THAMMASAT REVIEW
PRINT ISSN: 0859-5747 ONLINE ISSN: 2630-0303
Volume 22 No 1 (January-June) 2019 [Page 91-120]

Vocational Education Choice and Fiscal Incentive for Low-Income Families

Thitima Plubplueng [a, *], Direk Patmasiriwat [b]

[a] *Faculty of Business Administration, Rajamangala University of Technology Rattanakosin, Thailand*

[b] *School of Development Economics, National Institute of Development Administration, Thailand*

Received 8 November 2018; Received in revised form 14 May 2019
Accepted 14 May 2019; Available online 26 June 2019

Abstract

This research presents a case study of parental and student choices over vocational education versus general education assuming that a government provides a financial incentive for students who are currently in Mattayom 3 and would take vocational education. Specifically, a survey of 607 households from 4 provinces in Thailand was conducted to infer about their educational preferences and choices, and the bivariate probit method was modeled to test important factors. According to the scheme, the government would set a fund to promote vocational education and 2,200 baht per month would be granted as an incentive for those who chose vocational schools. Two equations were used in the estimations:1i) the probability of choosing a vocational school; and 2) the estimated proportion of those who are interested in the scheme. Our findings are as follows. Firstly, 40 percent of the respondents expressed an interest in participating in the scheme. Secondly, the scheme attracted a higher proportion of low-income children than medium or high income children. This was perhaps due to a higher chance of employment and a relatively quick financial return from vocational education. Lastly, the fiscal cost of the scheme was estimated to be around 6,090 million baht per year.

Keywords

Fiscal incentive scheme, Vocational education, General education, Low-income children, Fiscal cost.

*** Corresponding author:** thitima.plu@rmutr.ac.th **DOI:** 10.14456/tureview.2019.6

Introduction

The debate on general versus vocational education has been an important part of policy makers' and academics' agenda. As both educational systems have their benefits, there exists a well-known general-vocational trade-off. Countries differ remarkably in the emphasis their school systems place on general versus vocational education. European countries such as Sweden and Germany prioritize managing vocational over general academic education in high school by focusing on providing professional skill training to individual students in preparation for entry into the labor market (Hanushek et al., 2011). Skills derived from these trainings will offer a starting point for better chances of getting jobs relevant to their vocational education, although job security risks may be higher than those of the general academic education in the long term (Verhaest & Baert, 2015). The United States, however, prioritizes general over vocational academic education in high school because general education is vitally important to changes in the nation's economy while students can also change jobs and adapt to new technologies faster than those who choose vocational academic education (Goldin, 2001; Hanushek et al., 2017). Additionally, graduates with general academic education possess the qualifications which are in demand in more diverse sectors of the job market but may at the same time be associated with higher dropout rates among those less likely to meet these requirements (Bishop & Mane, 2001; Dee & Jacob, 2006).

As for developing countries, there are concerns over shortages of skilled labor demanded by the job market (World Bank, 2013) due to the need of technological innovations as a driving force for sustainable economic growth while addressing issues around social exclusion and equity (Psacharopoulos, 1997). As a result, large numbers of skilled labor are needed from the lower to higher levels in the industrial sector which requires increasingly more graduates with vocational academic education both at the high school and higher education levels, which at present are numbered far less than those with general academic education. As a result, ASEAN governments such as Laos, the Philippines and Thailand have introduced education reforms through policies for increasing the proportion of students with vocational secondary education in the future (International Labour Organization, 2016) which has resulted in an increase in the proportion of students with vocational academic education in these countries (Cedefop, 2009). In Thailand, vocational academic education has been reformed with the aim to increase the proportion of students with vocational academic education to be more than or nearly the same as those with general academic education. This is consistent with the vocational secondary education rates in developed countries (Nevriye & Esed, 2009).

The majority of school-age children in Thailand chose to pursue a general education track (77%) despite the fact that National Educational Policy has strongly encouraged

students to take a vocational education track. According to the Office of Education Council, there are at least two reasons why vocational education should receive greater public attention. Firstly, the employment opportunity for vocational graduate is higher than that of general education. Secondly, there has been ample evidence of a shortage in vocationally trained manpower (Office of Education council, 2011); hence, the National Educational Policy tries to increase vocationally and technological trained personnel. Figure 1 shows the trend of general education versus vocational education in Thailand over the past decade. About two thirds of students who completed lower secondary school chose to continue general-education and only one third of students took vocational education. The statistics indicate a decreasing proportion of vocational enrollment from 2007 to 2015, specifically, a drop from 39.8% in 2007 to 32.7% in 2015.

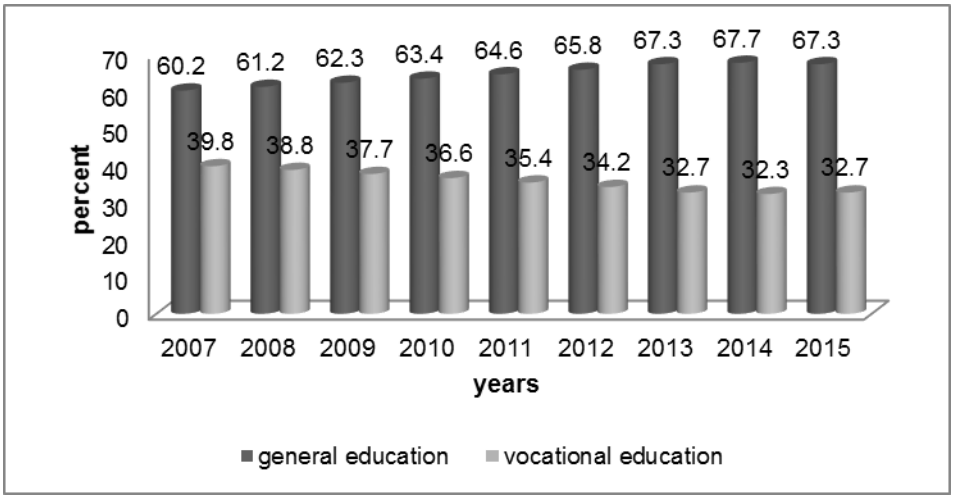

Figure 1 The portion of general education vs. vocational education from 2007-2015
Source: Statistical Education of Thailand, Ministry of Education

A reason why vocational education is less popular may be involved with parental attitudes and values which come from student violence in vocational and technical schools and the fear that their children may be adversely affected by these student conflicts (Chanchaona et. al., 2012). In fact, vocational education provides quick financial returns and greater chances of being employed in factories and industrial enterprises (Pimpa, 2007). According to studies by Gatlin (2008), rich households prefer to send their children to general education school and, later on, continue to university education whereas the poorer ones opt for vocational education due to quick returns and good chances of being employed (Plubplueng, 2014).

