School Choice and Labor Market Outcomes in the Republic of Korea: Focusing on Vocational Education Path

Choi, Seonkyung

(Degree)
博士（学術）

(Date of Degree)
2019-03-25

(Date of Publication)
2022-03-25

(Resource Type)
doctoral thesis

(Report Number)
甲第7538号

(URL)
https://hdl.handle.net/20.500.14094/D1007538

2018 年 12 月 20 日　提出

School Choice and Labor Market Outcomes in the Republic of Korea: Focusing on Vocational Education Path

韓国における学校選択と労働市場の成果

– 職業訓練教育経路に着目して –

Faculty / Graduate School of International Cooperation Studies

Department / Regional Cooperation Policy Studies

Professor / Keiichi OGAWA

Student Number / 141i035i

Name / Seonkyung CHOI (崔　善境)

SUMMARY

Most developed countries are concerned more about the general education studies and its policy agenda than vocational education in secondary schools (Goldin, 2001; Krueger & Kumar, 2004a; 2004b). As the world enters a full-fledged low-growth era, concerns are increasing over the unemployment rate for young people. Many education economists debate the discourse of productiveness / effectiveness of the "school to work transition" through vocational education compared to general education (Fersterer, Pischke & Winter, 2008; Hanushek, Woessmann & Zhang, 2015).

Young people who have jobs also experience job mismatches in various forms, from high frequency of job changes to unemployment and vice versa. Accordingly, many policy analysts continue changing the value of policy favoring a high enrollment rate on higher education instead of vocational education. A strategical way to address these problems is to strengthen vocational education, thereby facilitating smooth school to work transition and reducing the gap of mismatch between the school and the labor market (CEDEFOP, 2012; 2013). These similar situations illustrate in Republic of Korea (henceforth Korea) for a long time, the problem of youth unemployment is very serious that it draws attention at the national and individual levels. In particular, the unemployment problems among university graduates have become a more serious social problem based on the vast majority of young people who enter college without any learning motivation (known as over education) have brought main problem of the job-mismatch between job seekers who complete higher education and small and medium sized enterprises. (Jung, 2017; Ministry of Employment and Labor, 2016).

To address these challenges, the Korean government has endeavored to improve vocational high school in revitalizing the role of vocational secondary education as a career specialized secondary education institution that can also help prevent excessive college entrance. Concerning the issue of vocational education linking to labor market, many studies in Korea (Chae, 2004; Kim, 2013; Choi, 2018) have looked at its labor market outcomes only

in wages and employment. However, it is necessary to consider in depth the labor market outcomes on every conceivable education pathway based on vocational education.

Against this background, this study aims to explore the following major three research questions: (1) What are the factors affecting an individual's schooling decision on high school university choice in Korea; (2) How does the labor market outcomes correlate with each education path and level in terms of employment and wages; and (3) How does the labor market outcomes correlate with each education path and level in terms of job quality. The purpose of this study is to investigate the effects of individual's school choice (selected from high school level) on labor outcomes More specifically, it first investigates the impact of the different type of high school choice on tertiary education decisions, and second, the effect of every level of education as well as every conceivable education pathway on labor market outcomes.

The analysis related to the first research question tests two hypotheses: (1-1) Students who have low performance and parents with less education and lower income levels in the middle-school are more likely to go to vocational high school than to general high school; (1-2) Students who have a low performance and parents with less education and lower income levels in the high-school are more unlikely to participate in higher education. The hypotheses related to the second research question are as follows: (2-1) Obtaining higher level of education as a 2-year university or vocational secondary education can increase the likelihood of employment after graduation as opposed to other education pathway; (2-2) Obtaining the highest of levels education can lead to greater opportunities for wages, nonetheless fewer opportunities to find employment. For the research question 3, the study hypotheses are as follows: (3-1) Obtaining higher levels of education, particularly, general education track, such as 4-year university based on general high school can lead to greater opportunity for job status compare to fewer years of education; (3-2) Obtaining higher levels of education, particularly general education track, such as 4-year university based on general high school can lead to greater opportunity for working in large corporation compare to fewer years of education.

This study applies a probit model to analyze the determinants of disparate high school enrollment. In addition, determinants of tertiary education choice between 2-year and 4-year university is investigated by applying an MNL model. To examine the impact of every level of education as well as every conceivable education pathway on labor market outcomes, the OLS and probit model is utilized in a combination with CECM technique. The study uses the nationally representative panel education and employment survey tracing data, Korean Education and Employment Panel (KEEP) which was collected through the KRIVET from 2004 to 2014. This study treats the dataset as a pooled cross-section with the years 2004, 2007 and 2014 used as sample periods.

The estimation results regarding the determinants of high school choice basically shows that the higher teacher's assessment has a negative effect to attend in vocational high school. The students who had highest score in the male group, have no probability to enter vocational high school. Better father's income affects more male group than female group than male group and better father's education level affect more female group in nonenrolment in vocational high school. The results might imply that 1) academically excellent students ignored the choice of vocational high school due to focusing on entering prestigious university, 2) boys are more unconditionally and socially supported by their parents spending a high amount of private tutoring for education investment than girls, which is a traditional social perception in Korea from a long time ago, 3) educated fathers do not follow the social perception of educational support to the boys rather than girls.

The estimation results on the determinants of higher education choice between 2-year and 4-year university shows the privileged family background has not strongly affected the decision to enter 4-year university and the school performance is more likely to give effect of such decision. This observation is different with previous studies. This study found that the most important thing for entering 4-year university is the better academic performance. The female group has a strongly higher probability of pursuing higher education with teacher assessment 4 and 5 than male group. It can be interpreted that the girl's academic ability is

stronger and more efficient than boys with respect to education investment. The results also show the fervent social perception of higher education robustly drives the decision of pursuing higher education, the family conditions are not only caught up the fervent social perception of higher education. It shows how strongly the blinded social perception of higher education has settled into Korea.

The estimation results on the impact of every education level and education pathway on labor market outcomes (wages, employment, quality aspects of employment status such as regular job and working for the large company) show that even if student attended the highest possible level of education, it does not necessarily lead to easier access to employment, and better employment status (e.g. regular job and working for large company). However, it does have the effect of receiving better wage. There is no big gap in labor market outcomes when this study compares between vocational high school graduates and 2-year university graduates and 2-year university graduates are worse than vocational high school graduates in terms of wages amount and likelihood to work for large companies. In the pathway where vocational high school graduates continue to obtain more education in 2-year or 4-year university, it does not have any significant effect on labor market outcomes in terms of wages, employment and quality aspects of employment status such as regular job and working for large companies. It is important to note that more than 70% of vocational high school students are going to university in Korea. In addition, this study reveals that the vocational high school graduates in comparison with general high school graduates, do have advantages on wages and likelihood to work for large companies, whereas this advantage could not be found at 2-year and 4-year university graduates' outcomes.

