that those students whose parents had a tertiary level of education performed, significantly better in tests of science, reading and mathematical ability than do those whose parents had only basic schooling. Thus, family background also has an impact on child's educational choices.

Parental influences are parent's educational level, income level, and occupational level. The parental influence is statistical significant that impact on students' decision towards vocational education (Ayub, 2017; Khan et. al., 2015; Haveman et. al., 1991; Altinok, 2011). The analysis shows that children of parents with lower socio-economic status (lower economic, educational and occupational background) are more likely to get vocational education compared to children of parents with higher education. The opposite results (Moenjak and Worswick, 2003) show that parent's higher economic status positively influences children's probability to choose vocational education. Children having father in a white collar or a blue collar occupation significantly increases the probability of undertaking vocational education, compared to menials such as farmers or service providers. Also, father's educational attainment being higher than primary level significantly increases the probability of undertaking vocational education. In some studies (Lavendets et al., 2012) concluded that parent's place of living has an impact on their children for selection vocational education.

Ayub (2017) studied parental influence and attitude of students towards technical education and vocational training in Pakistan. The results of this study reveals that parental influence is statistical significant that impact on students' decision towards Technical Education & Vocational Training.

Khan et. al. (2015) focused the influence and impact of parent educational level on student academic achievement at secondary level of education in the District Rajanpur, South Punjab. The research found significant positive relationship between parents education level and academic achievements of students

Haveman et. al. (1991) demonstrated that children who grow up in a low-income family typically have lower educational achievements and, subsequently, lower returns to education than children who grow up in a wealthy family. The paper used mother's education to represent family background and found that the mother's education usually has a positive effect on educational returns of a child.

Altinok (2011) compared the intake of general and vocational education across countries and found that pupils with high socio-economic status tend to be significantly more enrolled in general education. Socio-economic background is measured by the PISA index of economic, social and cultural status (ESCS). This index captures a range of aspects of a student's family and home background that combines information on parents' education and occupations and home possessions.

Lavendets (2012) studied the influence of socio-demographic characteristics on vocational education in Latvia. The study showed that pupils' path of transition to VET depend on pupils' gender, programme enrolled, pupils' and their parents' country of origin and pupils' place of living.

The number of household members also has an impact on educational choices, vocational or academic education. Moenjak and Worwick (2003) found insignificant relationship between the decision to study vocational education and the numbers of family's members. More specifically, the presence of young siblings in the household affects women by positively influencing their decision to join vocational education; whereas the effect on men is insignificant. (El-Hamidi, 2006).

Geographical location is one factor affecting educational achievement. Students from non-metropolitan areas are more likely to have lower educational outcomes in terms of academic performance and retention rates than students from metropolitan areas (Cheers, 1990). More specifically, children raised in a more prosperous region of the country (the middle region or Bangkok) significantly increases the probability of undertaking vocational education (Moenjak and Worswick, 2003).

Educational performance at school has also been found to vary according to the students' sex (Horne, 2000). In particular, Males were more likely than females to become a vocational concentrator – that is, whether or not a student earned at least three credits in a single occupational area during high school.

2.2 How educational tracks affect 3 labor market outcomes

Most educational systems around the world contain both a general and a vocational component of secondary schooling. But there is remarkable diversity in the emphasis on general versus vocational education across different countries. The debate on the relative benefits of upper secondary vocational education and of general education is still ongoing. While this area of research has been very active in the United States and industrialized countries in recent years. Empirical works about earnings between vocational and academic education in Thailand are available (Moenjak and Worwick, 2003; Srinang, 2014) and found that the return to schooling for upper secondary vocational graduates are higher than for upper secondary general graduates. Surprisingly, although vocational graduates receive higher returns than academic graduates, there is still a shortage of vocational graduates in Thailand. This paper added other labor market outcomes, unemployment risk and below-average income risk, to find out the reasons why more student continue to study general education than vocational education in Thailand.

2.2.1 Wages

One of the most measurable returns on investments in education is the level of income. According to Goldberg and Smith (2007), the annual earnings or the hourly wage depends, in a linear way, on the years of schooling. Education has a positive impact on incomes (Soloman

and Fagano, 1997). An explanation for this fact is brought by Edgerton, Roberts and von Bellow (2012) who argue that a higher level of education raises workers' productivity.

For many years, vocational education in upper-secondary schools has been perceived as inferior to general education. Many studies in this field, examining the effects of secondary-vocational education, found few or no economic benefits (e.g. Gustman and Steinmeier 1983; Hotchkiss 1993; Neuman and Ziderman 1999). However, some researchers consider vocational education to be an educational alternative to general secondary schooling. Neuman and Ziderman (1999) described vocational education as a 'framework for improving life-outcomes of unemployed youth and other social groups with special needs'. However, based on Israeli data, they found only a small difference in earnings between the vocational and academic graduates. More encouraging data was found by Bishop and Mane (2004), who noted that the return to secondary vocational education in the United States has been growing since the 1980s.

A lot of literatures (Psacharopoulos,1987; 1994; Dearden et. al.,2000) have found that general secondary education offered higher social rates of return, largely because of the high unit cost of providing vocational education. However, some studies (Chung, 1990; El-Hamidi, 2006; Backes-Gellner and Geel, 2014; Strawinski et. al., 2016) found the conflicting results. That is, the wages of vocational high school graduates are larger than those of general high school graduates. In Indonesia, the study found that the returns to vocational and general education are about the same (World Bank, 1995). The study in Thailand found higher rate of return to vocational than to general secondary schooling in Thailand (World bank, 1990; Moenjak and Worswick, 2003; Hawley, 2004; Srinang, 2014).

Psacharopoulos (1987) provided evidence that the rate of return to investments in general curricula in much higher than that in vocational program.

Psacharopoulos (1994) reviewed studies where returns to general secondary schools are higher than those to vocational track and stressed that the difference in social rates of return is more dramatic because of the much higher unit cost of vocational education.

Dearden et. al. (2000) studied returns to academic and vocational qualifications in Great Britain and found that The additional returns associated with academic qualifications, taking no account of the time taken to acquire such qualifications, are typically higher than those associated with vocational qualifications at the same level.

Chung (1990) studied in Hong Kong and found higher earnings for vocational than for general education.

El-Hamidi (2006) studied earnings between general and vocational education in Egypt. He concluded that vocational schooling has produced higher wages and returns on investment than general education.

Backes-Gellner and Geel (2014) studied earnings between vocational and academic education in Switzerland and found higher average wages for vocational graduates at career entry. However, higher average wages disappear at later career stages.

Strawinski et. al. (2016) studied returns to vocational education in Poland and concluded that vocational education graduates have, on average, a higher probability of finding a permanent job, and secondary-vocational education graduates receive higher earnings than secondary general education graduates in Poland.

World Bank (1995) found that returns to vocational and general education are about the same, and former is more expensive than the latter in Indonesia.

World Bank (1990) found higher social rate of return to vocational than to general secondary schooling in Thailand.

Moenjak and Worswick (2003) used data from Thailand's Labor Force Survey for the years 1989 to 1995 inclusive. Their paper investigated the factors that influence an individual's choice between two types of education and then estimate the relative returns to the two types of education using a self-selection corrected earnings model. They found that vocational education gives higher earnings returns than general education does.

Hawley (2004) used Thailand's Labor Force Survey and found that vocational education provide higher returns than general education does.

Srinang (2014) used the concept of a Mincerian earning function to find the difference in rate of return to upper-secondary vocational education and upper-secondary general education in each region in Thailand for the year 2001 and 2011. The result showed that the return to schooling for upper-secondary vocational school graduates are higher than for secondary general school graduates. The region that has the highest return gap between the two different tracks of education is the Northwest, while Bangkok has the lowest return gap.

2.2.2 Unemployment risk

Most studies (Laura DIACONU, 2014) have found the higher the level of education, the better the chances of employment. More specifically, vocational education reduces the risk of youth unemployment in Russian region (Blinova et.al., 2015) . Lower unemployment rate is observed among vocational high school graduates than among general high school graduates (Backes-Gellner & Geel, 2014). In an influential paper, Ryan (2001), summarizes the cross-country evidence, indicating that vocational programmes, and in particular apprenticeships, increase the chances of an early working life.

On the other hands, some studies (Brauns et.al., 1999) found opposite result. In German, education plays a negligible role for risk of unemployment, which is more tied to features of employment positions.

Ryan (2001) studied 7 advanced economies, France, Germany, Japan, the Netherlands, Sweden, the UK and the US. The research has concluded that as for vocational education in general, apprenticeship appears to increase the employment content of early working life.

Laura DIACONU (2014) studied education and labor outcomes in Romania. The research stated that the higher the level of education, the better the chances of employment. We noticed that the highest percentage of employment can be found with university graduates.