This paper takes a case study of decision-making by parents and students who are currently about to complete lower secondary education with respect to general education high school versus vocational education. The simulated model entitled "Fiscal Incentive for Vocational Education" assumed that a scholarship, free-of-obligation, is granted for those children in Mattayom 3 who would take the vocational path (Por Vor Chor in Thai). The scholarship will be granted by the Area-Based Committees based on grades and achievements of students, income status (preferably low-income families), and attitudes toward a vocational career (Patmasiriwat, 2009). When the scheme is approved, a grant of 2,200 baht per month will be awarded over the next 3 years. Students are free to choose specialized fields of study ranging from technician, commerce, and agriculture in the public vocational institutions. The scholarships will be announced prior to the beginning of the first semester. From the national perspective, this scheme is expected to increase the proportion of vocational students over general education students to the desired proportion.

The paper is organized into five sections. Section II provides an introduction to the institutional background of secondary education in Thailand. Section III presents a literature review related to factors for decision making of households affecting educational investment. Section IV explains the theoretical model in detail. In Section V, the data source and empirical evidence results are reported. Lastly, Section VI presents the conclusion and discussion.

Background

Thai education can be categorized into 2 groups. The first group is Basic Education, which takes at least 12 years. It consists of Pre-Primary Education for children of age 3-6 years old, and Primary Education for children of age 7-13 years old. The second group is Secondary Education, which consists of Lower Secondary Education for students of age 13-15 years old, and Upper Secondary Education for students of age 16-18 years old. There are two types of education in this category. The first one is Academic Track or Grade 10-12, which is a basis for further study in a university level. The second one is Vocational Certificate (3 years) for developing vocational knowledge and skills or studying in higher vocational levels. There is also Compulsory Education for 9 years (Grade 1-9). The Compulsory Education is different from the Basic Education, which provides the right for Thai people to obtain education but is not compulsory. As for Tertiary Education, it is Post-secondary Education and can be divided into 3 levels. 1) Lower than Degree Level: Vocational Certificate and Diploma. It takes about 2-3 years after Secondary Education. 2) Bachelor Degree takes about 4-5 years after Secondary Education. Students can attend both public and private institutions. 3) Higher Education Level includes Certification, Master and Doctorate degrees.

The Ministry of Education oversees the overall Thai education system. However, there are agencies in charge of higher education starting from high school. The Office of the Vocational Education Commission (VEC) oversees the Vocational Education, and the Office of the Higher Education Commission (OHEC) oversees the academic track in this level. The VEC is also a secretariat of the Vocational Education Commission. In the 2017 academic year, there were 882 vocational institutions with a total of 976,615 students. There were 425 state-own vocational institutions, with 674,113 students; and 461 private vocational institutions with 302,502 students.

The VEC administers and provides vocational education to serve students' needs and preferences. Their vision is to focus on developing quality vocational training to meet the demands of the labor market and society at national and ASEAN levels. Universal and theoretical knowledge, together with Thai wisdom are passed on to students to build their capacity for pursuing a career as a practitioner or an independent professional. The Vocational Certificate is a course for junior high school graduates to develop into skilled specialists. The Higher Vocational Certificate is a course for vocational certificate or high school graduates to develop professional skills.

Student Loan Programs in Thailand as a Tool to Enhance Education for Low-Income People

The Thai government has been providing financial support to underprivileged students to solve disparities in educational opportunities. The Student Loan Fund (SLF) was established in 1996 and the Income Contingent Loan (ICL) was established in 2006. The latter has provided loans for tuition fees or expenditures to be repaid after students graduate and start a career. ICL differs from SLF in the sense that SLF provides loans for students, whose income is no more than 150,000 baht per year, to pursue high school, vocational education, and higher education. The loan includes tuition fees and personal expenses, carrying interest at 1% per year. It requires a guarantor, and after 2 years of graduation, borrowers with a salary starting from 4,700 baht per month are obligated to repay the loan within 15 years to Krung Thai Bank. As for ICL, it is provided only for tuition fees to all students who wish to pursue higher education. It does not charge interest but is adjusted with inflation or the consumer price index. The loan does not require a guarantor, but future income of borrowers is used as a repayment guarantee. Terms of repayment start when borrowers begin working and earn more than 16,000 baht per month. The period of repayment paid to the Revenue Department depends on the ability of borrowers to repay. Currently, the two funds are still in operation. However, research has found that SLF cannot effectively screen for low-income students (Chapman et al., 2010), which is consistent with the results of a study in the United States – motivation by the state to provide educational loans to low-income students to be repaid after graduation cannot provide an effective

incentive compared to grants (McPherson & Schapiro, 2002; Heller, 2002; Lee, 2002). A loan has no effect on the parent's decision to support their child's educational pursuits, excepted debt for their household. Also, if they cannot finish school, their family's situation could get worse (Gladieux, 2002). Thus, the government should increase the opportunity for education including junior high school and senior high school for low-income families, by applying full scholarships without any conditions, as the concept of CCT (Condition Cash Transfer). CCT could produce motivation for children to study further in high school, which is more appropriate than a loan from the SLF.

Mortgage-type loan (collateral)

There has been a suggestion that in addition to the mortgage-type loan, there should be another fund that targets poor students in the form of conditional cash transfer (CCT) which has been popularized in many developing countries around the world. Aliterature review of 42 studies from 21 countries (Behrman& Knowles,1999) found that there was a positive correlation between household income and opportunities to pursue further education and household income constraints were the most important factors that caused children to drop out of schools or to arrive late or miss classes. In other words, increased household income will result in better chances for children to pursue further education. Therefore, this is an important condition for participating in CCT for households in each country. Several empirical studies showed the impacts of the absence of lifelines such as when a head of household was dismissed from work, resulting in a financial crisis in the household and causing children to drop out of school because financial institutions were not available to provide tuition loans. Duryea et al. (2003) showed that a head of household with no job would, at a high level, increase child labor and decrease further education especially for 16-year-old girls. In Guatemala, child labor has continued to increase. When children drop out of school it is unlikely they will return. Factors have shown that parents were unable to secure tuition loans from financial institutions for their children while not having social security to prevent children from dropping out of schools, such as during an economic crisis in Indonesia and Argentina which resulted in a reduction in school attendance (Thomas et al., 2003; Rucci, 2003). In contrast, parents in Tanzania are able to access loans which help to protect against risks from various events experienced by the household and help children to continue receiving education (Funkhouser, 1999). Furthermore, an empirical study by Janvry et al. (2006) of rural households in Mexico which joined CCT found that the program's conditions both for the student grants and attendance records for children between 5-17 years old particularly by random sampling from grade 3 and 9 clearly helped to motivate households to let their children continue receiving education until they graduated from primary and secondary schools. This helped reducing the number of children that dropped out of schools for various reasons such as natural disasters or

household crisis. Therefore, CCT is a tool that can prevent poor people from dropping out of school at an early age and improve chances of employment after they graduate from high school.