In conclusion, experience has a greatly and significantly positive effect on every labor market outcomes and vocational high school graduates have a significant effect on wage and employment in large company. Based on these results, the strategy of having a decent job for vocational high school graduates, who are in disadvantaged group with regards to their school of achievement and family background, is by prioritizing job acquirement first and, then

accumulating work that will subsequently help to secure a desirable job. More generally, vocational education, especially at the high school level is still very important to succeed in reducing the problem of employee's shortage in the small and medium sized enterprises.

Accordingly, the government policy needs to sustainably support on vocational education at the secondary level. Since the results of this study also show that employees who had a vocational education do not seem to be able to secure and stable job on this has a negative effect to regular job. With respect to the government policy, there is a necessity to keep balance in supporting for vocational education link to the labor market outcomes in terms of its efficiency. It is also inevitable to promote quality and stability in labor market for vocational high school graduates based on appropriate internal and external structure in society.

ACKNOWLEDGEMENT

I will be forever grateful to many people for the guidance and assistance that made possible the success and completion of my dissertation and I am extremely privileged to have got this all throughout its completion. I am grateful to my professors, my family, colleagues, and organizations for helping me achieve one of the dreams that I have had ever since coming to Japan.

It would definitely have been impossible to complete my dissertation without my academic supervisor, Prof. Keiichi OGAWA. Completion of my dissertation was supported by his unlimited encouragement, patience and wisdom. Moreover, he gave me many opportunities to have various experiences in academia as well as in international organization during my Ph.D. course. I will always remember Prof. Masahiro CHIKADA for his encouragement and also for his timely support and guidance not only for the completion of my dissertation but also for my professional career. I owe the deepest gratitude to Prof. Kazufumi YUGAMI, who showed infinite patience with my dissertation and guided me throughout with all the information necessary for completing my dissertation.

I am thankful to and fortunate enough to have had constant encouragement and suggestions from all seminar colleagues and friends at school which helped me to successfully complete my dissertation. I believe that I could not have completed my Ph.D. course properly if I had not had the opportunity to obtain a Kobe-Sugahara Scholarship. I appreciate it very much. Also, I would like to extend my sincere esteem to all staff in GSICS-Kobe University. They kindly and deeply supported me a lot to continue to live and study in Kobe as an international student. I heartily thank my parents, sister and many relatives for their support with their unconditional love. All my friends in Korea have also kindly encouraged me during my whole academic experience in Japan.

Seonkyung CHOI

December 20, 2018

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

AME	Average Margin Effect
CECM	Conditional expectation correction Method
CEO	Chief Executive Officer
DCE	Deciding on a Career for Employment
GHS	General High School
GVC	Global Value Chain
HRD	Human Resource Development
HS	High School
ILO	International Labor Organization
KCCI	Korea Chamber of Commerce and Industry
KEEP	Korea Education and Employment Panel
KEIS	Korea Employment Information Service
KOMA	Korea Manpower Agency
KRIVET	Korea Research Institute for Vocational Education and Training
KOSIS	Korean Statistical Information Service
LDV	Limited Dependent Variable
LEB	Lifelong Education Burau
LFS	Labor Force Survey
LPM	Linear Probability Model
MNL	Multinomial Logit Model
MOE	Ministry of Education
MOEL	Ministry of Employment and Labor
NCS	National Competency Standards
NCDS	British National Child Development Study
OECD	Organization for Economic Co-operation and Development

Off-JT	Off the Job Training
OJT	On the Job Training
OLS	Ordinary Least Squares
PISA	Programme for International Student Assessment
ROR	Rate of Return
SMEs	Small and Medium Enterprises
TVET	Technical and Vocational Education and Training
UNESCO	United National Educational, Scientific and Cultural Organization
VHS	Vocational High School
WLS	Working Life Satisfaction
VocEd	Vocational Education

CHAPTER 1:

INTRODUCTION

1.1 BACKGROUND

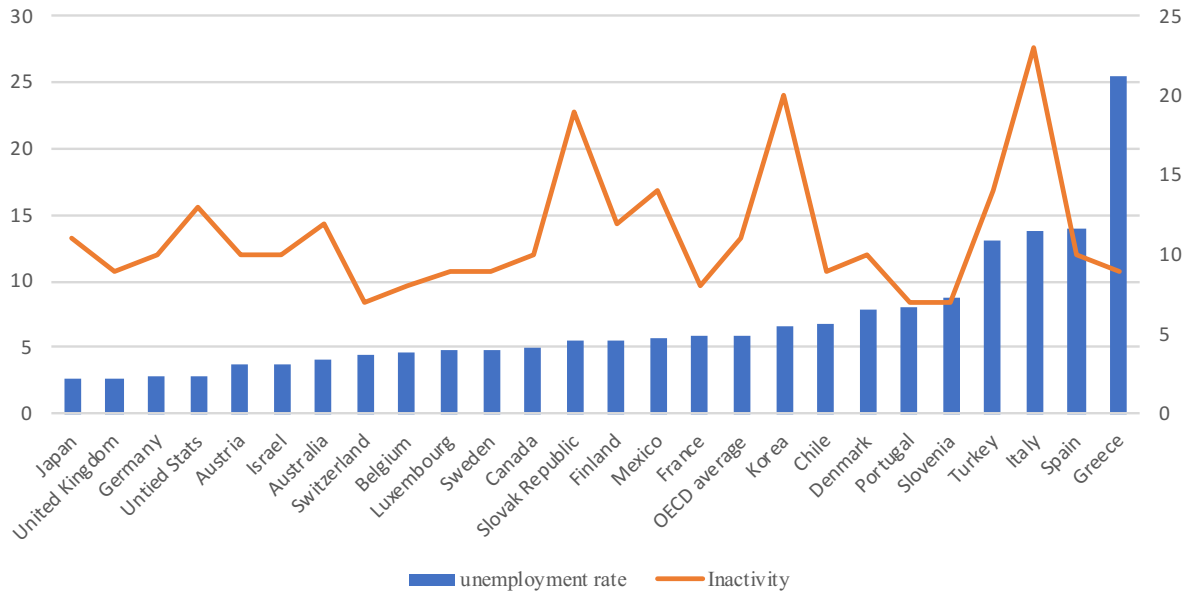
Despite vocational education possibly making "the school to work transitions" easier in the labor market to reduce the high unemployment rate in youth people (Hanushek et al., 2011), currently, many studies about education effects, especially in the developed countries, focus on general education, which dominantly affects national education policy (e.g. Goldin, 2001; Bishop and Mane, 2001; Dea and Jacob, 2006; Hall, 2016). With such large support to general education from scholars and national education policies, the amount of human capital with higher education has increased However, the chronic high unemployment rate of young people persists in many developed countries as well as in developing countries, including Korea. (Wolbers et al., 2001; Zimmermann et al., 2013).

As the world enters a full-fledged low-growth era, concerns remain over the unemployment rate for young people. Young people who have jobs also experience job mismatches in various forms, from high frequency of job changes to unemployment and vice versa. Accordingly, many policy analysts continue inquiring the significance of policy favoring a high enrollment rate on higher education instead of vocational education. A strategical way to address these problems is to strengthen vocational education, thereby facilitating smooth school to work transition and reducing the gap of mismatch between the school and the labor market (CEDEFOP, 2012; 2013).