Blinova et.al. (2015) aimed to perform an empirical analysis of the factors affecting the reduction of youth unemployment in Russian region and found that vocational education reduces the risks of youth unemployment in Russian regions.

Backes-Gellner and Geel (2014) studied unemployment risk between graduates of vocational and academic tertiary education in Switzerland. The research found equal unemployment risk at career entry and lower risk of unemployment for vocational graduates at later career stages.

Brauns et.al. (1999) investigated youth unemployment in France, the United Kingdom and West Germany as these three countries differ greatly with regard to major institutional characteristics of their education systems and labor markets. After initial employment has been found, education plays a negligible role for the risk of unemployment which is much more tied to features of employment positions.

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2.2.3 below-average income risk

This paper accounts for differences in risk in the labor market by examining variation in earnings which reflects the financial risks associated with these financial returns. Backes-Gellner and Geel (2014) studied how the type of tertiary education influence the income risk differently at career entry and subsequent career stages. They used variance in earnings to investigate an income risk and find lower income variance for vocational education graduates than for academic graduates. Some studies (Christiansen, Joensen, and Nielson (2007); Hartog & Vijverberg (2007) analyze the trade-off between risk and return and find the positive relationship.

Chapter 3
Theoretical Background

Human capital theory has been proposed by Schultz (1961) and developed extensively by Becker (1964). Schultz (1961) observes that increases in national output have been large compared with the increases of land, man-hours, and physical reproducible capital while there is unexplained large increase in real earnings of workers. Investment in human capital is probably the major explanation for this difference.

Both Schultz (1961) and Becker (1964) argue that formal education is the main activity which can improve human capital. Other activities which can also improve human capital are on-the-job training, emotional or physical health, migration, etc. Education raises an individual's productivity in the workplace and higher productivity leads to higher earnings. Education has little direct effect on earnings; it operates primarily indirectly through the effect on knowledge and skills. Education develops skills. Skills can be either general or specific (Becker, 1964). Schultz (1975) explained that education enhances a worker's ability to deal with disequilibria and eventually increases productivity.

Mincer (1974) stresses the importance of education on earnings. Investments in people are time consuming. Each additional period of schooling postpones the time of the individual's receipt of earnings and reduces the span of his working life if he retires at a fixed age. The deferral of earnings and the possible reduction of earning life are costly. These time costs plus direct money outlays make up the total cost of investment.

There are four assumptions under the Mincer's schooling model. One, all investment costs are time costs. Two, each additional year of schooling reduces earning life by exactly one year. Three, there exists no depreciation. Four, no further human capital investments are undertaken after completion of schooling so the flow of individual earnings is constant throughout the working life. The present value of an individual's lifetime earnings at start of schooling is

$$V_s = Y_s \sum_{t=s+1}^{n} \left[\frac{1}{1+r}\right]^t \tag{3.1}$$

where V_s is the present value of an individual's lifetime earnings at start of
schooling

Y_s is annual earnings of an individual with s years of schooling

n is the length of working life plus length of schooling or the length of working life for persons without schooling

t is time in years = 0,1,2,....,n

d is the difference in the amount of schooling, in years

e is the base of natural logarithms

r is the discount rate

When the discounting process is discrete and the process is continuous:

$$V_s = Y_s \int_s^n e^{-rt}\, dt = \frac{Y_s(e^{-rs} - e^{-rn})}{r} \tag{3.2}$$

Similarly, the present value of lifetime earnings of an individual who engages in s-d years of schooling is:

$$V_{s-d} = \frac{Y_{s-d}(e^{-r(s-d)} - e^{-rn})}{r} \tag{3.3}$$

The ratio, $k_{s,s-d}$, of annual earnings after s years to earnings after s-d years of schooling is found by letting $V_s = V_{s-d}$

$$V_s = V_{s-d}$$

$$\frac{Y_s(e^{-rs} - e^{-rn})}{r} = \frac{Y_{s-d}(e^{-r(s-d)} - e^{-rn})}{r}$$

$$k_{s,s-d} = \frac{Y_s}{Y_{s-d}} = \frac{e^{-r(s-d)} - e^{-rn}}{e^{-rs} - e^{-rn}} \tag{3.4}$$

Multiply e^{rn} both nominator and denominator, we get

$$\frac{Y_s}{Y_{s-d}} = \frac{e^{r(n+d-s)} - 1}{e^{r(n-s)} - 1} \tag{3.5}$$

3 conclusions can be reached from equation (3.5): one, people with more schooling command higher annual pay. The first difference of equation (3.5) is greater than zero. Take first difference equation (3.4) with respect to s,

$$\frac{\partial k}{\partial s} = \frac{r[e^{r(n+d-s)} - e^{r(n-s)}]}{[e^{r(n-s)} - 1]^2} > 0 \tag{3.6}$$

Two, the difference between earnings of individuals due to the difference in investment d years of schooling is larger the higher the rate of return on schooling. Three, the difference is larger the shorter the general span of working life.

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Educational tracks (general or vocational education) has an impact on an individual's human capital. According to Becker (1964), human capital could be categorized into general and specific human capital, indicating that diverse types of human capital contribute unequally to organizational productivity. In terms of education, occupationally-oriented education (i.e. vocational education) offers more readily deployable skills, in comparison with general education (Academic education). Such is attributable to differing goals whereby vocational education places greater emphasis on practical studies and readily-deployable work skills while general education emphasizes abstract and analytical skills.

Becker (1993) describes on-the-job training as a form of human capital investment. In his arguments, he presents definitions of two different types of training that can occur: general training and specific training. General training is useful to many firms and is therefore applicable to a wide range of jobs. Specific training in contrast is valuable to one or only a few firms and therefore is not as applicable to all job openings.

Becker (1962) states that on-the-job training is a process that raises future productivity and differs from school training in that an investment is made on the job rather than in an institution that specializes in teaching. There are two assumptions: one, each employee is hired for a specified time period. Two, both labor and product markets are perfectly competitive. In the absence of on-the-job training, a profit-maximizing firm would be in equilibrium when marginal products equal wages. As expressed by,

$$MP = W \qquad\qquad (2.1.26)$$

where W is wages or expenditures

MP is the marginal product or receipts

Workers are hired for one period and W and MP in future periods would be independent of a firm's current behavior. So, workers have unique MP and W in each period. A more complete set of equilibrium is

$$MP_t = W_t \qquad\qquad (2.1.27)$$

where t refers to the period t th

When on-the-job training is taken into account, the above condition will be different. For firms, training lowers current receipts and raise current expenditures. Firm would maximize profit until the present value of receipt is equal to the present value of expenditures.

$$\sum_{t=0}^{n-1} \frac{R_t}{(1+i)^{t+1}} = \sum_{t=0}^{n-1} \frac{E_t}{(1+i)^{t+1}} \tag{2.1.28}$$

where E_t is expenditures during period t

R_t is receipts during period t

i is the market discount rate

n is the number of periods

If training is given only in the first period, expenditures in the first period are equal to wages plus the outlay on training. Equation (2.28) becomes

$$MP_0 + \sum_{t=1}^{n-1} \frac{MP_t}{(1+i)^t} = W_0 + k + \sum_{t=1}^{n-1} \frac{W_t}{(1+i)^t} \tag{2.1.29}$$

where k measures the outlay on training. If new term is defined,

$$G = \sum_{t=1}^{n-1} \frac{MP_t - W_t}{(1+i)^t} \tag{2.1.30}$$

Equation (2.29) can be written as

$$MP_0 + G = W_0 + k \tag{2.1.31}$$

The problem with the equation (6) is that k reflects only outlay on training, not all training costs. The important cost excluded from the equation (6) is the time which persons spend on training. The difference between what could have been produced, MP_0' and what is produced, MP_0 is the opportunity cost of time spent in training. The equation that reflect the total training costs is

$$MP_0' + G = W_0 + C \tag{2.1.32}$$

where C is the sum of opportunity costs and outlays on training

The difference between G and C measures the difference between the return from and the cost of training. Training is further broken down into two types: general and specific training. General training increase the future marginal products of workers in the firm providing it, but also increase their marginal product in many other firms. Consequently, wage rates would rise by exactly the same amount as the marginal product and firms providing general training cannot capture the return.