Conditional Cash Transfer (CCT) is a subsidy for a student demand, which is a new alternative to create educational opportunities. It reduces child labor and dropout rates among children from low-income households. CCT has been used in several developing countries such as Mexico, Bangladesh, Indonesia, Turkey, Cambodia, Morocco, Pakistan, and throughout South America. It was also extended to New York, United States of America. CCT is mostly used to motivate parents to provide their children with education. It is also a health care tool for the children. The program name varies across countries (Morley & Coady, 2003). Studies found that the program is effective and can increase student achievement (Schultz, 2004). In addition to increasing low-income children's enrollment rates, the program also reduces dropout rates of those children. Most developing countries prefer to subsidize targeted students as a stipend (Patrinos & David, 1997).

Fiszbein & Norbert (2009) followed CCT results in various countries such as Cambodia, Indonesia and Bolivia under different names with poor households as a target group to increase the chance for receiving education. The selection process and payments to households were carried out through local departments using government budgets within a set period. It was found that the quality of life for poor people had improved while cash transfers for households also helped to reduce dropouts. For example, the introduction of pensions in the United States helped to increase school attendance and decrease child labor (Edmonds, 2005). However, it was found that unconditional cash transfer had less impact on children's school attendance than conditional cash transfer. For example, cash transfers may be reserved for only girls or poor households which can provide a better incentive for attending school than unconditional cash transfer. It was determined that children in Brazil who dropped out to find work at that time (Bourguignon et al., 2003) tended to return to school if they joined the program.

CCT or student grants for poor households not only prevented children from dropping out of schools and helped them to pursue higher education but such assistance also helped to end a cycle of poverty from parents to children which can be another tool for children's social security. Multiple educational results in various countries (Fiszbein & Schady, 2009; Stampini & Tornarolli, 2012) confirmed that CCT can improve the way of life for poor households and increase the household's overall consumption which helps to reduce poverty. Therefore, CCT is possibly a new innovation that can increase the chances for education for poor children or children who lack opportunities in Thailand. This study aims to use CCT on a trial basis to increase the chances for education for poor people in order to

increase the proportion of vocational education students in accordance with Thailand's education policy.

Literature Review

Educational choices and preferences are socially and jointly determined by parents and students, which can be expressed in term of a family utility function (Becker, 1993). Families allocate all of their limited production factors into the consumption of goods, savings or accumulation of assets and educational investments for their children for maximum utilization and seek income from work. The quantity and quality in the allocation and distribution of resources as well as the time spent on various activities will affect the level of success of a child's education in the future (Haveman & Wolfe, 1995; Sherraden, 1991; Becker, 1993) according to human-capital theory which was applied as a thinking framework in the decision-making of educational investments for children in this article. Furthermore, the issue of choosing between general and vocational academic education has become an important subject for academics comparing long-term effects. As for low-income households, deciding to receive vocational academic education will improve the chances of finding jobs faster while also possessing the qualifications required by employers (Arum & Shavit, 1995). However, vocational education graduates may have high incomes early in their careers but as they age, income proportions or career advancement especially during the pre-retirement period will become less advantageous than those with general academic education (Forster & Bol, 2018; Hanushek et al., 2017). Vocational education reforms in each country may cause the incomes for graduates to increase and the income difference between graduates with vocational and general academic education will be a deciding factor in choosing their high school education (Zilic, 2018) and support each country's policy for increasing the proportion of vocational students.

A literature review was conducted for studies on education opportunities and choices in high school for each individual who decided whether or not to continue education after middle school (Mattayom 3) or mandatory education which would be between general and vocational academic education. Study results with independent variables for predicting the choices and success of education are as follows:

Conley (2001) used logistic regression to examine the relationship between wealth and college participation. He concluded that parental wealth has a strong effect on postsecondary access, may affect college completion, but has no significant effect on graduate school attendance. Furthermore, it was found that household income can be used to predict the success of middle school education for children. However, at the higher education level, household wealth must also be taken into consideration in order to increase prediction accuracy because it is used to measure all the resources available to the household, while household income serves only as a measurement for a certain

period of time (Conley, 1999). This is consistent with a study by Haveman and Wilson (2007) which used income and asset variables to analyze higher education inequality. It was found that poor children were likely to study at a community college or choose vocational education while some enrolled in undergraduate courses at universities of inferior prestige or quality than those enrolled by wealthy children.

A study by Gatlin (2008) examined the role of wealth and social determinants over educational choices, using US data to analyze educational decision making. The subjects referred to high-school graduates and alternative choices involved, 2-year diploma programs and 4-year bachelor degree programs. The National Longitudinal Study of Youth (1997) used a sample of 9,000 youths and adopted the logistic regression model to estimate relationships. The findings were as follows. Firstly, household wealth was found to be positively and significantly related to student achievement. It meant that the high-income students tended to perform better than low-income students, measured by GPA score. Secondly, the high-income students opted for 4-year college degree programs more than their poor counterparts. Thirdly, the poor or moderate income parents opted to invest in a 2-year diploma program which might have been due to many reasons. For example, the average GPA among poor children was at a low or moderate level which limited their chances to apply for universities and the time duration of learning was shorter and hence they would receive a relatively quick financial return from vocational education.

Among previous research in Thailand, Wongmonta (2012) investigated factors determining educational choices for students who completed Mattayom 3 and were about to make a decision to pursue general education or a vocational track. Three data sources were used in this study, i.e., i) the SES survey in 2009; ii) the 2009 Ordinary National Education Test (O-NET); and iii) the 2009 National Labor Force Survey (LFS). Specifically, he applied a multinomial probit model to estimate the relationship in which educational choice was a dependent variable against a set of explanatory variables. His findings were: i) household financial asset was found to be an important factor for those who chose the general-secondary track; ii) those households with credit-constraints (1,882 observations) tended to choose the vocational track whereas the unconstrained group (1,883 observations) opted for the general track.

Moenjak & Worswick (2003) studied educational choices and compared returns to education between the general-secondary track versus the vocational track. They used Thailand's Labor Force Survey from the years 1989 to 1995 to estimate choices (the IV probit model) and the Mincerian earnings equation. The explanatory variables were parental education and location. Their findings were: a) fathers' education was found to be an important factor and positively related to the vocational choices, i.e., fathers who completed higher than primary education and were blue-collar workers; b) the OLS estimated the Mincer

earnings model, as compared to general education at the same level, upper secondary vocational education gave a higher return with regards to earnings by 23.8 percent for men and 20.7 percent for women.