There are remarkably different outcomes of vocational education in several countries that have some positive and negative outcomes from vocational education to work transitions. Germany is often cited as a successful example of Technical and Vocational Education and Training (TVET), has somewhat alleviated the unemployment rate of young people. However, France, Korea, US and some advanced countries could not have the same situation of positive

outcomes with vocational education, principally reducing its high unemployment rate of young people at the high school level(Gerber, 2003; Zimmermann et al., 2013).

Figure 1-1: Unemployment and inactivity rates of 25-34 years-old (2017) by tertiary education



Source: Created by the Author based on OECD/ILO (2018)

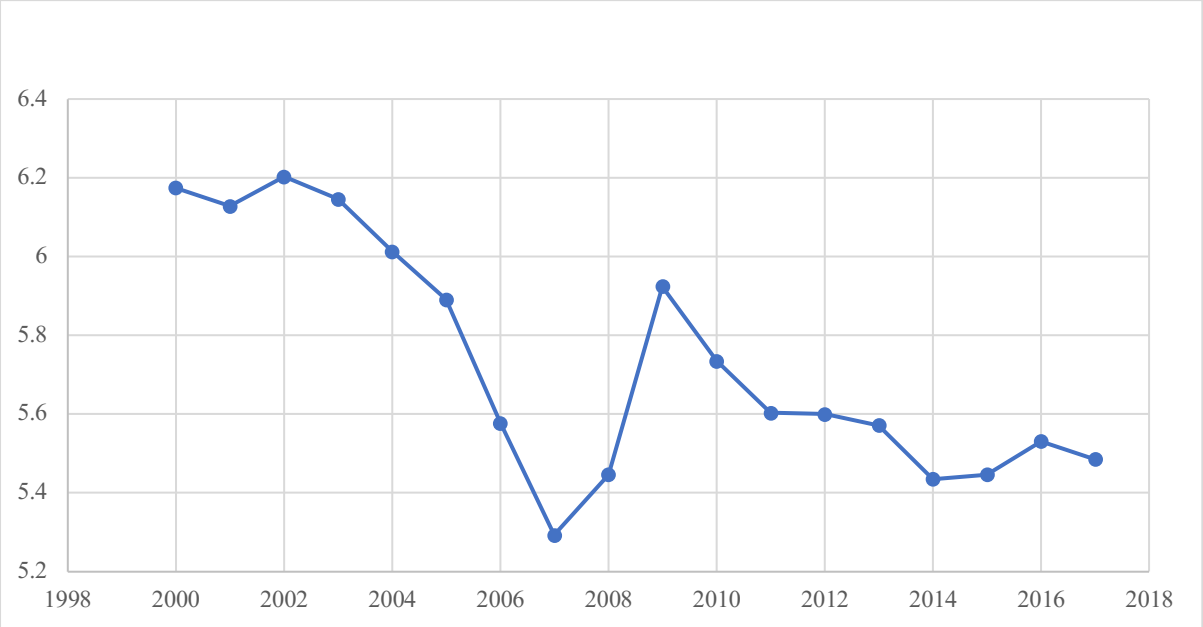
Note: Unemployment and inactivity rate are measured as a percentage of all 23-34 year-olds in the labor force. Inactivity rate is defined by OECD (2018) that all persons who are not classified as employed or unemployed are defined as inactive, and the proportion of the population that is not in the labour force.

Figure 1-1 shows the 2017 number of unemployment and inactivity[1] rates of 25-34 years-old people by tertiary education in OECD countries. At a glance, it seems like Korea's unemployment rate among youth is not so serious, however the inactivity rate is much higher than other OECD countries and only second to Italy. This corresponds with the information in

[1] "The economically inactive population comprises all persons who were neither 'employed' nor 'unemployed' during the short reference period used to measure 'current activity'. This population is split into four groups: Attendant at educational institutions, Retired, Engaged in family duties, Other economically inactive" (Eurostat, 1999). In other words, the inactivity rate is not included by in the labor force, but included in the proportion of the population. The proportion of the population will sum to 100 per cent among the inactivity rate and labor force participation rate.

Figure 1-2 on the nationwide unemployment rate. The unemployment rate not that much higher, but the inactivity rate among youth of Korea is very higher. It is presumed that young people who graduated from college due to intense job competition abandoned employment. This is one of the factors that aggravate the quality of labor market in Korea.

Figure 1-2: Unemployment rate, total (% of total labor force), 2000-2017



Source: Created by the Author based on ILO (2018)

Unlike in Europe, which has the extraordinary feature of the educational pathway in Korea (e.g. high enrollment rate in higher education for general and vocational high school graduates), plenty of the students who choose vocational education at the high school level are generally intending to post-secondary or tertiary education again. This is utterly different educational pattern than in the past, whereas the government fostered vocational education at the high school level and graduates of the vocational high school led the Korean economy. Hence, it is necessary to analyze accurately about the diverse aspects of the return of vocational education in Korea. It is needed to consider such circumstances, such as the number and various students' education paths after receiving vocational education.

In other words, the purpose of this study is to analyze the return to various education paths in consideration of the patterns and curriculum of vocational training education, and to understand the career path of the beneficiaries after graduation. This objective is set under a setting where the interest in general education is dominant.

Thus, it is also necessary to concern carefully for evaluating the rate of return to the education to consider to find a deep meaning for choosing of the education paths, for instance, those people who had the final academic background in general education and also the experience of taking vocational education in their whole educations. Because the vocational education has a main purpose of accumulating skills in a very direct relevance to the labor market for the workers rather than general academic paths.

In Korea, vocational education has been neglected for a long time. One of the indications are many proceeding studies that analyze the performance of general education in various aspects as well as the rapidly increasing enrollment rate in tertiary education (Kim, 2013). However, the unemployment rate is remarkably high and the unemployment rate for young people is excessively high more than world average. Based on this, the vocational education gradually get attention as a key solution to reduce unemployment rate especially among young people. Nevertheless, there is a few studies about the labor market outcomes on the vocational education with various further education paths such as 2-year or 4-year university which need to precisely recognize for obtaining appropriate results on the vocational education in Korea. There are quite a few studies found that vocational high schools have a (negative) stigma in Korea (Kim, 2002). Often people reinforce this negative stigma by comparing labor market outcomes among high school graduates, both male and female students in vocational high schools are having low wages.

However, it is difficult assume that vocational high school students have disadvantaged on the labor market outcomes such as wage or employment compared to general high school students without considering latent abilities in study analysis.