Under the competitive labor market, firms would provide general training only if they do not have to pay for the training costs. Persons receiving training would be willing to pay for the costs since training raises their future wages. From equation (2.32), since wages and marginal products are raised by the same amount, MP_t must equal to W_t for all $t = 1,...., n-1$

$$G = \sum_{t=1}^{n-1} \frac{MP_t - W_t}{(1+i)^t} = 0 \tag{2.1.33}$$

Equation (2.32) is reduced to

$$MP_0' = W_0 + C \tag{2.1.34}$$

$$W_0 = MP_0' - C. \tag{2.1.35}$$

~~The wage of trainees would not equal their opportunity marginal product but would be~~ less by the total cost of training. Employees would pay for general training by receiving wages below their productivity. Trained persons would receive lower earnings during the training period and higher earnings at later ages because the return is collected then (figure 2.1.1).
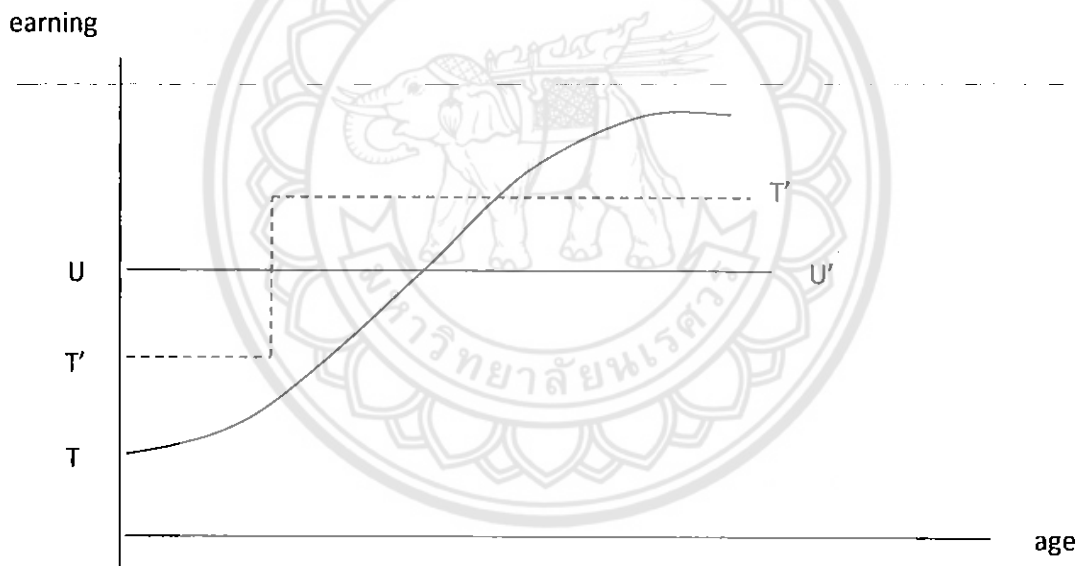
Figure 2.1.1 The relationship between earning and training

Suppose, to take an extreme case, that training raises the level of marginal productivity but has no effect on the slope, so that the marginal productivity of trained persons is independent of age, line UU. If earnings equal marginal product, TT would be parallel to and higher than

UU. Since earnings of trained persons would be below marginal product during the training period and equal afterward, they would rise sharply at the end of training period and then level off as line T'T'.

Firms in competitive labor market have no incentive to pay training costs because firms that train workers are supposed to impart external economies to other firms, that is, other firms can use these workers free of any training charge.

Specific training increases productivity by a different amount in firms providing the training than in other firms. If all trainings are completely specific, the wage that an employee can get elsewhere will be independent of the amount of training he receives. Wages are paid by firms would be independent of the amount of training, so firms would pay training costs. Firms would collect the return from such training in the form of larger profits resulting from higher productivity, and training would be provided whenever the return is at least as large as the cost.

Job Signaling theory by Spence (1983)

Signaling models are basically equivalent to screening models. The difference is that while in signaling model, workers move first choosing their educational level to signal their productivity to employers, in screening model, employers make the first move by choosing educational level required for a job.

In Michael Spence's job-market signaling model does not reject the basic assumptions of human capital theory, namely that productivity and earnings are primarily a function of a worker's skills (i.e., earnings remain a function of individual characteristics). The primary difference is to emphasize the role of education in the matching function which is overlooked by human capital theory, and to suggest that education may not necessarily add to skills and that it is not the only source of skills or skill development.

Signaling models study interactions marked by the presence of asymmetric information. Hiring is an investment decision. In job market, the employer is not sure of the productive capabilities of an individual at the time he hires him. Therefore, this information will not become available to the employer immediately after hiring him. It takes time to learn an individual's productive capabilities. To hire someone is frequently to purchase a lottery. Spence has assumed that the employer pays the certain monetary equivalent to the individual as wage. If he is risk neutral, the wage is taken to be the individual's marginal contribution to the hiring

organization. The employer cannot directly observe the marginal product prior to hiring. He can only observe personal data in the form of observable characteristics and attributes of the individual such as education, previous work, race, sex, criminal records, etc. Of those observable, personal attributes, some are immutably fixed, while others are alterable.

Spence has categorized personal attributes into 2 groups: indices and signals. Indices are observable and unalterable attributes such as sex, race, nationality. Some attributes, like age, do change but not at the discretion of the individual so Spence has also defined those as indices. Signals are observable characteristics attached to the individual that are subject to manipulation by him such as education.

After hiring an individual, the employer will learn the individual's productive capabilities. On the basis of previous experience in the market, the employer will have conditional probability assessments over productive capacity given combinations of signals and indices. Signals and indices are to be regarded as parameters in shifting conditional probability distributions that defines an employer's beliefs.

On employees, potential employees therefore confront an offered wage schedule whose arguments are signals and indices. The applicant cannot change indices but they can manipulate signals. The costs of making these adjustments are called signaling costs for example, education is costly. Signaling costs include psychic and other costs, as well as the direct monetary ones. Individual will invest in education either academic or vocational education if there is sufficient return as defined by the offered wage schedule. Individuals, then, are assumed to select signals (education) so as to maximize the difference between offered wages and signaling costs. The critical assumption is that signaling costs are negatively correlated with productivity.

From the employer's perspective, the best thing about relying on diplomas is to help narrow the pool of job applicants. In short time, employers may not lay out huge sum of money to learn the potential employee's competence. Employers may value the fact that their employees are certified by third parties (Educational institutions) who specialize in the general education of students. Education is really more of screening device that helps employers to minimize time and resources devoted to interviewing a long line of applicants.

In this research, type of education (i.e. academic and vocational education) is used as the screening device. In fact, both education types carry differing values to different employers, depending largely on the task requirements. In other words, a candidate with academic

education is more favored for a task that requires a high general cognitive capacity for learning new skills and adapting to a new technical environment. On the other hand, a VE candidate is preferred for a position that requires specific skill sets with minimal additional training.

Chapter 4

Data and Statistical Framework

This research used the 2011 - 2015 Labor Force Survey (LFS) data by the National Statistical Office (NSO) of Thailand. The NSO conducts the survey annually by interview and the samples are drawn randomly from households throughout the country. This research was focused on individuals aged 15-60 years at the time of survey. The samples used in the first-step probit analysis were restricted to those individuals who reported having upper-secondary vocational or upper-secondary general education as the highest level of education, with complete parental education data. In the second-step evaluation of the earnings and below-average-income risks, the samples were further restricted to those who reported their earnings and were employed at the time of survey.

Table 1 Dependent and explanatory variables and definitions

Variables	Definition
Dependent variables	
Unemployment risk	Dummy variable, coded 1 if unemployed and 0 otherwise
Monthly earnings	Natural logarithm of monthly wages
Below average-income risk	Dummy variable, coded 1 if individual wage is below the mean wage and 0 otherwise
Explanatory variables	
Experience	Potential experience is determined by subtracting the respondent's age by years of education and 6, where 6 is the compulsory age to start school in Thailand (i.e., potential experience = age – years of education – 6).
Experience squared	Experience multiplied by experience
Age	Years of age
Marital status	Dummy variable, coded 1 if married and 0 if unmarried (i.e. single, divorced or widowed)
Gender	Dummy variable, coded 1 if male and 0 otherwise
Household size	The number of household members
Region of residency	5 regions: Bangkok, Central, North, Northeast and South
Data year	5 years: 2011-2015
Parent education	Dummy variable, coded 1 for bachelor's degree or higher and 0 otherwise
Vocational education	Dummy variable, coded 1 for vocational education and 0 for academic education

Table 1 tabulates the variables used in this research. The dependent variables are the three labor market outcomes: unemployment risk, monthly earnings, and below-average-income risk. The unemployment risk is a dummy variable, coded 1 if an individual is unemployed and 0 otherwise. The LFS defines an unemployed worker as an individual aged 15 years or above who is unemployed or holds no full-time job for a period of 30 days or longer prior to the survey. The monthly earnings is the natural logarithm of monthly wages to analyze the income levels of AE and VE graduates. The below-average-income risk is a dummy variable, coded 1 if an individual's income is below the mean (average) income and 0 otherwise.