This study employed the concept of Bourdieu (1986) by using the variables regarding economic capital, cultural capital, and social capital. For the economic capital relating to household income and wealth (Conley, 2001; Haveman & Wilson, 2007), it analyzed the opportunities and choices in decision making on studying between general education and vocational education in secondary school and higher education. It was found that households which had increasing income or asset wealth would make a decision on studying in general education more than vocational education (Wongmonta, 2012; Gatlin, 2008). Moreover, home owners were more likely to take their children to study and their children were more likely to graduate from college than children whose parents did not own a home (Kim & Sherraden, 2011; Elliott III & Hyun-a Song, 2011).

Cultural capital was transferred from the family and the education system (Hertz et al., 2007). Most research showed that parents who had high education would make the decision to have their children study in general education more than vocational education (Yi, 2005; Zhan & Sherraden, 2011). Also, children who had more academic ability would choose to study in general education while those who had less academic ability would choose to study in vocational education (Gatlin, 2008; Suwankiri, 2007). Additionally, parents who closely participated in activities with their children had the opportunity to have them study in general education more than vocational education (Dumais, 2002; Plubplueng, 2014).

Social capital focused on the parents' positive attitude towards occupational study. This made them choose vocational education for their children (Pimpa, 2007). Furthermore, the increase of home-to-college straight-line distance would decrease opportunity to study at that institution (Fuller et. al., 1995).

In addition, the independent variables of parental hope functions consisted of an age-of-parents variable. It could be said that children would get more educational opportunity according to their parents' age (McLanahan & Sandefur, 1994; Daouli et. al., 2010). Moreover, the occupation of the head of the household which was labor, low skilled, or high skilled work, would give less opportunity for their children to graduate from at least junior high school (Daouli et. al., 2010). When the father was a white collar or a blue collar worker and craftsment, it would increase the opportunity of decision making for both male and female children to choose vocational education (Moenjak & Worswick, 2003). The gender of household head was also a factor. If the household head is female, that family will usually have less wealth than a male household head (Hao, 1996). Mostly, in a divorce status, a wife becomes a single parent and takes care of the children alone. Accordingly, children tended to

graduate at a lower level than those who had a male household head (Nam & Huang, 2008; Ngware et. al., 2009).

Theoretical Model

Our study adapts the model originated by Brown (2003) who articulates that social capital, cultural capital and economic capital are factors that influence educational choices. Economic capital is measured by the household consumption of products and services and the time devoted to child care. Social capital is measured by the frequency of parental activities in communities and schools. Cultural capital refers to the educational attainment of both the father and mother.

However, for this study, both production factors will be accumulated into cultural capital and social capital. For measuring investment in education from the highest level of a child, a household is divided into 2 durations with the assumptions of the model, which are: each household may consist of a father or mother with identical preferences and have the number of *n* children; the household has liquidity constraints, unable to loan or borrow future money from sources for consumption but with the income from work; are able to consume products and services no more than the total assets of the household. Therefore, each household will try to allocate the limited existing resources to maximize utility (u), which consists of the consumption in Duration 1 (C^1) and the consumption in Duration 2 (C^2).

Hence, U (C^1, C^2) is determined to be a strictly concave utilities function. For the consumption in Duration 2 (C^2) of the parents is the investment in education for the child, which will be shared according to the sharing rule, α_t, by which α_t may have an equal or different value according to the satisfaction of the parents to share the resource to each child. The utilities function in the consumption of the parents in Duration 2 depends on the consumption of the child according to the altruism function of the parents, ξ_t, which depends on the type of the variables that are relevant to the child (b), such as gender, family tree, sibling sequence, and cumulative Grade Point Average, etc., and the variable of father or mother or the household structure (p), such as the household size, education and taste (attitude) of parents, marital status, etc., in which it can be written in the function form of $\xi_t = f(b, p)$ by which b is a variable of the child and p is a variable of parents or household structure.

Therefore, such utilities function variables as mentioned are as follows. μ is the current household's preferences or the weight from the consumption in Duration 1, and $\mu \in [0,1]$. α_t is the weight of sharing resources that parents provide to each child (in case of having more than 1 child) and $\alpha_t \in [0,1]$. In Duration 2, parents use the remaining resources from the consumption in Duration 1 to take care of the child with the investment in education according to the production function (g). The functions can be written as follows:

$$U = \mu U(C^1) + (1-\mu) \sum [\alpha_t + (1-\alpha_t)\ \xi_t (b,p)]\ U(C^2) \quad (1)$$

μ is the household's preference (weight) for the period 1 consumption. Set $\mu \in [0,1]$ and α_t are the parental weight distributions for each child. If there is more than one child, set to $\alpha_t \in [0,1]$.

In the period 2, the parents use the resources left over from the consumption in the first period to provide child care by education investment in the production function (g) which is written as follows:

$$C^2 = g\ (K_i) \quad (2)$$

Where $K_i = (K_e, K_c, K_s)$, K_e is economics capital, K_c is cultural capital, and K_s is social capital.

Each type of capital is the input that parents use to invest in education to gain the appropriate output, which is for the child to graduate in the appropriate education and study plan (C^2) under the existing limitation with the variable of economic capital, cultural capital, and social capital in the model of decision making of the household about the investment in education. (Plubplueng, 2014).

The household's problem can be written as a mathematical equation as follows:

$$\begin{aligned} \textbf{Max} \quad & \mu U(C^1) + (1-\mu) \sum [\alpha_t + (1-\alpha_t)\ \xi_t (b,p)]\ U(C^2) \\ \textbf{s.t} \quad & C^1, K_i \\ & C^2 = g\ (K_i) \\ & P^C C^1 + P\ K_i \le A_t \\ & T = t_W + t_{C^2} \\ & Y_t = w(H) t_W + r K_t \end{aligned} \quad (3)$$

P^C is the price of products and services, which is assumed to be equal to 1 (equivalent of comparison price in each product and service). P is the price or cost of each capital that is used to invest in education. Y_t is the household income and T is the total time in 1 day (24 hours). t_w is the total working -hours of the father and mother, and t_{C^2} is the time that is used to invest in child education. In this model, it is stated that apart from the working hours, all the times will be devoted for taking care of the child to develop human capital. Therefore, opportunity cost for human capital development is independent from the working hours. w(H) is the function of the opportunity cost that is used for other activities. In this regard, it is the time used for the investment in child education in which the hourly wage is the opportunity cost, depending on the education level of the parents. r is the return on assets or investment (interest rate). K_t is the amount of capital and A_t is the household asset that covers

the income and savings. The equation can be solved by using the First order conditions to compare with C^1 and K_i, which are:

$$\mu \frac{\partial U}{\partial C^1} - \lambda = 0 \quad (4)$$

$$(1 - \mu)[\alpha_t + (1-\alpha_t)\ \zeta_t (b,p)] \frac{\partial U}{\partial C^2} \frac{\partial C^2}{\partial Ki} - P\lambda = 0 \quad (5)$$