1.2 PROBLEM STATEMENT

A study which is quite related with my study concern came from Chae (2004) who examined the labor market outcome (i.e., job seeking and wage level) of vocational education. On one hand, the study found that vocational high school graduates found their first job faster and receive more wage than general high school graduates. On the contrary to this, those who entered colleges and universities showed that there was no significant difference in labor market performance between vocational high school graduates and general high school graduates, or rather that vocational high school graduates were worse than vocational high school graduates. In relation to this, it is necessary to give more careful consideration to the analysis progress with unobserved heterogeneity or selection bias, otherwise the results show unfitted values such as underestimated or overestimated values. Evidence on the time required for acquiring first job after graduation may be influenced by various factors, besides the expansion of quantity of human capital acquired through the school curriculum. Those who want to go to a higher school, or those who have not attended military service in the case of a man, naturally requires a longer period of time to get his/her first job. The wage level of the first job is also a rather weak evidence.

As can be seen in Chae's work (2004), there are certain times where wage data is not shown or unavailable. Chae (2004) shows the wage level at the current job. The vocational high school graduates have lower wage by 3.4% compare to general high school graduates (no entering university), and those who graduated from a junior college after vocational high school, the wage level is lower by 7.5% compare to those who graduated from a junior college after general high school, but this result is not statistically significant.

To sum up, the results show that the wage effect of the vocational education is not found in the high school graduate group or the college graduate group, and it is negatively affected in the labor market outcomes.

There are also other studies that analyzed and compare achievement, academic performance, and other aspects of college level tertiary education vis-à-vis vocational

education. However, most studies have limitation in terms of sample size and research method, e.g. only by analyzing the mean value. And also, the research results are vary depending on the research method is required consistency even though they use same model or same data (Lee, 2001; Kim, 2002; Cho, 2003). Results of most studies in Korea are completely opposite negatively or positively in the school performance of the vocational and general high school. Moreover, previous studies also indicate that vocational high school graduates have higher satisfaction on their enrollment to college more than general high school graduates (Kim and Byun, 2010). However, it is not clearly satisfied whether the curriculum is well-prepared in high school or low quality of academic capacity is more likely to adapt school life.

There is a study about vocational education outcome, it shows the results between male and female groups. To see the vocational education outcome by gender separately is also important due to differences among social expectations. In the gender aspect for Neuman and Ziderman (2003) shows that the wage effects of vocational education on social status using the Israeli data, the wage effect of vocational education is little in new immigrants and Arab Jews, whereas the wage effect of the Sephardie Jew is positively statistically significant. In this Sephardie Jew, when vocational education and occupation are involved, the wage effect of increase is shown and the wage effect of vocational education by gender is significant for males but not for females. The argument that the wage effects of vocational education can be discriminative, especially between men and women, is also an important consideration to measure return to vocational education. For instance, when the worker is settled in their field after vocational education, there is a statistically significant wage effect for male and less significant for female (Kim & Byun, 2005).

Other past studies also have analyzed whether vocational high school graduates receive higher wage level than general high school graduates (Nam, 2005). He found that the wage premium is increasing when the vocational high school graduates' job matched with their major. The results show that wage levels of vocational high school graduates were not different with general high school graduates. When the vocational high school graduates' major match with

the job, it is also no probability of wage effect. From the wage perspective, vocational high school education is not showing clear results.

Currently, the demand for vocational high school education is declining in Korea (Kang, 2013). From the analytical point of view, so far, the crucial limitations of previous studies are that they do not systematically controlled the quality of students' capacities between vocational high school students and general high school students. Simply, the decision of entering university cannot eliminate the selection bias that exists between the two groups. Therefore, a more robust analysis in this aspect is required.

1.3 RESEARCH QUESTIONS

The main purpose of this study is to resolve the following two main research questions: i) What are the reasons for choosing to go to school? and ii) How do the Labor market outcomes differ depending on each education pathway?

Research Question 1: What are the factors which affect an individual's schooling decision making on high school and university in Korea?

1-1: What are the determinants of the high school choice (General HS vs Vocational HS) in the student's ability and student's family backgrounds?
1-2: What are the determinants of the university choice (2-year university vs 4-year university) in the student's ability and student's family backgrounds?

Research Question 2: How does the labor market outcomes correlate with each education path as well as all levels of education in terms of employment and wage?

2-1: How do the Labor market outcomes differ depending on each education pathway in terms of employment?

2-2: How do the Labor market outcomes differ depending on each education pathway in terms of wages?

Research Question 3: How does the labor market outcomes correlate with each education path as well as all level of education in terms of job quality aspects?

3-1: How do the Labor market outcomes differ depending on each education pathway in terms of job quality aspect in employment status as a regular or non-regular job?
3-2: How do the Labor market outcomes differ depending on each education pathway in terms of job quality aspect in the workplace?

1.4 OBJECTIVES OF THE STUDY

The aim of this study is to analyze each individual's outcome in the labor market who have a wide range of education backgrounds as well as track the changes in income throughout each participant's life.

By answering the research questions, the study intends to examine: (1) the school performance and family background factors contributing to unequal distribution of opportunity of accessing school choice among secondary general, vocational education and higher education in Korea with special attention paid to the influence of school achievement constraints and differences in the effects of the factors between different type of high schools, college and university enrollment; and (2) the effectiveness of the government's targeted financial assistance policies to promote access to vocational high school students among low income and academically underachieving groups. Finally, based on the evidences gained, the study aims to produce recommendations towards the enhancement of the current vocational education development policies.

The objective of the study is to contribute to enriching the evidence base regarding the effect of determinants of access to vocational education in the disadvantaged group of Koreas.

As well as, labor market outcomes and this considering clarify to support the crucial issue of job mismatch through vocational education effects on labor market outcomes and its enhancing.

1.5 SIGNIFICANCE OF THE STUDY

This study is important in that it allows one to have a more accurate understanding of vocational education in terms of labor market outcomes in the Republic of Korea. It also allows us to further understand how student vocational education choice in high school is linked to human capital mobility. More specifically, this study explores labor market outcomes demanding education investment and the reasons behind student school choice depending on family background and academic performance, and which factors are more likely to affect school choice at high school and university level regarding vocational education. The in-depth look at vocational education from this study is able to contribute to practical policy development in the following regards.

First, this study particularly evaluates possible education pathways in school choice between secondary and higher education regarding vocational education links to labor market outcomes in Korea. There are many studies which have identified school choice in secondary and tertiary level regarding vocational education in comparison with general education with respect to labor market outcomes (Neuman & Ziderman, 1993;1999;2003; Shavit & Müller, 1998; Moenjak & Worswick, 2003). However, it is not enough to analyze vocational education's outcomes without taking into consideration the various education pathways, which is not only for the final education degree without concerning education pathway and includes high school backgrounds with high enrollment rate of post-secondary education in Korea. Even the vocational high school students pursue higher education without any motivation to succeed at higher education. The main factors of school choice in each level of education based on individual characteristics still needs to be investigated since vocational education is an unusual school choice these days, particularly in developed countries. For school choice, we cannot neglect some factors, such as financial issues which are generally undergone by parents as well

as an individual's school performance for taking an entrance exam in many developed countries including Korea. Most of the studies in Korea do not investigate the factors separately and properly, especially in the empirical studies even though the enrollment rate of higher education is very high and in vocational high school, it is very low. In general, broad comparisons have been discussed between secondary and higher education in terms of school choice. Higher and secondary education can serve different needs of students linking to labor market, and have different accessibility in various entrance admission policies and academic requirements for entrance. Secondary education provides mainly general and vocational course, including many specialized courses which usually take three years to complete. Higher education required the period of school attendance of 2year or 4year to complete in both courses and includes general and vocational sectors as well in Korea.