The explanatory variables include work experience, age, marital status, gender, household size, region of residency, parent education, and vocational education. Year dummies were included to control for structural change.

In this research, the samples were restricted to individuals aged 15 – 60 years who graduated upper-secondary education as the highest level of education, with complete parental education data. Information on parental education is important because it reflects the individual's socio-economic status, which is an influencing factor of offspring's decisions on the types of education (VE or AE) (Chiswick, 1986; Heckman & Hotz, 1986). Therefore, individuals with incomplete parental education were excluded from the regression analysis. The exclusion suggests that the samples were a selected group. According to Griliches (1977), sample selection could lead to biased coefficient estimates for the regression analysis. To correct for the sample selection bias, this research used a two-stage procedure with inverse Mills ratio.

In the first-stage probit model, the dependent variable was the decision to pursue VE or AE, coded 1 for VE and 0 otherwise. The explanatory variables included parental education, age, region of residency, household size, marital status, and gender. Year dummies were included to control for structural change. In this study, parental education was used as the proxy for household socioeconomic status, consistent with Chiswick (1986); Heckman & Hotz (1986), who reported that parental education significantly influenced the individual's education decision. Parental education (dummy variable) was coded 1 if either of the parents has a tertiary education and 0 if neither does.

The second-stage selection-correction analysis determined the influence of vocational education on the three labor market outcomes: unemployment risk, monthly earnings, and

below-average-income risk. The unemployment risk was a dummy variable, coded 1 if unemployed and 0 otherwise. The natural logarithm of monthly earnings was used to mitigate the effects of earnings outliers (Moenjak and Worswick, 2003). The below-average-income risk was a dummy variable, coded 1 for the earnings below the mean income and 0 otherwise. The explanatory variables were work experience, experience squared, gender, marital status, household size, and region of residency. Year dummies were also included to control for structural change, and the self-correction term for bias correction.

Chapter 5

Research Results and Discussion

Research Results and Discussion

Unemployment Risk Model

Table 2 tabulates the demographics of total samples (37,905 individuals) by education types (academic or vocational education), gender, work experience, marital status, household size, and region of residency.

Of the total samples, 59.94% were male and 40.06% female. By education types, 62.66% and 37.34% of the vocational graduates were male and female, and 59.04% and 40.96% of the academic graduates were male and female. Years of work experience were categorized into four groups: < 10, 11-20, 21-30 and > 30 years, with the average work experience of 7.65 years. The below-10-year group was the largest group (72.62%), followed by the 11-20 (26.42%), 21-30 (0.8%), and over 30 (0.16%) groups.

Table 2 Demographics of the sampled upper-secondary graduates by educational type (for the unemployment risk model)

Variables	Vocational education n=9391		Academic education n=28514		Total n = 37905	
	f	%	f	%	f	%
Gender						
Male	5884	62.66	16835	59.04	22719	59.94
Female	3507	37.34	11679	40.96	15186	40.06
Work experience						
0-10	6890	73.37	20638	72.38	27528	72.62
11-20	2411	25.67	7603	26.66	10014	26.42
21-30	77	0.82	227	0.8	304	0.8
>30	13	0.14	46	0.16	59	0.16
Marital status						
Married	3339	35.56	10040	35.21	13379	35.3
Unmarried	6052	64.44	18474	64.79	24526	64.7

Household size

1-5	6037	64.28	18791	65.9	24828	65.5
6-10	3313	35.28	9546	33.48	12859	33.92
11-15	40	0.43	172	0.6	212	0.56
>15	1	0.01	5	0.02	6	0.02

Region of residency

Bangkok	520	5.54	798	2.8	1318	3.48
Central	3593	38.26	8219	28.82	11812	31.16
North	1756	18.7	5739	20.13	7495	19.77
Northeast	1950	20.76	9138	32.05	11088	29.25
South	1572	16.74	4620	16.2	6192	16.34

Nearly two-thirds (64.70%) of the samples are unmarried (divorced, widowed, or separated). The household sizes were categorized into four groups: 1-5, 6-10, 11-15 and over 15 members, with the average of household size of 5 household members.

The regions of residency were categorized into five regions: Bangkok, Central, North, Northeast and South. The result showed that 31.16% of the samples owned a residence in the central region of Thailand, followed by the Northeast (29.25%), the North (19.77%), the South (16.34%), and the capital Bangkok (3.48%). In addition, 38.26% of the vocational graduates resided in the central region and 32.05% of the academic graduates (32.05%) lived in the Northeast.

In Table 3, the first-stage probit results showed the relationship between various socio-economic variables and the decision to study vocational education. The analysis showed that parent education was a good predictor ($\beta=0.08$, $p<0.05$). In addition, if either parent had a tertiary education, there was a higher likelihood that the offspring would pursue vocational education. This is consistent with Moenjak and Worswick (2003), who reported that the level of educational attainment was positively correlated with the probability of pursuing vocational education in the Thai context.

The likelihood of pursuing vocational education decreased with age ($\beta = -0.004$, $p<0.05$), and married individuals were more likely to study vocational education ($\beta = 0.05$, $p<0.05$). Males were more likely to enroll in the VE programs ($\beta = 0.09$, $p<0.05$). Household size was positively correlated with the decision to pursue vocational education ($\beta = 0.008$, $p<0.10$). Compared with the respondents in Bangkok, those in the Central, the North, the

Northeast, and the South had a lower likelihood to pursue vocational education (β = -0.24, -0.46, -0.66 and -0.4 respectively, p <0.05).

Table 3 Two-stage regression analysis of the unemployment risk model

| Variables | Vocational education | | Unemployment risk | |
| | First Stage probit | | Selection corrected | |
	Coefficient	Standard error	Coefficient	Standard error
Parent Education	0.08**	0.036		
Vocational Education			0.116**	0.033
Age	-0.004**	0.001		
Experience			-0.06**	0.008
Experience squared			0.002**	0.0004
Married	0.05**	0.02	-0.47**	0.06
Male	0.09**	0.015	-0.28**	0.086
Household Member	0.008*	0.005	-0.02	0.012
Region				
Central	-0.24**	0.037	0.628**	0.215
North	-0.46**	0.039	1.04**	0.39
Northeast	-0.66**	0.038	1.54**	0.57
South	-0.4**	0.039	0.98**	0.34
year 2012	-0.016	0.022	0.057	0.052
year 2013	-0.004	0.023	0.08*	0.05
year 2014	-0.007	0.023	0.16**	0.05
year 2015	-0.028	0.023	0.19**	0.055
Self-selection term			-3.1**	1.13
Constant	-0.26**	0.057	1.47	1.16

Note: ** significant at 5% level, * significant at 10% level

For the second-stage selection-corrected analysis, the unemployment risk of the VE graduates was higher than that of the AE graduates ($\beta = 0.116$, p<0.05). This could be explained by the nature of academic education that emphasizes the general skills, which results in more job opportunities for the AE graduates, as opposed to vocational education which emphasizes the specific work skills. Underemployment was also another contributing factor of the lower unemployment risk among the AE graduates.

Years of work experience were inversely correlated to the unemployment risk ($\beta = -0.06$, p<0.05). The male graduates had a lower unemployment risk than their female counterparts ($\beta = -0.28$, p<0.05), and the married individuals had a lower unemployment risk ($\beta = -0.47$, p<0.05), suggesting a willingness to accept an overqualified job (i.e., underemployment) due to greater financial responsibility. The unemployment risk in Bangkok was lowest, with the vocational graduates in the Central, the North, the Northeast, and the South having a higher probability of unemployment ($\beta = 0.628$, 1.04, 1.54 and 0.98, respectively, and $p < 0.05$). This could be explained by the higher concentration of industries in and around Bangkok. The household size played an insignificant role in the unemployment risk ($\beta = -0.02$, P>0.05). The positive year-dummies indicated that the unemployment risk was high during 2012-2015, relative to the year 2011. This could be attributed to political turmoil and violent street demonstrations in 2012 – 2013, followed by a military *coup* in 2014. The statistical significance of the self-selection correction term ($\beta = -3.1$, p<0.05) indicated that the coefficient biases were removed following the self-selection correction.

Monthly Earnings and Below-Average-Income Risk Models (Models 2 and 3)

Table 4 tabulates the demographics of the samples with earnings data (16,960 individuals) by education types (academic and vocational education), gender, work experience, marital status, household size, and region of residency.