Replace the values λ and solve the two equations as follows:

$$\frac{MUc^1}{MUc^2} = \frac{(1-\mu)\left[\alpha_t + (1-\alpha_t)\xi_t(b,p)\right]}{\mu P} \frac{\partial C^2}{\partial Ki} \quad \text{at the appropriate allocation} \quad (6)$$

$$\frac{\partial C^2}{\partial Ki} = \frac{\mu P}{(1-\mu)\left[\alpha_t + (1-\alpha_t)\xi_t(b,p)\right]} \frac{MUc^1}{MUc^2} \quad (7)$$

$$U(C^2) = f(\xi_t (b,p), K_i) \quad (8)$$

$$C^2 \text{ or } y_1 = a + \beta_i \xi_i (b,p) + \theta_i K_e + \eta_i K_C + \chi_i K_S + \varepsilon_i \quad (9)$$

y_1 is the alternative education of the child, which can be divided into 2 alternatives in which $y_1 = 0$ is the child that does not pursue study in vocational education and $y_1 = 1$ is the child that pursues study in vocational education (Vocational Certificate 1). Therefore, parents will make the decision to choose the education level and the appropriate study plan for the child to receive the highest utilities in the household Max U (y_1^*).

The analysis of this study took the motivation on the Fiscal Measures for Vocational Education Model and the opportunity of making decisions for children to study vocational education by using Bivariate Probit Model. The variables of the 2 equations are the decision making for children to study further in senior high school and the interest of the Fiscal Measures for the Vocational Education Model. These variables have a relationship as they can be considered from discrepant terms which are correlated ($\rho \neq 0$). Moreover, the decision making for children to study in vocational education may have an effect on the interest of the Fiscal Measures for the Vocational Education Model. Therefore, the researcher would like to present the Bivariate Probit Regression Model for the analysis because it is more suitable than using the Probit Model. It is divided into 2 equations by defining 2 variables which are the decision for having children study in vocational education (y^*_{i1}) and the interest of the Fiscal Measures for Vocational Education Model (y^*_{i2}). Therefore, 2 variables can be described as follows:

y_{i1} = 1, If parents decide to have their children study further in vocational education.

= 0, If parents decide whether to have their children study further in general education or not.

y_{i2} = 1, If parents are interested in the Fiscal Measures for Vocational Education Model.

= 0, If parents are not interested in the Fiscal Measures for Vocational Education Model. In this context, the Bivariate Probit Model involves the estimation of two equations, specified as follows:

$$y^*_{i1} = \mathbf{x_{i1}}' \beta'_1 + \varepsilon_{i1} \quad , y_{i1} = 1 \text{ if } \quad y^*_{i1} > 0 \text{ , 0 otherwise}$$

$$y^*_{i2} = \mathbf{x_{i2}}' \beta'_2 + \varepsilon_{i2} \quad , y_{i2} = 1 \text{ if } \quad y^*_{i2} > 0 \text{ , 0 otherwise} \qquad (10)$$

$$(\varepsilon_{i1} , \varepsilon_{i2}) \sim N_2 (0 , 0 , 1 , 1 , \rho), \; -1 < \rho < 1$$

Where y_{i1} and y_{i2} are the binary variables representing individual observation and, in our case previously defined in Eqs. (1) and (2) , β'_1 and β'_2 are the vectors of coefficients associated with the $\mathbf{x_{i1}}$ and $\mathbf{x_{i2}}$ sets of explanatory covariates, and ε_{i1} ε_{i2} are the random parts (i.e., the unobserved parts) assumed to be jointly normally distributed with zero means, unit variances, and correlation ρ. Therefore, the identification of a correlation coefficient ρ significantly different from zero indicates the existence of a significant correlation between the two choices as the unobserved parts associated with y^*_{i1} and y^*_{i2} are not independent (Green, 2012). For the explanatory covariates, a set of variables included in the questionnaire was used to address questions on economic capital, cultural capital and social capital variables.

The estimation of the model expressed in Eq. (3) with dependent variables indicated in Eqs. (1) and (2) can be derived from the following probabilities:

$$P(y_1, y_2 \mid x_1, x_2) = \varphi_2 [q_{i1}\beta'_1 x_{i1}, q_{i2}\beta'_2 x_{i2}, q_{i1}q_{i2}\rho] \qquad (11)$$

where, $q_{im} = 2y_{im} - 1$, m = 1, 2 and φ_2 denotes the bivariate standard normal cumulative distribution function, while the other parameters are introduced in Eq. (3). The coefficient estimation relies on the following log likelihood:

$$\text{Log L} = \sum_i \ln P(y_1, y_2 \mid x_1, x_2) \qquad (12)$$

The Model is estimated by using the full information maximum likelihood. Marginal effects are further derived from the following conditional mean:

$$E[y_1, y_2 = 1, x_1, x_2] = P\frac{[y_1 = 1 \mid y_2 = 1, x_1, x_2, \rho]}{P[y_2 = 1 \mid x_1]} \quad (13)$$

where the elements $y_1, y_2, x_1, x_2,$ and ρ are defined in Eq. (3).

Hypotheses

H_1: The variables related to economic capital (household income, owning a house, financial liquidity, and having debts), culture capital (education level of head of the household, activities that support the child, and time spent encouraging the child to study), and social capital (the attitude of the parents towards vocational education) affect the opportunity and alternatives in the decision to invest in vocational education.

H_2: The fiscal measures for vocational education that were developed to examine the motivation of household decision making in investing in education that would make that household change their original decision of not allowing their child to study in a vocational education (no further study or study in general education) into allowing their child to study in vocational education with the possibility of not under 0.4.

Data Source and Empirical Evidence

A survey of households was taken between January 2017 and March 2017 from 4 provinces, namely, Nakhon Nayok, Nakhon Prathom, Supanburi, and Phitsanulok to collect information regarding family socio-economic status, student educational status and educational choices in the near future. A multi-stage random sampling was adopted and may be described in two steps: In the first step, 4 provinces were selected of which 2 provinces are ranked highly in Thailand Human Development Index (HDI) (UNDP, 2014), namely, Nakhon Nayok and Nakhon Prathom, and the other 2 provinces ranked in the middle of the HDI, namely, Supanburi and Phitsanulok. In the second step, two districts and two public schools were selected for each province. Altogether, our sampling covers 16 public schools of which 8 are large-size public schools located in the city center (Amphur Muang), and the rest are public schools located in rural areas which are commonly referred to as "educational opportunity expansion schools"[1].