Secondly, the study of school choice has to deal with data analysis carefully in individual's unobserved heterogeneity, such as different individual outcomes through education possibly being correlated with motivation, ability (IQ or EQ) and so on. There are many studies for school choice based on family background (Kim, 1993; Kim & Kim, 1999; Chang, 2000; Phang & Kim, 2003; Park, 2004), but definitely a lack of studies for school choice regarding unobserved heterogeneity such as motivation from parental financial and social status which can denote in an empirical study using large-scale data in Korea below.

Kim & Byun (2006), who conduct an empirical analysis of Korea with respect to school choice concerning family background and academic performance, use hierarchical generalized linear models (HGLM). The research found that parents' socioeconomic status (SES) has correlation with children's educational aspiration, academic achievement, choosing different types of high schools (i.e., vocational high school or general high school) and universities (i.e., 2-year university or 4-year university). In addition, the higher parental socioeconomic status (SES) have more power to push their children to go to general high school and 4-year university expecting to obtain desirable occupation and also retry entrance examination of university to enter best university. These results have more significance on males compare to females to

pursue higher education and entering better university. However, this study could not eliminate the unobserved heterogeneity properly for the model analysis.

Thirdly, most of the studies have been dedicated to analyzing the labor market outcome in the rate of returns to education as it correlates to wage (Webor, 2011; Meer, 2007; Oosterbeek et al., 2007). However, the wage differences cannot deeply explain their job quality or stability in Korea due to a large number of existing employees with contract jobs and without a welfare system. Moreover, most of the studies in Korea that determined the rate of returns to vocational education have been unconcerned about the unobserved variable that is affecting heterogeneity. (Choi, 2011; Ahn & Lee, 2009)

This study takes a more in-depth look at the correlation of labor market outcomes and education by analyzing basic factors beyond income so that the study includes quality factors such as job status (regular or non-regular job) and work place (large company or not) variables as well as unobserved variables implicated in heterogeneity.

CHAPTER 2:

EDUCATION SECTOR AND SOCIAL DEVELOPMENT IN SOUTH KOREA

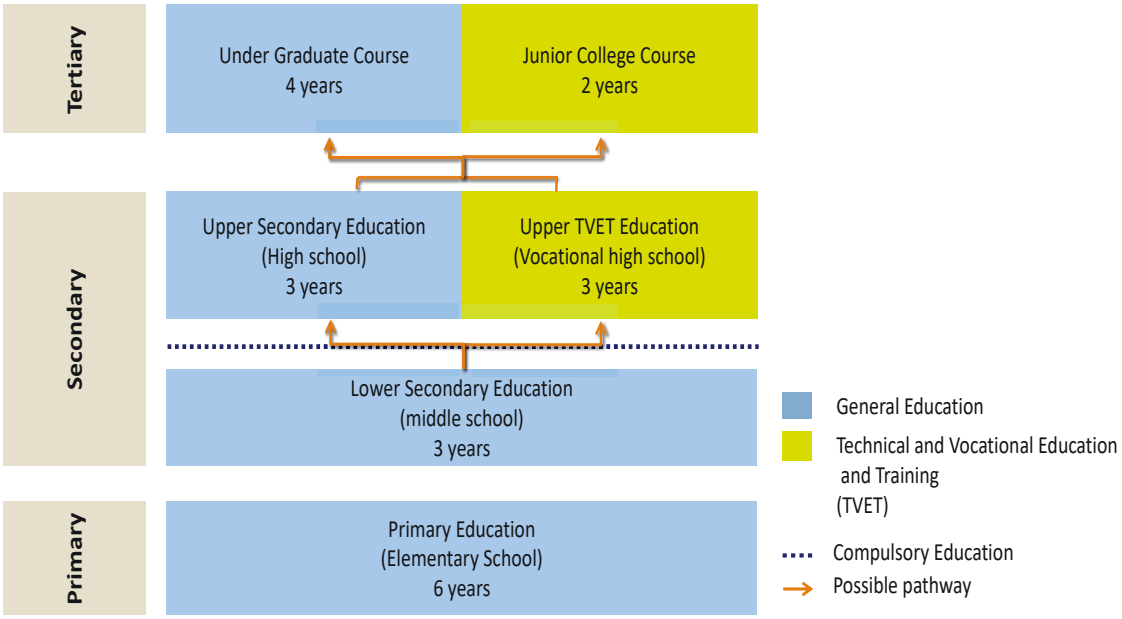
2.1 Overview of Education Development in the National Education System

Since 1954, after the Korean-war, South Korea is supported a public education system. It consists of six years compulsory primary school (6-11 years old), three years of compulsory junior high school (12-15 years old), and three years of optional high school (16-18 years old). The academic year begins on March and has two semesters. The assessments for junior high school and high school are based on midterm and final examinations (see figure 2-1).

In junior-high school, the curriculum and courses are similar, however, in high school, there are mainly two types of schools: general high schools and vocational high schools. Vocational high schools include special-purpose schools, specialized schools, and Meister-focused schools. The student selection process differs by school type and/or location (e.g., metropolitan or provincial areas).

Students are required to pay admission fees and tuition since high school is not compulsory education in Korea (MOE, year). However, all vocational high school students receive a 100 % tuition waiver as scholarship. Despite this tuition waiver, many students attend general high school.

Figure 2-1: Education system in Korea



Source: Created by Author based on UNESCO reports (2012)

All of these education systems are provided by 16 Education Bureaus of cities and provinces in any course and curriculum under the umbrella of the Ministry of Education.

Various laws of education have been enacted regarding the curriculum of elementary and secondary education since independence from Japan in 1948 (Rhee,1985; Lee, 1993; Ham, 2003). The National Curriculum of primary and secondary schools was established in 1954 after Korean War, and since then it had severed full revisions and two partial revisions, with latest revision being National Curriculum in 2009. The National Curriculums has been developed in line with changing education trends according to all aspects of education at each grade level and school (An & Bae, 2013). Also, the process of education curriculum is difficult to separate from the social changes in Korea. Especially, excessive competition for higher education has had a strong influence on the period of high economic growth, which is directly related to social change (Lee, 2011, 2011).

This chapter will take a look at the overall education stream with the changing National Curriculum, which is intimately related to social change and economic development in Korea.