Table 4 Demographics of the upper-secondary graduates with earnings data by educational type (for the monthly earnings and below average-income risk models)

Variables	Vocational education n=4818		Academic education n=12142		Total n = 16960	
	f	%	f	%	f	%
Gender						
Male	2837	58.88	6846	56.38	9683	57.09
Female	1981	41.12	5296	43.62	7277	42.91
Work experience						
0-10	3591	74.53	8780	72.31	12371	72.94
11-20	1179	24.47	3236	26.65	4415	26.03
21-30	45	0.93	104	0.86	149	0.88
>30	3	0.06	22	0.18	25	0.15
Marital status						
Married	1655	34.35	4282	35.27	5937	35.01
Unmarried	3163	65.65	7860	64.73	11023	64.99
Household size						
1-5	3055	63.41	7800	64.24	10855	64
6-10	1741	36.14	4246	34.97	5987	35.3
11-15	21	0.44	94	0.77	115	0.68
>15	1	0.02	2	0.02	3	0.02
Region of residency						
Bangkok	395	8.2	562	4.63	957	5.64
Central	2113	43.86	4497	37.04	6610	38.97
North	781	16.21	2249	18.52	3030	17.87
Northeast	806	16.73	3019	24.86	3825	22.55
South	723	15.01	1815	14.95	2538	14.96

The results showed that 57.09% were male and 42.91% female. By education types, 58.88% and 41.12% of the vocational graduates were male and female, and 56.38% and 43.62% of the academic graduates were male and female. Years of work experience were categorized into four groups: < 10, 11-20, 21-30 and > 30 years, with the average work experience of 7.74years. The below-10-year group was the largest group (72.94%), followed by the 11-20 (26.03%), 21-30 (0.88%), and over 30 (0.15%) groups.

Nearly two-thirds (64.99%) of the samples were unmarried (divorced, widowed, or separated). The household sizes were categorized into four groups: 1-5, 6-10, 11-15 and over 15 members, with the average of household size of 5.08 household members.

The regions of residency were categorized into five regions: Bangkok, Central, North, Northeast and South. The result showed that 38.97% of the samples owned a residence in the central region of Thailand, followed by the Northeast (22.55%), the North (17.87%), the South (14.96%), and Bangkok (5.64%).

In Table 5, the first-stage probit analysis indicated that parent education significantly influenced the choice of education of their offspring (β=0.25, $p < 0.05$). More specifically, if either parent had a tertiary education, there was a higher likelihood that the offspring would pursue vocational education.

The likelihood of pursuing vocational education decreased with age ($\beta = -0.007$, $p<0.05$), and males were more likely to enroll in the VE programs ($\beta = 0.06$, $p<0.05$). Compared with the respondents in Bangkok, those in the Central, the North, the Northeast, and the South had a lower likelihood to pursue vocational education ($\beta = -0.24, -0.42, -0.58$ and -0.35 respectively, $p <0.05$). Marital status, household size, and year dummies had no significant influence on the choice of educational track ($p>0.05$).

The second-stage regression of the **earnings model** showed that the monthly income of the vocational graduates was higher than that of the academic graduates ($\beta = 0.1$, $p<0.05$). More specifically, the VE graduates' earnings were 10% higher than the AE graduates', consistent with Moenjak & Worwick (2003); Srinang (2014); Hawley (2004). The earnings increased with years of work experience ($\beta = 0.02$, $p<0.05$), as suggested by an approximately 2% increase in the earnings for each incremental year of work experience. The employees in Bangkok earned considerably more than those in other regions, especially compared to those in the North who earned 26% lower. Marital status, gender, and household size had no influence on the monthly earnings ($\beta = 0.01, 0.0002$ and -0.003, $p>0.05$). The statistical significance of the self-selection correction term ($\beta=-0.52$, $p<0.05$) indicated that the coefficient biases were removed following the self-selection correction.

Table 5 Two-stage regression analysis of the earnings and below-average income risk models

Variables	Vocational education First Stage probit		Ln(Income) Selection corrected		Below-average income risk Selection corrected	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Parent Education	0.25**	0.055				
Vocational Education			0.1**	0.006	-0.29**	0.024
Age	-0.007**	0.002				
Experience			0.02**	0.002	-0.06**	0.006
Experience squared			-0.0002*	0.0001	0.001**	0.0002
Married	0.02	0.024	0.01	0.007	-0.06**	0.025
Male	0.06**	0.021	0.0002	0.007	0.02	0.03
Household Member	0.006	0.006	-0.003	0.002	0.01	0.006
Region						
Central	-0.24**	0.044	-0.11**	0.02	0.51**	0.08
North	-0.42**	0.048	-0.26**	0.03	1.1**	0.11
Northeast	-0.58**	0.047	-0.15**	0.04	0.76**	0.15
South	-0.35**	0.048	-0.2**	0.03	0.91**	0.1
year 2012	-0.016	0.033	0.12**	0.01	-0.52*	0.04
year 2013	0.015	0.032	0.26**	0.01	-1.19**	0.04
year 2014	-0.018	0.033	0.35**	0.01	-1.54**	0.04
year 2015	-0.04	0.033	0.39**	0.01	-1.67**	0.04
Self-selection term			-0.52**	0.1	1.47**	0.33
Constant	-0.12	0.077	9.27**	0.1	-0.98**	0.32

Note: ** significant at 5% level, * significant at 10% level

The second-stage regression of the **income risk model** showed that the vocational graduates were less likely to suffer from the below-average-income risk (β = -0.29, p<0.05). This could be explained by the readily-deployable skills of the vocational graduates. Years of experience were significantly negatively correlated with the below-average-income risk (β = -0.06, p<0.05), suggesting that the below-average-income risk of experienced individuals was

lower. The married individuals had a lower probability to earn below the average income (β = -0.05, p<0.05), consistent with Moenjak and Worwick (2003). Gender and household size had no impact on the income risk (β = 0.02, 0.01, respectively, and p > 0.05). The employees in Bangkok were likely to earn above the mean income, as opposed to those in the Central, the North, the Northeast, and the South (β = 0.51, 1.1, 0.76 and 0.9, respectively). The statistical significance of the self-selection correction term (β=1.47, p<0.05) indicated that the coefficient biases were removed following the self-selection correction.

Due to the nature of vocational education which emphasizes the specific work skills, the VE graduates had a higher unemployment risk than the AE. However, the VE graduates earned more than the AE graduates, at the same level of education. To attract more lower-secondary students to pursue upper-secondary vocational education, the government and other stakeholders, including the Ministry of Education, vocational institutions, school alumni, and the media, must address the issue of street brawls. In addition, vocational curriculum should be routinely reviewed and updated to improve the quality of VE graduates to meet changing labor-market demands through a school-and-private sector collaboration. This would improve the perception of the general public toward vocational education. The public should also be made more aware of the higher economic return of vocational education.

Conclusion

This research has investigated the influence of two diverse upper-secondary educational tracks: academic (AE) and vocational education (VE), on the three labor-market outcomes: the unemployment risk, monthly earnings, and below-average-income risk. The study used the 2011 – 2015 Labor Force Survey data by the National Statistical Office of Thailand. The samples were individuals aged 15 – 60 years who graduated upper secondary education, with complete parental education data. After correcting for self-selection, the unemployment risk model showed that the VE graduates had a higher unemployment risk than the AE graduates (β = 0.116, p<0.05), due to the nature of vocational education which emphasizes the specific work skills. The unemployment risk was significantly negatively correlated with years of work experience and the male gender; but positively correlated with the region of residency. The earnings model showed that the earnings of the VE graduates were higher than the AE graduates (β = 0.1, p<0.05), with the earnings being significantly positively correlated to years of

experience ($\beta = 0.02$, $p<0.05$). The below-average-income risk model showed that the VE graduates were less likely to suffer from the lower-than-average income risk ($\beta = -0.29$, $p<0.05$). The lower-than-average income risk of the individuals with more work experience was lower than that of the inexperienced graduates ($\beta = -0.06$, $p<0.05$).

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Appendix

Research Article

Influence of diverse upper secondary educational tracks on labour market outcomes in Thailand

Akkaya Senkrua

Department of Economics,
Faculty of Business, Economics and Communications,
Naresuan University,
Phitsanulok, Thailand
Email: akkayanu@gmail.com

Abstract: This research investigates the influence of diverse upper-secondary educational tracks: academic (AE) and vocational education (VE), on three labour-market outcomes: unemployment risk, monthly earnings, and below-average-income risk. The research used the 2011–2015 labour force survey data by the National Statistical Office of Thailand. The samples were upper-secondary graduates aged 15–60 years with complete parental education data. The probit result showed that individuals with tertiary-educated parents were more likely to pursue VE. After correcting for self-selection, the regression result indicated that VE was significantly positively correlated with the unemployment risk. More specifically, the unemployment risk was higher for VE graduates due to the emphasis of VE on specific work skills. The monthly earnings were significantly positively correlated with VE as the VE graduates earned a higher monthly income than the AE graduates. The below-average-income risk and VE were negatively correlated.