Our database comprises 607 sampled students who were currently enrolled in Mathayom 3 and soon would make decisions whether to pursue the general educational track or vocational track. Data and information are grouped under 4 headings: namely, i) household socio-economic characteristics such as age, gender, education level of household head, family income, housing asset, and financial liquidity; ii) parental attitude toward children

[1] In the past, these schools offer only primary education, and later on they are extended to offer lower-secondary education (Mathayom 3) in accordance with the policy of the Ministry of Education.

education, parental participation in school activities, and time devoted for child education; iii) decision making over child education in the future, in particular, choice of general education or vocational track; and iv) a simulated financial offer (grant-in-aid) and family decision on conditions that family annual income is less than 150,000 baht and they choose vocational education track.

Table 1 compares socio-economic variables by occupation which includes family income, family size, home ownership, indebtedness, and ability to borrow money from the financial institutions. It should be noted that, firstly, there are wide variations in family income between occupations, for instance, the civil officers rank highly on income with an average of 38,400 baht per month. On the other hand, the general worker as a group earned the lowest income with an average of 13,400 baht per month. Secondly, home-ownership is on average about 82 percent and the variable does not vary widely, and it is similar to family size variable of all occupations with little variation. Thirdly, about half of families incur debt and the group of government employees ranked on top which may be the result of credit worthiness and their incomes are predictable and relatively stable compared to other occupations.

Table 1 Socio-economic household variables by occupation

Occupation	Frequency (household)	Income (1,000 baht)	Size (member)	Homeownership (0/1)	Debt (0/1)
Government employee	56	38.4	4.446	0.929	0.607
Private employee	74	24.8	4.595	0.811	0.527
Own account worker	127	27.9	4.866	0.835	0.402
Agriculture	89	15.2	4.787	0.921	0.562
Employee	252	13.4	4.567	0.766	0.516
Other	9	16.7	5.444	0.778	0.333
Total	607	20.4	4.667	0.824	0.506

Cultural capital is assumed to be influential in predicting educational progress of children and it may be measured by: i) parental reading skill (hours per week), ii) time devotion for child education, and iii) parental participation in school affairs. Table 2 compares the statistics of student GPA against 3 measures of cultural capital differentiated by occupational groups. Note that the government employee group seems to rank highly in cultural capital, higher than other occupations; whereas the general worker group ranked lower in cultural capital.

Table 2 Parental engagement in child education and GPA

Occupation	Reading (hour per week)	Time devoted for child education (hour per week)	GPA (1-4)
Government employee	6.98	9.04	3.16
Private employee	5.84	8.64	3.10
Own account worker	6.20	7.78	3.10
Agriculture	4.81	9.01	3.09
Employee	4.82	7.53	2.93
Other	4.56	8.33	3.33
Total	5.43	8.09	3.04

Figure 2 illustrates three choices to take after completion of Matayom 3. This is to say, [A] out-of-school (or simply “working”), [B] pursuing a general education as en route to university education, and [C] vocational track. Our assumption is that a grant-in-aid may influence family educational choices, in particular the vocational track on the grounds that it is a government policy. The outcomes from the survey may be summarized as: First, without mentioning a grant-in-aid, 30 cases (equivalent to 4.94%) indicate they would leave school to findi jobs; the majority (399 cases equivalent to 65.7%) would take a general education track; and the rest, 178 cases (equivalent to 29.3%), chose a vocational track. Later on, all families were informed of the grant-in-aid (2,200 baht per month with no obligation if their income is less than the minimum standard). The results are: i) Those who earlier said they would leave school showed interest in taking the vocational track, specifically, 13 out of 30 cases (43 percent); ii) Among those who earlier indicated pursuing general education, 42 percent were unwavering but 233 out of 399 cases (58%) were now interested in the offer.

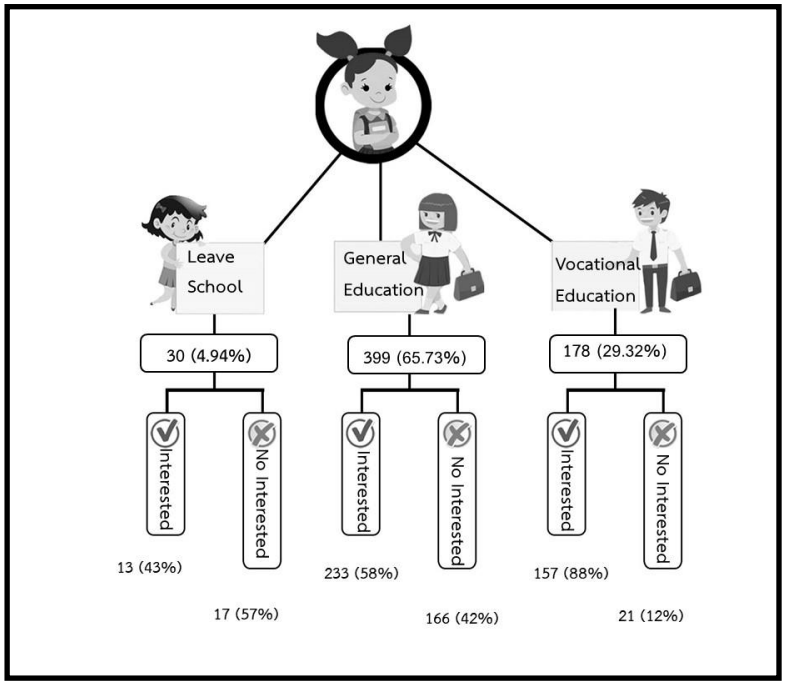

Figure 2 Choice and financial incentive

Table 3 shows that heads of household who are farmers, employees and have other careers with low income decided to send their children to initially take general education and tended to be interested in the government's financial support for vocational education with an increasing proportion of 2-3 times than those households whose decision remained unchanged or, in other words, low-income households were more interested in the government's support measures at a rate of 70% (Table 4).

Table 3 Decision over educational choices and interest in the financial offer, differentiated by occupation

Occupation	Interest in the financial offer	Decision-making	
		I Track: General Education	II Track: Vocation Education
Government employee	no	28	2
	yes	19	7
Private employee	no	22	5
	yes	25	22
Own account worker	no	58	2
	yes	41	26
Agriculture	no	16	4
	yes	49	20
Employee	no	58	8
	yes	109	77
Other	no	1	0
	yes	3	5

Table 4 A proportion of families interested in taking the vocational track

Occupation	An interest in vocational track (0/1)
Government employee	0.464
Private employee	0.635
Own account worker	0.528
Agriculture	0.775
Employee	0.738
Other	0.889
Total	0.664

Table 5 shows descriptive statistics of family decisions over child education after the completion of lower secondary education, in frequency and percentage. Here is the summary of the survey. 429 cases out of 607 (or 70.67%) planned to continue an upper-secondary track and 178 cases (29.32%) a vocational track. 204 cases (representing 33.61%) were not interested in the financial offer, yet, there were 403 cases (66.39%) which showed interest in the financial offer. In Table 6, the result was that the income of those families averaged 20,000 baht/month. 82.37% of each household owned houses, 25.41% of them had financial liquidity, and 49.42% of them owed debt. Most of the household heads graduated from senior high school and junior high school with a GPA of 3.04. Their average age was 46 years old, and most were married couples living together.