1) The 1st National Curriculum (1954-1963): Subject-Centered Curriculum

In 1951, the Ministry of Education promulgated Regulations on the National Research Council for Education (Education Regulation No. 16), which were suspended due to the Korean War, for deliberation on the composition of the National Curriculum. Its purpose was to recognize the National Curriculum based on the ideology of education and education policy in accordance with the Education Law. In 1954, the 'Educational Dividend Standard for Education Curriculum,' promulgated as No. 35 of Education Ordinance, and 'curriculum' for each grade of school was the first systematic curriculum made.

In this period, the national economy had a major task of developing the agricultural industry and reform of agricultural land, including establishing basic education law. Therefore, it was realized to establish a definite education frame as a main educational policy such as the establishment of the basic education system, education law, interdisciplinary education, curriculum, compulsory education for elementary and popular literacy campaign.

High school was divided into general and vocational schools consisting of the main curriculum activities and the special activities as the elementary and junior high schools. The main curriculum activities consisted of the compulsory curriculum and the elective curriculum, and it was the same for both the general and vocational high schools. In the elective curriculum, vocational schools have included specialized courses to achieve the objectives of vocational education. The main curriculum activities consisted of the compulsory subject and elective subjects, and the compulsory subjects contain in both general and vocational high schools. For the elective subjects of the vocational schools, the specialized textbooks have issued to achieve vocational education purpose.

2) The 2nd National Curriculum (1963-1973): Experience-Centered Curriculum

The 2nd National Curriculum was called Life-Oriented or Experience-Centered Curriculum, and "curriculum" was defined as "all activities from the experience under the guidance of the school". It emphasized the content of curriculum in independence, productivity, and usability, and this curriculum was considered based on rationality on social organization and locality for managing as a basic qualification for the human being. This period saw a quantitative expansion of secondary education, as well as the national economy being led by the government with outward-looking industrial modernization, Five-Year Plans of South Korea and implementation of labor-intensive Light Industry and capital-intensive Heavy Industry.

In order to expand secondary education, a new system was phase-in by linking vocational education and training to economic development plans. For example, entrance exams for middle schools were eliminated, there was a high school equalization policy, institutionalization and expansion of vocational education and training, stable securing of primary and secondary education resources and improvement of the teacher training system.

3) The 3rd National Curriculum (1973-1981): Discipline-centered curriculum

The 3rd National Curriculum emphasized Discipline-Centered Curriculum while avoiding the Experience-Centered Curriculum of the 2nd National Curriculum. Each subject explored the structure of knowledge like the inquiry activity of scholars.

This period was based on the ideology of the National Education Charter, which strengthened the national quality and reformed national knowledge and vocational education. The contents of high school curriculum were the same as the 2nd National Curriculum in compulsory subjects of each grade, including common subjects being more flexible with completion unit from 204 to 222. And, there were many changes, such as reducing the total number of subjects to be completed during high school and allocating 12 units for special activities.

4) The 4th National Curriculum (1981-1987): Human-centered curriculum

The aim of the 4th National Curriculum was to reform the excessive school hours, excess contents of study, relatively inappropriate age-level contents, textbook focus, and lack of well-established fundamental education. The systematization of Civics Education, the strengthening of whole-being education, and the improvement of career guidance was emphasized as the basic policy of the curriculum. The integrated curriculum was tried in first and second grades of elementary school at the same time.

The most important features of the high school curriculum of this period were to unify the curriculum of high school in general, vocational and other high schools. For developing national whole-being education, compulsory subjects in all courses were applied the proportion from 40 percent to 60 percent.

By adjusting the excessive education content, the total number of units was reduced (201 ~ 216 units), and the number of optional subject units, such as philosophy, logic, psychology, religion, etc. are increased (0 ~ 8 units). Student also had the option of choosing two or more subjects.

5) The 5th National Curriculum (1987-1992): Improvement on curriculum system

The 5th National Curriculum emphasized the enhancement of basic education, the strengthening of education and the improvement of education efficiency for responding to the informatization of society. In the background of revising the curriculum so far, before the 5th the National Curriculum of the revision, there was a relatively clear reason that it responded to the changing social situation or academic tendencies. However, the 5th National Curriculum prompted a revision of the curriculum because of the administrative reason that textbooks could not be used for more than 5-7 years. During this period, the high school curriculum reduced the students' learning burden by presenting the standard credits of each subject and by

publishing the textbooks according to the standard units. As a result, high school including general, vocational and other courses, the total number of credits changed from 204 ~ 216 credits for three years (192 ~ 204 credits) and special activities (12 credits). In addition, new science and art courses were offered in the normal curriculum of high school curriculum, and the class activities were divided by class level and school level.

In the 4th National Curriculum and 5th National Curriculum, the main purpose was the qualitative improvement at the secondary education level and the quantitative expansion in higher education. In this period, the important tasks for developing national economic issues were Economic Liberalization and Industrial Structure Improvement, the Five-Year Plans of Economic and social development, implementation of technology-intensive heavy chemical industry and fostering some high-tech industries. The education system issues were the normalization of secondary education, the expansion of higher education, and the implementation of the local education system.

The other education system issues, major education policies were implemented such as the reform of 7.30 education policy that was the prohibition of private tutoring and the improvement of public education quality, the expansion of higher education opportunities through graduation controlling policy (students could enter university relatively easier than their school performance, but the graduation is not so easy like entrance, students need regardless of good achievement all the time during university for graduation. Because, the universities select students more than their capacity which fixed number of students for the graduation.), operating of the Presidential Advisory Education Reform Organization, and the realization of local education system.

6) The 6th National Curriculum (1987-1992): Decentralization and diversification of curriculum

The 6th National Curriculum was revised to improve the problems of the existing curriculum,

such as the centralized authority to decide the curriculum, the uniformity of the curriculum structure, the inadequacy of the contents, and the inefficiency of the goal achievement. For the high school curriculum, all high schools could select the appropriate subjects properly by various categories of subjects (general subject: general liberal arts, specialized subject: vocational and professional subject), every student could decide the high school type, primarily between general and vocational high school based on the school qualifications. (decisions of the city or provincial office of education) and the optional subject (school decisions). Moreover, the total number of credits during the high school was reduced to 204 credits, the number of subjects per semester has been reduced to 12, and new subjects were added in considering diverse student characteristics and deafferenting school performance. So far, only three courses have been established in general high schools, but in the 6th National Curriculum, the city and provincial offices of education have set up the necessary courses so that they could be presented to each school.

7) The 7th National Curriculum (1997-2007): Student-centered curriculum

The 7th National Curriculum was reorganized from Supplier-centered curriculum to Student-centered curriculum. The discussion on the 7th National Curriculum was initiated by the Education and Reform Commission, the Presidential Advisory Body. The vision of the 'Open Education Society and Lifelong Learning Society' was for students to be able to learn various subjects according to their aptitudes and abilities by cutting down elective subjects and expanding optional subjects, such as subjects of informatization and globalization, and organizing and operating curriculum by customized levels of curriculum. A major change was also that it introduced “level-specific curriculum” in consideration of individual differences, such as student ability and aptitude, and expanded 'discretionary time' in order to enhance learner's self-directed learning ability.