Keywords: academic education; vocational education; below-average-income risk; unemployment risk; monthly earnings; educational tracks; labour market outcomes; Thailand.

1 Introduction

In Thailand, compulsory education includes six years of primary education (grades 1–6) and three years of lower-secondary education (grades 7–9). Upper-secondary education (grades 10–12) is optional, with two alternative educational tracks: academic (AE) and vocational education (VE). Primary education aims to develop the basic skills in literacy

and numeracy and to assist young children in developing an understanding of the world so that they can participate as active members of society. Secondary education equips the learners with knowledge and skills appropriate for their ages, needs, interests, and aptitudes. Figure 1 shows the education system in Thailand.

Figure 1   Thailand's educational system
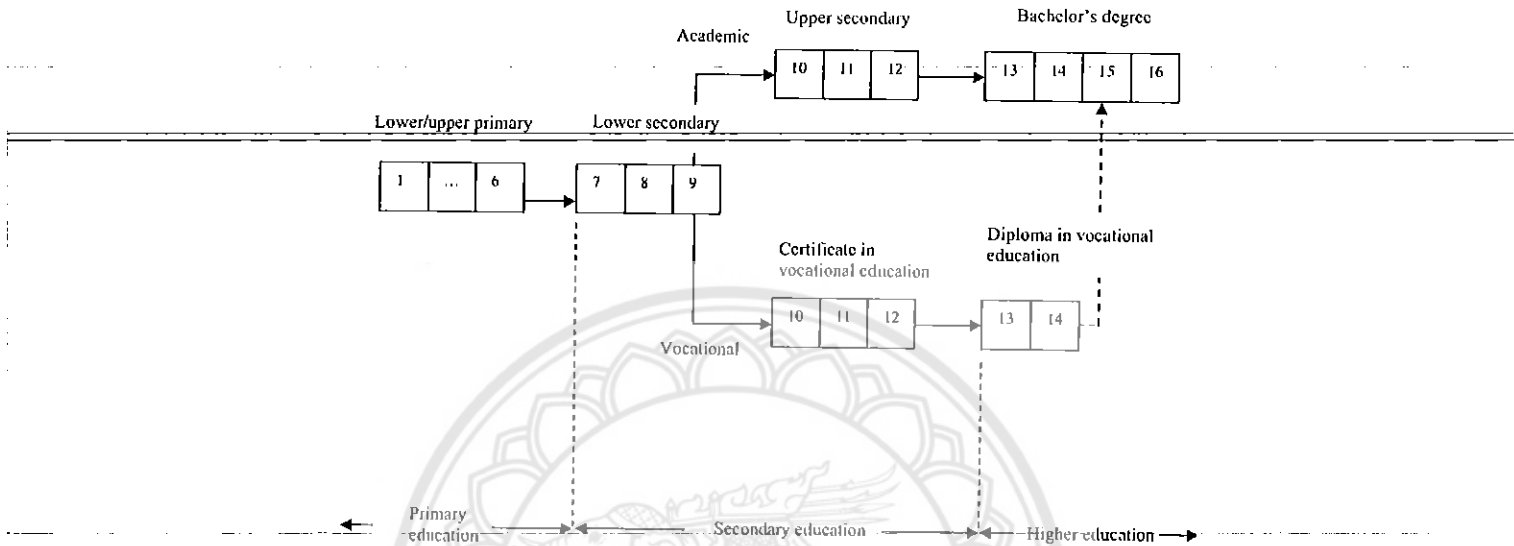
According to Chalamwong (2011), an additional 200,000 vocational graduates were needed to meet the country's industrial expansion by the end of this decade. However, Thailand is struggling with a severe shortage of vocational graduates due to a VE/AE ratio imbalance (23:77). Successive governments have implemented measures to rebalance the imbalance, aimed at increasing the number of VE enrolments with the 60:40 (VE/AE) ratio target.

The low enrolments in VE programs in Thailand could be explained by:

1   Poor reputations as some of the vocational students often engage in street brawls with their rival schools. This fact influences many parents not to enroll their offspring in the VE programs.

2   A higher social status attached to AE in relation to VE.

3   A misconception that the AE return on investment is greater than that of VE.

There were previous research studies on the relationship between a chosen educational track and the labour-market outcomes. According to Psacharopoulos (1994), a tertiary education offers more economic returns than a lower-level education. Recent research found that the returns on education varied between types of education, even at the same education level. Weber (2003), El-Hamidi (2006) and Sakellariou (2003) reported the higher returns on education for vocational graduates than for academic graduates. Bennell (1996a, 1996b) reported the higher rates of return on VE than general education and

negated the existing assumption that AE generates a higher return than vocational study. Lauer and Steiner (2001) and Teal and Kahyarara (2008) reported the higher labour market returns for AE than for VE in Germany.

This research investigates the influence of two diverse upper-secondary educational tracks: AE and VE, on the three labour-market outcomes: the unemployment risk, monthly earnings, and below-average-income risk, using the regression models. The study used the 2011–2015 labour force survey (LFS) data by the National Statistical Office (NSO) of Thailand. The samples were individuals aged 15–60 years who graduated with an upper-secondary education degree, with complete parental education data.

2 Theoretical background and literature review

According to the theory of human capital, a larger proportion of national output growth, relative to increases in land, man-hours, and physical reproducible capital, is the product of investment in human capital (Schultz, 1961). According to Schultz (1961) and Becker (1964), formal education is one of the important contributors of human capital improvement and higher earnings potential. Education enhances an individual's productivity and earnings capabilities (Forbes et al., 2010; Leigh, 2007; Kedir, 2008; Pereira and Martins, 2001; Bonjour et al., 2003).

Becker (1964) categorised human capital into general and specific human capital, each contributing differently to the organisational productivity. For education, an occupationally-oriented education (i.e., VE) provides the readily-deployable skills, unlike general education (AE). More specifically, VE emphasises the practical and readily-deployable skills, while general education focuses on the abstract and analytical skills. Therefore, VE graduates require less additional training when they start work, which means the lower training costs for the employers. The compensation of the VE graduates should be higher than that of the AE graduates (Backes-Gellner and Geel, 2014; Srinang, 2014).

According to screening theory, due to the information asymmetry about employees' productivity, employers need to screen the potential employees (Stiglitz, 1973). The employers mainly rely on the applicants' educational background as a screening device, including the institution attended, educational level, field of study, and type of education (i.e., AE or VE).

In this research, types of education (i.e., AE and VE) were used as the screening device. Both education types are valued differently, depending on the task requirements. An AE graduate is preferable for a task that requires the cognitive capacity for new skills and technology. On the other hand, a VE graduate is preferred for a position that requires specific skill sets.

According to Psacharopoulos (1985, 1987, 1994), Robinson (1997) and Walker and Zhu (2007), the net return on AE was higher, due to the substantially higher unit cost of VE. However, Weber (2003), Moenjak and Worswick (2003), Hawley (2004) and Tangtipongkul (2013) reported the lower returns for academic than vocational graduates. Bennell (1996a, 1996b) found no difference between the returns on AE and VE for Latin American and Caribbean countries.

According to Maxim (2014), employability is positively correlated to education attainment. Blinova et al. (2015) found that VE effectively lowers the risk of youth unemployment in Russia. However, Brauns et al. (1999) reported that education plays an insignificant role in the lower unemployment in Germany. Backes-Gellner and Geel (2014) used the earnings variances to investigate the income risk and found the lower income variances for vocational-education graduates than for academic graduates. Christiansen et al. (2007) and Hartog and Vijverberg (2007) analysed wage variances by occupation and education levels and found the earnings variability between occupations and education attainment.

3   Study data and research methodology

This research used the 2011–2015 LFS data by the NSO of Thailand. The NSO conducts the survey annually by interview and the samples are drawn randomly from households throughout the country. This research was focused on individuals aged 15–60 years at the time of survey. The samples used in the first-step probit analysis were restricted to those individuals who reported having upper-secondary vocational or upper-secondary general education as the highest level of education, with complete parental education data. In the second-step evaluation of the earnings and below-average-income risks, the samples were further restricted to those who reported their earnings and were employed at the time of survey.

Table 1 tabulates the variables used in this research. The dependent variables are the three labour market outcomes: unemployment risk, monthly earnings, and below-average-income risk. The unemployment risk is a dummy variable, coded 1 if an individual is unemployed and zero otherwise. The LFS defines an unemployed worker as an individual aged 15 years or above who is unemployed or holds no full-time job for a period of 30 days or longer prior to the survey. The monthly earnings are the natural logarithm of monthly wages to analyse the income levels of AE and VE graduates. The below-average-income risk is a dummy variable, coded 1 if an individual's income is below the mean (average) income and zero otherwise.