Table 5 Characteristics of the sample household's children

Variables	**Frequency**	**Percent**
Decided to pursue vocational education	178	29.32
Decided to continue upper-secondary education	429	70.67
Interested in the fiscal incentive scheme Fiscal Measures for VE Model	403	66.39
Not interested in the financial offer	204	33.61
Homeownership	500	82.37
Household has financial liquidity.	154	25.41
Household has no financial liquidity.	452	74.59
Indebtedness	307	50.58
Household has no debt.	300	49.42
Household head with Prathom Suksa certificate	258	42.72
Household head with Matthayom Suksa certificate	267	44.21
Household head with undergraduate certificate	79	13.08
Household head divorced or did not get married.	93	15.32
Household head got married and stayed together or split up.	514	84.68
Household head is a farmer or others.	350	57.66
Household head is a civil servant or state enterprise officer.	56	9.23
Household head is a private company employee.	74	12.19
Household head is a merchant or self-business owner.	127	20.92
Parents have a positive attitude towards vocational education.	450	74.14
Parents do not have a positive attitude towards vocational education.	157	25.86

Table 6 Descriptive Statistics

Variables	Mean	Median	S.D.	Min	Max
Household income (thousand baht)	20.42226	15	20.18691	1	190
Age of household head (year)	45.83855	45	8.89860	3	80
Children's GPA	3.03855	3.09	0.56376	1.23	4.00
Total members of household (person)	4.66721	4	1.72287	1	15
Level of supporting children's activities	6.42174	6	1.56384	5	10
Parent's reading duration (hour/week)	5.42833	4	3.70233	1	16
Duration of attention to children's education (hour)	8.08566	8	5.21699	1	16
Home-to-college straight-line distance (km.)	13.8758	8	31.75693	0	400

In the estimation, the bivariate probit method was adopted. Two dependent variables (y1, and y2) were used where y1 = 1 if choosing the vocational track and 0 if leaving school or general education; and y2 = 1 if interested in taking the financial offer and 0 if not interested. It tested against explanatory variables which included economic capital, cultural capital and social capital. In Table 7, it was found that, as household income increases by 1,000 baht, their chance of being interested in the Fiscal Measures for Vocational Education Model would reduce by 0.005 times. The households with financial liquidity would be 0.4 times less likely to allow their children to study further in vocational education than households that lacked financial liquidity. Additionally, they would be 0.29 times less interested in the Fiscal Measures for Vocational Education Model than households lacking financial liquidity. As the age of household heads increased by 1 year, their chance of allowing their children to study further in vocational education would increase by 0.012 times. Also, the household heads, who got married, including living together or splitting up, would have more chances of having their children study further in vocational education. Also, they were 0.27 times less interested in the Fiscal Measures for Vocational Education Model than divorced or widowed households. Moreover, the household head who is a private company employee would be 0.32 times more likely to allow their children to study further in vocational education than a household head who is a farmer or employee. On the other hand, a household head who is a merchant or business owner would be 0.50 times less interested in the Fiscal Measures for Vocational Education Model than a household head who is a farmer or employee. Parents who support more than 1 child's activities would decrease their chance of allowing children to study further in vocational education by around 0.07 times. However,

parents who have more than 1 level of positive attitude towards a vocational education would increase their chance of making a decision for children to study further in vocational education by 1.37 times. Also, they would increase their opportunity for being interested in the Fiscal Measures for the Vocational Education Model by 0.77 times. As home-to-college straight-line distance increases by 1 kilometer, a parent's chance for allowing their children to study further in vocational education would increase by 0.003 times.

When the hypothesis was tested, the rho was not zero with statistical significance. The rho was equal to 0.406. This means that the discrepant terms of variance in 2 equations, which are the opportunity for allowing children to study further in vocational education and the interest in the Fiscal Measures for the Vocational Education Model, have a relationship. They are not independent to each other. Thus, it is appropriate to employ the Bivariate Probit Model for the analysis. These results can present a policy of increasing the portion of vocational students among low-income families (Table 8). It predicts that 29% of the parents in the sample group would approve children to study further in vocational education and that 66% of them would be interested in the Fiscal Measures for the Vocational Education Model. In addition, when the relationship between the opportunities for approving children to study further in vocational education and the parents who were interested in the Fiscal Measures for Vocational Education Model was considered, the probability was equal to 0.26 or 26%. In addition, when parents decided to have their children study further in vocational education but were not interested in the Fiscal Measures for the Vocational Education Model, the probability was equal to 0.04 or 4%. Also, the group that the researchers were interested in was parents who decided to have their children study further in senior high school, or who did not allow them to study further but were interested in the Fiscal Measures for the Vocational Education Model. This group's probability was equal to 0.40 or 40%, and it is a target group for increasing the portion of vocational students. For the last group that the Fiscal Measures for the Vocational Education Model could not create motivation to change the parents' decision of having their children study further in senior high school, or not allowing them to study further, and were not interested in the model, the probability was equal to 0.30 or 30%. This was a group of parents who were determined to have their children attend college in order to get a career which they wanted. Consequently, they had to choose to study in general education at upper secondary schools to take the entrance exams to enter the faculty that they want in famous universities.

Table 7 Model Results

Bivariate probit Regression Number of obs = 601 Wald chi2 (36) = 157.82

Prob > chi^2 = 0.0000 Log likelihood = -623.57784

y_1 = 1 is studying further in vocational education 1

y_2 = 1 is whether studying further in senior high school or not

Variable	y_1		y_2	
	Coef.	**Std.Err.**	**Coef.**	**Std.Err.**
Household income (thousand baht)	-.0065979	.0045406	-.0055603*	.0033399
House ownership	.1228149	.1567984	.0975482	.1526348
Financial liquidity	-.4013975**	.1568949	-.2965578**	.1371342
Owe debt	-.1528418	.1209525	.1351080	.1143308
Household head graduated with Matthayom certificate	-.1498380	.1367387	-.0902730	.1339347
Household head graduated from higher vocational education, undergraduate, or higher degree	-.3672072	.2332502	-.2623396	.2078935
Age of household head	.0122126*	.0068919	-.0034089	.0066007
Got married or split up	-.2744873*	.1604168	-.2706861*	.1620520
Occupation of household head:				
Civil servant/ State enterprise officer	-.0811245	.2644589	-.3584975	.2302577
Private company employee	.3220165*	.1871291	-.2264477	.1829716
Merchant/ self-business owner	-.2320612	.1637159	-.4958003***	.1511455
GPA	-.0542076	.1085423	-.0976132	.1029790
Total members of household	-.0170438	.0355211	-.0358195	.0333246
Support children's abilities	-.0746516*	.0431398	-.0283593	.0403335
Parents' reading duration	.0150657	.0189246	.0189334	.0169720
Duration of paying attention to children's education	-.0072951	.0122261	-.0121684	.0115925
Parents' attitude towards vocational education	1.378056***	.1898897	.7711792***	.1271942
Home-to-future college straight-line distance	.0034443**	.0016778	-.0005525	.0016836
Constant	-1.073191*	.5813407	1.214802**	.5367582
/athrho	.4311033***	.0894077		
Rho	.406243	.0746524		