For instance, by 10th grade in the school including the elementary and middle-level education should be taken as compulsory subjects (the first year of high school), should be taken 10 subjects as the National Basic Subject. After this from 11th grade, students could decide optional subjects to be carried the learner-centered selective curriculum in the second and third year of high school.

Since the 5th National Curriculum, these periods were seriously considered as the expansion of education for the quality of higher education and lifelong education. This period was in the foreign exchange crisis and the national policy focused on overcoming the crisis through new growth industries doing overcome, and the restructuring of economic for transforming Advancement of Economic and the Knowledge-based Economy. Thus, one of the national economy goals were fostering Knowledge Service Industry and New Technology Industry. It linked to universalization and quality improvement of higher education, the establishment of lifelong learning, the decentralization of education and expansion of the various education options, and strengthening of science and technology education as major policy issues. It also could link to the challenges for the education system.

8) 2007 revised the National Curriculum (2007-2011)

The revised National Curriculum of 2007 is focused on the succession of the 7th general education curriculum and improvement of education contents. In order to strengthen the "Quality of the Curriculum" is for the school, all kind institution and keeping students' assessment and evaluation of curriculum and its management to ensure curriculum quality regularly. The sustainably of "Quality of the Curriculum" is also needed controlling by the city and provincial office of education conducts evaluation of academic achievement, preparation of curriculum, and evaluation of operation to manage the organizations.

9) 2009 revised the National Curriculum (2011-present)

The 2009 revised National Curriculum refers to No. 2009-41 Curriculum announced by the Ministry of Education, Science and Technology on December 23, 2009, and its main goal is to nurture global creative talents. The 2009 revised National Curriculum has been applied annually beginning in 2011 by school and class level.

The main points are coordination of the 9-year National Co-curriculum (from elementary school to the 3rd year of junior high school), elective curriculum for 3 years of high school, the cooperation between each grade of students for securing flexibility along with the concept of the common curriculum is reconstructed by academic characteristics to minimize the burden of school learning through the reduction in the number of subjects required per semester, revitalization of intensive courses and building new curriculum, "'Creative Experiential Activities". Since the 7th National Curriculum, the major framework has emphasized the School- centered Curriculum and the Guarantee of Learner-centered Choice, the Curriculum characterization and individualization.

Since 2009, the National Curriculum has been an expansion period of education welfare. The expansion of the Knowledge-based Economy, Green Growth, boosting of the FTA, and the Creative Economy is being promoted. The education system in Korea has more considered diversity and autonomy of education, tightened up the accountability and selectivity of education, and strongly developed educational welfare. Table 2-1 summarizes the changes in the curriculum of Korea with all social changes described above.

Table 2-1: National Curriculum's Characteristics by Period and Its Process Change

Classification	Characteristics of national curriculum
1st National Curriculum (1954-1963)	·Subject-centered curriculum ·Organization of school subjects and extra-curricular activities ·Emphasis on anticommunist education and morality education
2nd National Curriculum (1963-1973)	·Experience-centered curriculum ·Emphasis on autonomy, productivity, and utility
3rd National Curriculum (1973-1981)	·Discipline-centered curriculum ·Development of national quality, reinforcement of human education, and reform of intellectual & technical education
4th National Curriculum (1981-1987)	·Human-centered curriculum ·Balance of subjects, experience, and discipline-centered curriculum - Harmony of individual, social, and intellectual suitability
5th National Curriculum (1987-1992)	·Improvement on curriculum system and structure ·Curriculum rationalization, substantiality, localization
6th National Curriculum (1992-1997)	·Decentralization and diversification of curriculum decision making ·Development of creative ability corresponding to the social change ·Diversity of educational contents dependent on students' individuality and ability
7th National Curriculum (1997-2007)	·Student-centered curriculum based on creativity and autonomy ·Formation of national common basic curriculum ·Reduction of required courses, expansion of elective courses, differentiated curriculum ·Expansion of discretion activities, introduction of graded school system
2007 revised National Curriculum (2007-2011)	·Focus on curriculum quality management, state-dominated evaluation system
2009 revised National Curriculum (2011-present)	·School-based curriculum ·Optimizing burden of study (e.g. policy of grade clusters, intensive course completion system)

Source: Recreated by Author based on An and Bae (2013)

Up to now, the changes in the overall curriculum of Korea in relation to social and economic fluctuations has been examined. According to the comprehensive evaluation of the National Curriculum changes (Park, J., Park, H. & Lee, 2013), "Carrier Achievement through Education" became reality in virtue of equality consciousness and achievement motives after liberation. The demand for education, such as completion of compulsory education for elementary education, no entrance examination for junior high school, and quality equalization of high school has increased as well as the enrollment rate for higher education already exceeding 80%.

In other words, the quantitative expansion of primary and secondary education has concluded and the quantitative expansion of tertiary education has also been rapidly completed. Korean society has constantly debated over-education along with persistently fierce competitive education and academic background. This rapid growth of people's academic background could be closely related to the accelerated economic growth of Korea.

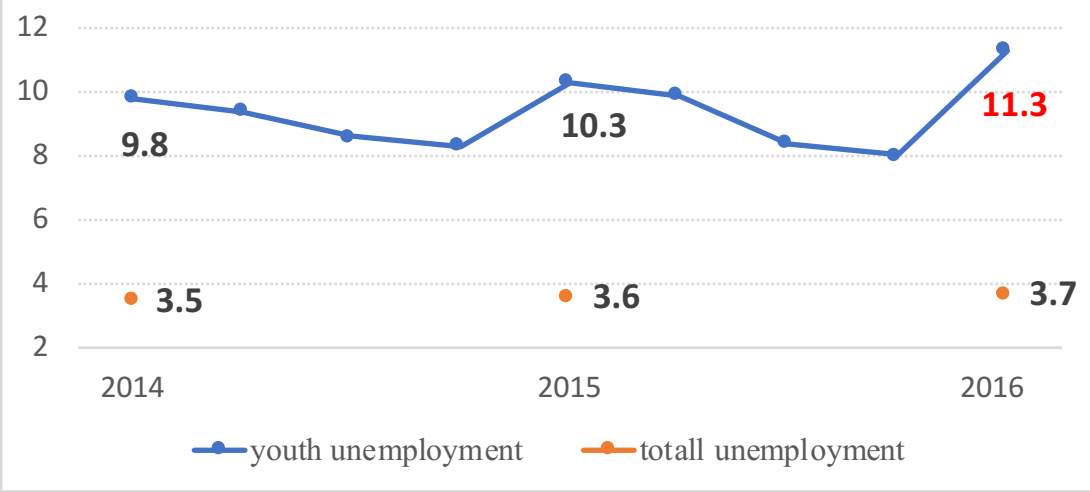
In this sense, it can be assumed that it has interaction effects between the social change arising from appropriate transforming of education and its curriculum and the education change resulting from rapid social change. However, it is difficult to say that the number of suitable and stable jobs for the labor market with higher education has not increased as much as expected, and the qualitative transforming of education has not been achieved, such as the ability to think about new creation of the invention in the field of technology, science, industry and so on.