The explanatory variables include work experience, age, marital status, gender, household size, region of residency, parent education, and VE. Year dummies were included to control for structural change.

In this research, the samples were restricted to individuals aged 15–60 years who graduated upper-secondary education as the highest level of education, with complete parental education data. Information on parental education is important because it reflects the individual's socio-economic status, which is an influencing factor of offspring's decisions on the types of education (VE or AE) (Chiswick, 1986; Heckman and Hotz, 1986). Therefore, individuals with incomplete parental education were excluded from the regression analysis. The exclusion suggests that the samples were a selected group. According to Griliches (1977), sample selection could lead to biased coefficient estimates for the regression analysis. To correct for the sample selection bias, this research used a two-stage procedure with inverse Mills ratio.

In the first-stage probit model, the dependent variable was the decision to pursue VE or AE, coded 1 for VE and zero otherwise. The explanatory variables included parental education, age, region of residency, household size, marital status, and gender. Year dummies were included to control for structural change. In this study, parental education

was used as the proxy for household socioeconomic status, consistent with Chiswick (1986) and Heckman and Hotz (1986), who reported that parental education, significantly influenced the individual's education decision. Parental education (dummy variable) was coded 1 if either of the parents has a tertiary education and zero if neither does.

Table 1　　Dependent and explanatory variables and definitions

Variables	Definition
Dependent variables	
Unemployment risk	Dummy variable, coded 1 if unemployed and zero otherwise
Monthly earnings	Natural logarithm of monthly wages
Below average-income risk	Dummy variable, coded 1 if individual wage is below the mean wage and zero otherwise
Explanatory variables	
Experience	Potential experience is determined by subtracting the respondent's age by years of education and six, where six is the compulsory age to start school in Thailand (i.e., potential experience = age – years of education – 6).
Experience squared	Experience multiplied by experience
Age	Years of age
Marital status	Dummy variable, coded 1 if married and zero if unmarried (i.e., single, divorced or widowed)
Gender	Dummy variable, coded 1 if male and zero otherwise
Household size	The number of household members
Region of residency	Five regions: Bangkok, Central, North, Northeast and South
Data year	Five years: 2011–2015
Parent education	Dummy variable, coded 1 for bachelor's degree or higher and zero otherwise
VE	Dummy variable, coded 1 for VE and zero for AE

The second-stage selection-correction analysis determined the influence of VE on the three labour market outcomes: unemployment risk, monthly earnings, and below-average-income risk. The unemployment risk was a dummy variable, coded 1 if unemployed and zero otherwise. The natural logarithm of monthly earnings was used to mitigate the effects of earnings outliers (Moenjak and Worswick, 2003). The below-average-income risk was a dummy variable, coded 1 for the earnings below the mean income and zero otherwise. The explanatory variables were work experience, experience squared, gender, marital status, household size, and region of residency. Year dummies were also included to control for structural change, and the self-correction term for bias correction.

4   Research results and discussion

4.1   Unemployment risk model

Table 2 tabulates the demographics of total samples (37,905 individuals) by education types (AE or VE), gender, work experience, marital status, household size, and region of residency.

Table 2   Demographics of the sampled upper-secondary graduates by educational type (for the unemployment risk model)

Variables	VE n = 9391		AE n = 28514		Total n = 37905	
	f	%	f	%	f	%
Gender						
Male	5,884	62.66	16,835	59.04	22,719	59.94
Female	3,507	37.34	11,679	40.96	15,186	40.06
Work experience						
0–10	6,890	73.37	20,638	72.38	27,528	72.62
11–20	2,411	25.67	7,603	26.66	10,014	26.42
21–30	77	0.82	227	0.8	304	0.8
> 30	13	0.14	46	0.16	59	0.16
Marital status						
Married	3,339	35.56	10,040	35.21	13,379	35.3
Unmarried	6,052	64.44	18,474	64.79	24,526	64.7
Household size						
1–5	6,037	64.28	18,791	65.9	24,828	65.5
6–10	3,313	35.28	9,546	33.48	12,859	33.92
11–15	40	0.43	172	0.6	212	0.56
> 15	1	0.01	5	0.02	6	0.02
Region of residency						
Bangkok	520	5.54	798	2.8	1,318	3.48
Central	3,593	38.26	8,219	28.82	11,812	31.16
North	1,756	18.7	5,739	20.13	7,495	19.77
Northeast	1,950	20.76	9,138	32.05	11,088	29.25
South	1,572	16.74	4,620	16.2	6,192	16.34

Of the total samples, 59.94% were male and 40.06% female. By education types, 62.66% and 37.34% of the vocational graduates were male and female, and 59.04% and 40.96% of the academic graduates were male and female. Years of work experience were categorised into four groups: < 10, 11–20, 21–30 and > 30 years, with the average work experience of 7.65 years. The below-10-year group was the largest group (72.62%), followed by the 11–20 (26.42%), 21–30 (0.8%), and over 30 (0.16%) groups.

Nearly two-thirds (64.70%) of the samples are unmarried (divorced, widowed, or separated). The household sizes were categorised into four groups: 1–5, 6–10, 11–15 and over 15 members, with the average of household size of five household members.

Table 3   Two-stage regression analysis of the unemployment risk model

Variables	VE		Unemployment risk	
	First stage probit		Selection corrected	
	Coefficient	Standard error	Coefficient	Standard error
Parent education	0.08**	0.036		
VE			0.116**	0.033
Age	–0.004**	0.001		
Experience			–0.06**	0.008
Experience squared			0.002**	0.0004
Married	0.05**	0.02	–0.47**	0.06
Male	0.09**	0.015	–0.28**	0.086
Household member	0.008*	0.005	–0.02	0.012
Region				
Central	–0.24**	0.037	0.628**	0.215
North	–0.46**	0.039	1.04**	0.39
Northeast	–0.66**	0.038	1.54**	0.57
South	–0.4**	0.039	0.98**	0.34
year 2012	–0.016	0.022	0.057	0.052
year 2013	–0.004	0.023	0.08*	0.05
year 2014	–0.007	0.023	0.16**	0.05
year 2015	–0.028	0.023	0.19**	0.055
Self-selection term			–3.1**	1.13
Constant	–0.26**	0.057	1.47	1.16

Note: **significant at 5% level, *significant at 10% level.

The regions of residency were categorised into five regions: Bangkok, Central, North, Northeast and South. The result showed that 31.16% of the samples owned a residence in the central region of Thailand, followed by the Northeast (29.25%), the North (19.77%), the South (16.34%), and the capital Bangkok (3.48%). In addition, 38.26% of the vocational graduates resided in the central region and 32.05% of the academic graduates (32.05%) lived in the Northeast.

In Table 3, the first-stage probit results showed the relationship between various socio-economic variables and the decision to study VE. The analysis showed that parent education was a good predictor ($\beta = 0.08$, $p < 0.05$). In addition, if either parent had a tertiary education, there was a higher likelihood that the offspring would pursue VE. This is consistent with Moenjak and Worswick (2003), who reported that the level of educational attainment was positively correlated with the probability of pursuing VE in the Thai context.

The likelihood of pursuing VE decreased with age ($\beta = -0.004$, $p < 0.05$), and married individuals were more likely to study VE ($\beta = 0.05$, $p < 0.05$). Males were more

likely to enroll in the VE programs ($\beta = 0.09$, p < 0.05). Household size was positively correlated with the decision to pursue VE ($\beta = 0.008$, p < 0.10). Compared with the respondents in Bangkok, those in the Central, the North, the Northeast, and the South had a lower likelihood to pursue VE ($\beta = -0.24$, -0.46, -0.66 and -0.4 respectively, p < 0.05).

For the second-stage selection-corrected analysis, the unemployment risk of the VE graduates was higher than that of the AE graduates ($\beta = 0.116$, p < 0.05). This could be explained by the nature of AE that emphasises the general skills, which results in more job opportunities for the AE graduates, as opposed to VE which emphasises the specific work skills. Underemployment was also another contributing factor of the lower unemployment risk among the AE graduates.

Years of work experience were inversely correlated to the unemployment risk ($\beta = -0.06$, p < 0.05). The male graduates had a lower unemployment risk than their female counterparts ($\beta = -0.28$, p < 0.05), and the married individuals had a lower unemployment risk ($\beta = -0.47$, p < 0.05), suggesting a willingness to accept an overqualified job (i.e., underemployment) due to greater financial responsibility. The unemployment risk in Bangkok was lowest, with the vocational graduates in the Central, the North, the Northeast, and the South having a higher probability of unemployment ($\beta = 0.628$, 1.04, 1.54 and 0.98, respectively, and p < 0.05). This could be explained by the higher concentration of industries in and around Bangkok. The household size played an insignificant role in the unemployment risk ($\beta = -0.02$, p > 0.05). The positive year-dummies indicated that the unemployment risk was high during 2012–2015, relative to the year 2011. This could be attributed to political turmoil and violent street demonstrations in 2012–2013, followed by a military coup in 2014. The statistical significance of the self-selection correction term ($\beta = -3.1$, p < 0.05) indicated that the coefficient biases were removed following the self-selection correction.