Likelihood-ratio test of rho = 0 chi2(1) = 24.7325 Prob > chi2 = 0.0000

Source: Primary Data Survey

Note: * level of significance .10 ** level of significance .05 *** level of significance .01

Table 8 Predicted Probability from the Model

Variables	Average	Standard Deviation	Minimum Values	Maximum Values
y_1 : vocational education	.2932455	.4556255	0	1
y_2 : interested policy	.6639209	.4727559	0	1
Biprob1	.2929106	.1915908	.0007646	.8555873
Biprob2	.6655585	.1887274	.1102998	.9344086
Biprob11(p11)	.2575533	.1748000	.0004794	.3168884
Biprob10(p10)	.0353572	.0288766	.0002788	.3168884
Biprob01(p01)	.4080052	.1056116	.0694015	.6752926
Biprob00(p00)	.2990842	.1976918	.0413281	.8874851

Source: Calculation

Discussion and Conclusion

The analysis of opportunities and alternatives in decision making for pursuing upper secondary education between general education and vocational education in this study uses economic capital, cultural capital, social capital, and household structure as the criteria for considering scholarships for low-income families. Each scholarship gives 2,200 baht per month for student expenses for three years. In the Fiscal Measures for Vocational Education Model, considering the household income, which is a main variable, is important. Therefore, the decision making for studying further and choosing the vocational education can be predicted. However, the decision of pursuing a study in general education has to add more variables relating to household wealth. These variables have to be considered as well (Gatlin, 2008), since parents who have their children study further in general education usually expect them to graduate college. Hence, the more household wealth variables that are added, including net assets (Haveman & Wilson, 2007), liquidity of assets (Zhan & Sherrden, 2011), financial assets (Wongmonta, 2012), and house ownership, the more chances of studying further in general education than vocational education will occur. Therefore, when the households decide to invest in education for their children to study further in general education in upper secondary education (Matthayom 4), they usually hope for the children to go to college. These families generally have an economic and social status which is quite more prepared than households which decide to have their children study further in vocational education. This includes the household heads who have a stable career (Daouli et. al., 2010), high education (Yi, 2005), and parents who stay together as a complete family (Hao, 1996). Additionally, the parents' attitude towards vocational education is an important variable in the decision making for their children in choosing to study further in vocational education (Pimpa, 2007). If parents have a negative attitude towards the vocational

education, they will not let their children study further in vocational education as well. Another reason is that parents begin to have expectations about their children's careers. They want their children to have a stable career, income, and job, such as a civil servant.

From this point, parents tend to make a decision for their children in choosing to study in general education and college as valued in Thai culture. It accords with Human Capital Theory which explains that parents want their children to have a better future than themselves. Moreover, children who have low grades and live with low-income families will have a higher chance of choosing to study in vocational education (Gatlin, 2008; Plubplueng, 2014). However, there is no influence of such variables in this study, since the educational system focuses on the GPA as part of the consideration to study at a higher level. This makes many schools and teachers help students thoroughly and the result is that most of their grades are quite high. Therefore, it cannot determine the different abilities of students and may not affect parents' decision making or expectation of their children.

The target household for increasing the proportion of vocational students, following the government policy, is a family which has an opportunity of changing their decision from not letting their children study further, or having them study in vocational education by using the model instead of general education. This target household is at 40%. From these fiscal measures, the scholarship program can create the motivation for households to change their decision in educational investment. The significant variables that have an effect on the Fiscal Measures for Vocational Education Model are poverty and lack of readiness for the educational investment for children. These include the households that have low-income, lack of financial liquidity, farmer parents, and an incomplete family, but parents have a positive attitude towards studying in vocational education. From this point, these variables are used as the conditions in searching for students who are truly from low-income families.

The researcher believes that the Fiscal Measures for the Vocational Education Model is an economic tool to increase educational return. This is conducted by decreasing the cost of education for low-income families. It will tangibly result in a change of decision for children to study further in vocational education. If this process could be used in Thailand, it would definitely be possible to increase the proportion of vocational students and general students to be 50: 50 within the next 10 years as the government aims. In addition, the government supports full scholarships without any conditions, following the concept of CCT which is active in other countries. They have to set the criteria for searching for students who are from low-income families by using empirical data more than documents. Moreover, the area committee should be nominated, including teachers and local leaders. Also, local government departments should participate in the consideration of defining the proper criteria. Importantly, they should use the criteria from the results in this study, such as considering their income, financial liquidity, debts, household status, picture of the house,

and a house visit. Furthermore, scholarships should be allocated based on the household poverty rating from this study's proposed criteria results.

Additionally, schools should record students' data by using an information system to easily determine students who live in low-income families. This will help them have a chance to study further in vocational education. Nevertheless, for the households with medium or relatively good status, parents will decide to support children to study further in vocational education when they intend to or like the vocational education indeed.

In the final part of the article, the author will try to calculate a simulation of fiscal burden of vocational education funding in the upper secondary education level (vocational certificate) for 3 years by taking into consideration the student statistics in academic year 2016 (at the time of the survey). It is expected that all students are studying in Grade 9 in the 2017 academic year and 769,081 students are studying in Grade 8. The calculation is based on the poorest students of the first two deciles, accounting for 0.2% of the total Grade 8 students or 153,816 students. Then the screening committee selected the poorest households to receive the funds according to the fiscal measure for vocational education. It assumes that 50% of the poor will decide to take vocational education, resulting in 77,000 students nationwide receiving the funds. Qualified students can choose any field of vocational education and will receive the complimentary funds only for living cost of 2,200 baht monthly for 3 years. Therefore, each student will receive 79,200 baht in total. As a result, the government may set aside 6,090 million baht for the project. About 70% of the funds should be supported by the government and the remaining 30% should be from the Student Loan Fund, so that 77,000 Grade 9 students from the poorest households nationwide will have a chance to finish a 3-year vocational education degree. This is a concrete method to increase the proportion of vocational students under the government's policy.

Acknowledgement

The author would like to express gratitude for the joint-financial support by the Office of the Higher Education Commission, the Thailand Research Fund, and The Rajamangala University of Technology Rattanakosin.

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