4.2   Monthly earnings and below-average-income risk models (models 2 and 3)

Table 4 tabulates the demographics of the samples with earnings data (16,960 individuals) by education types (AE and VE), gender, work experience, marital status, household size, and region of residency.

The results showed that 57.09% were male and 42.91% female. By education types, 58.88% and 41.12% of the vocational graduates were male and female, and 56.38% and 43.62% of the academic graduates were male and female. Years of work experience were categorised into four groups: < 10, 11–20, 21–30 and > 30 years, with the average work experience of 7.74 years. The below-10-year group was the largest group (72.94%), followed by the 11–20 (26.03%), 21–30 (0.88%), and over 30 (0.15%) groups.

Nearly two-thirds (64.99%) of the samples were unmarried (divorced, widowed, or separated). The household sizes were categorised into four groups: 1–5, 6–10, 11–15 and over 15 members, with the average of household size of 5.08 household members.

The regions of residency were categorised into five regions: Bangkok, Central, North, Northeast and South. The result showed that 38.97% of the samples owned a residence in the central region of Thailand, followed by the Northeast (22.55%), the North (17.87%), the South (14.96%), and Bangkok (5.64%).

Table 4   Demographics of the upper-secondary graduates with earnings data by educational type (for the monthly earnings and below average-income risk models)

Variables	VE n = 4818 f	VE %	AE n = 12142 f	AE %	Total n = 16960 f	Total %
Gender						
Male	2837	58.88	6846	56.38	9683	57.09
Female	1981	41.12	5296	43.62	7277	42.91
Work experience						
0–10	3591	74.53	8780	72.31	12371	72.94
11–20	1179	24.47	3236	26.65	4415	26.03
21–30	45	0.93	104	0.86	149	0.88
> 30	3	0.06	22	0.18	25	0.15
Marital status						
Married	1655	34.35	4282	35.27	5937	35.01
Unmarried	3163	65.65	7860	64.73	11023	64.99
Household size						
1–5	3055	63.41	7800	64.24	10855	64
6–10	1741	36.14	4246	34.97	5987	35.3
11–15	21	0.44	94	0.77	115	0.68
> 15	1	0.02	2	0.02	3	0.02
Region of residency						
Bangkok	395	8.2	562	4.63	957	5.64
Central	2113	43.86	4497	37.04	6610	38.97
North	781	16.21	2249	18.52	3030	17.87
Northeast	806	16.73	3019	24.86	3825	22.55
South	723	15.01	1815	14.95	2538	14.96

In Table 5, the first-stage probit analysis indicated that parent education significantly influenced the choice of education of their offspring ($\beta = 0.25$, $p < 0.05$). More specifically, if either parent had a tertiary education, there was a higher likelihood that the offspring would pursue VE.

The likelihood of pursuing VE decreased with age ($\beta = -0.007$, $p < 0.05$), and males were more likely to enroll in the VE programs ($\beta = 0.06$, $p < 0.05$). Compared with the respondents in Bangkok, those in the Central, the North, the Northeast, and the South had a lower likelihood to pursue VE ($\beta = -0.24$, -0.42, -0.58 and -0.35 respectively, $p < 0.05$). Marital status, household size, and year dummies had no significant influence on the choice of educational track ($p > 0.05$).

The second-stage regression of the *earnings model* showed that the monthly income of the vocational graduates was higher than that of the academic graduates ($\beta = 0.1$, $p < 0.05$). More specifically, the VE graduates' earnings were 10% higher than the AE graduates', consistent with Moenjak and Worswick (2003), Srinang (2014); Hawley

(2004). The earnings increased with years of work experience ($\beta = 0.02$, $p < 0.05$), as suggested by an approximately 2% increase in the earnings for each incremental year of work experience. The employees in Bangkok earned considerably more than those in other regions, especially compared to those in the North who earned 26% lower. Marital status, gender, and household size had no influence on the monthly earnings ($\beta = 0.01$, 0.0002 and -0.003, $p > 0.05$). The statistical significance of the self-selection correction term ($\beta = -0.52$, $p < 0.05$) indicated that the coefficient biases were removed following the self-selection correction.

Table 5   Two-stage regression analysis of the earnings and below-average income risk models

| Variables | VE | | Ln (income) | | Below-average income risk | |
| | First stage probit | | Selection corrected | | Selection corrected | |
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Parent education	0.25**	0.055				
VE			0.1**	0.006	−0.29**	0.024
Age	−0.007**	0.002				
Experience			0.02**	0.002	−0.06**	0.006
Experience squared			−0.0002*	0.0001	0.001**	0.0002
Married	0.02	0.024	0.01	0.007	−0.06**	0.025
Male	0.06**	0.021	0.0002	0.007	0.02	0.03
Household member	0.006	0.006	−0.003	0.002	0.01	0.006
Region						
Central	−0.24**	0.044	−0.11**	0.02	0.51**	0.08
North	−0.42**	0.048	−0.26**	0.03	1.1**	0.11
Northeast	−0.58**	0.047	−0.15**	0.04	0.76**	0.15
South	−0.35**	0.048	−0.2**	0.03	0.91**	0.1
year 2012	−0.016	0.033	0.12**	0.01	−0.52*	0.04
year 2013	0.015	0.032	0.26**	0.01	−1.19**	0.04
year 2014	−0.018	0.033	0.35**	0.01	−1.54**	0.04
year 2015	−0.04	0.033	0.39**	0.01	−1.67**	0.04
Self-selection term			−0.52**	0.1	1.47**	0.33
Constant	−0.12	0.077	9.27**	0.1	−0.98**	0.32

Note: **Significant at 5% level, *significant at 10% level.

The second-stage regression of the income risk model showed that the vocational graduates were less likely to suffer from the below-average-income risk ($\beta = -0.29$, $p < 0.05$). This could be explained by the readily-deployable skills of the vocational graduates. Years of experience were significantly negatively correlated with the below-average-income risk ($\beta = -0.06$, $p < 0.05$), suggesting that the

below-average-income risk of experienced individuals was lower. The married individuals had a lower probability to earn below the average income ($\beta = -0.05$, $p < 0.05$), consistent with Moenjak and Worswick (2003). Gender and household size had no impact on the income risk ($\beta = 0.02$, 0.01, respectively, and $p > 0.05$). The employees in Bangkok were likely to earn above the mean income, as opposed to those in the Central, the North, the Northeast, and the South ($\beta = 0.51$, 1.1, 0.76 and 0.9, respectively). The statistical significance of the self-selection correction term ($\beta = 1.47$, $p < 0.05$) indicated that the coefficient biases were removed following the self-selection correction.

Due to the nature of VE which emphasises the specific work skills, the VE graduates had a higher unemployment risk than the AE. However, the VE graduates earned more than the AE graduates, at the same level of education. To attract more lower-secondary students to pursue upper-secondary VE, the government and other stakeholders, including the Ministry of Education, vocational institutions, school alumni, and the media, must address the issue of street brawls. In addition, vocational curriculum should be routinely reviewed and updated to improve the quality of VE graduates to meet changing labour-market demands through a school-and-private sector collaboration. This would improve the perception of the general public toward VE. The public should also be made more aware of the higher economic return of VE.

5 Conclusions

This research has investigated the influence of two diverse upper-secondary educational tracks: AE and VE, on the three labour-market outcomes: the unemployment risk, monthly earnings, and below-average-income risk. The study used the 2011–2015 LFS data by the NSO of Thailand. The samples were individuals aged 15–60 years who graduated upper secondary education, with complete parental education data. After correcting for self-selection, the unemployment risk model showed that the VE graduates had a higher unemployment risk than the AE graduates ($\beta = 0.116$, $p < 0.05$), due to the nature of VE which emphasises the specific work skills. The unemployment risk was significantly negatively correlated with years of work experience and the male gender; but positively correlated with the region of residency. The earnings model showed that the earnings of the VE graduates were higher than the AE graduates ($\beta = 0.1$, $p < 0.05$), with the earnings being significantly positively correlated to years of experience ($\beta = 0.02$, $p < 0.05$). The below-average-income risk model showed that the VE graduates were less likely to suffer from the lower-than-average income risk ($\beta = -0.29$, $p < 0.05$). The lower-than-average income risk of the individuals with more work experience was lower than that of the inexperienced graduates ($\beta = -0.06$, $p < 0.05$).

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