2.2 Economic Growth and Education in Korea

Korean society has developed rapidly, and education has been a very important factor in its development. Such rapid social change required intense competition in the educational environment, and a prestigious university degree has become a stronger evaluation requirement than the actual skills of human resources in all areas. It has brought credentialism and educational inflation, requiring job candidates to obtain higher degrees for positions that

formerly had lower credential requirements (Kim. et., al, 2013). In such an environment, high unemployment rates have been on the rise among youth (see figure 2-2). Young people in Korea have difficulty obtaining employment even though they graduated from universities. This feature is not only for middle or low-level university but also happened in the most prestigious universities in Korea.

Figure 2-2: Unemployment rate (%) in South Korea



Source: Created by Author based on Statistics Korea (2017)

The social phenomenon of persistently supporting higher education hinders the diversity of education and reducing the high youth unemployment rate among university graduates. It leads to the dominant social belief that more education is better, and parents avoid sending their children to vocational high school. The rate of students enrolled in vocational high school has been decreasing, and vocational high school students are also making more effort to go to university rather than seeking a job (Lee & Jyung, 2010). Due to the social phenomenon centering on academics, the university enrollment rate has reached the highest level in the world, but the employment rate after graduation is significantly lower than the world average. As shown in Figure 2-3, the quantitative expansion of Korean education has been accompanied by a rapid increase in the spending of the government education budget as well as the increase

of tuition and private tutoring expenditure. However, the increase of education investment has only led to the quantitative growth of education. It is represented by educational bubbles that have not led effectively to substantial human capital formation (Lee. et., al, 2014).

In other words, although the number of university graduates has increased, the gap has widened between graduates who have attended lower quality universities and a serious education bubble that cannot accumulate effective human capital. As a result of the education bubble, the proportion of university graduates receiving wages lower than the average wage of high school graduates has steadily increased. The lower 20% of 4-year college graduates and the lower 50% of 2-year college graduates' average salary was lower than average salary of high school graduates (see figure 2-4). The wage gap among university graduates is the main cause of the disparity in income inequality in Korea. In terms of the education bubble, the expansion of education is not the engine of comprehensive growth accompanied by improvement of income distribution. Therefore, it is urgent to improve the system for solving the education bubble in the Korean education system (see figure 2-4).

2.3 Overview of Vocational Education in Korea

The definition of Vocational Education in schools by Korean Education law, Law number 86 (Dec. 1949) declares that “middle and high schools that offer technical and vocational courses of at least 30% of all courses are considered to be vocational middle and high schools.” Despite the law including middle school, vocational education was only developed for high school (and university, referred to as technical school). The aim of vocational education is to teach skills in every industry of the labor market.

Although vocational high schools have played an important role in the economic development of the country since the economic policy of the First Five-Year Economic Development Plan (1962) in Korea, their role has not been properly evaluated for vocational high schools. Since the early 1980s, vocational high school has been neglected as human development was strengthened by the advance in science and technology with the expansion

of tertiary education and general high schools. Eventually, it has resulted in a lack of employees, especially in middle-sized companies (Kim, 2002).

Recently, most students who are unable to enter general high school due to low school achievement in school performance are entering vocational high school no matter their preference and potential talent. Therefore, the students in vocational high school having difficulty learning regular subjects due to lack of prior knowledge before enter the school. Basically, the conception of vocational high school in agriculture, industry and commerce, is that it has the role of education in cultivating functional human resources. However, vocational high school has been required keeping curriculum similar to general high school for students who want to be continue their study in university instead of entering labor market. Because, education in socio-economic environment changes, such as people's belief the high level of education can support well to have a desirable job and ensure high social status.

The Ministry of Education emphasized the overwhelming necessity of vocational education in the 1950s with the education policy of "Encouraging technical education for improvement of occupational skills (May. 1950 ~ Oct. 1952)", "Promoting science and technology, enhancing production and contributing to economic development (Apr. 1954 ~ June. 1956)", "Fostering independency of the financial situation by high quality of lifelong education (June. 1956.6 ~ Nov. 1957)", and "Improving the quality of education with practical environment by avoiding formalism education (Nov. 1957 ~ Apr.1960)". The goal of these Education policies in the vocational education was to promote national reconstruction and economic development from the damage caused by National Liberation. In this way, the education policy of the Ministry of Education in the 1950s strongly emphasized the necessity of vocational education. Overall, even if the changes in educational reforms did not vary from those of general education, the policies of vocational education were conducted in accordance with each economic development plan. Regarding many of vocational education issues, this chapter looks at the policy of key issues in vocational high school of Korea, this sub-sector takes a look at vocational high school policies that influence the curriculums.

1) The 1st National Curriculum (1954~1963)

At the beginning, the 1st National Curriculum contained specialized subjects in vocational high schools, including 23 departments: machinery, shipbuilding, electrical engineering, applied chemistry, textile, dyeing, civil engineering, architecture, mining, metallurgy, ceramics, metal work, woodwork, metal industry, telecommunication, aviation, navigation, engineer, printing, communication and transportation.

The vocational high school curriculum was developed as part of the Five-Year Vocational Education Plan, but the curriculum could not be implemented properly because of fundamental problems such as lack of facilities, textbooks and not enough teachers. Although it was not implemented, it was definitely one of the plans in the preparations of the transformation of economic conditions since the late 1950s, and mainly focused on the training of technical engineers.

2) The 2nd National Curriculum (1963~1974)

The 2nd National Curriculum was developed during the military government, in which policy makers constantly recommended policies of national economic development involving vocational high school. In order to secure an efficient number of skilled workers and implement proper education, which could lead to economic growth, the National Curriculum separately provided in general and vocational high schools: 1) To increase the proportion of vocational specialization subjects; 2) To foster medium-skilled engineers with avoiding theory-based education and having various options to combine favorite subjects by students from emphasized practical subjects and training (Yu & Kim 1998). The previous curriculum required at least 30% of specialized courses in vocational high school. In the second curriculum, more than 50% of the specialized courses had specialized curriculum. However, the practice-oriented curriculum was not fully implemented due to lack of facilities and practical conditions.

3) The 3rd National Curriculum (1974~1981)

The 3rd National Curriculum was deliberately revised in order to increase the time of specialized theoretical curriculum and nurture the core skilled workers for industrialization. This was in contrast to the general high school curriculum that set the direction for reorganization toward Human-centered curriculum. As the development of manpower emerged as the driving force of economic development, the Discipline-centered curriculum was emphasized. In 1971, the 3rd Five-Year Economic Development Plan was designed to nurture skilled workers at the high school level in order to concentrate on the heavy chemical industry sector (Ministry of Education, 1980).

As a result, the fundamentals of vocational education curriculum in this period were reconstructed by the subdivision and strengthening of subjects, strengthening experiments of class, practicing skills more related to the field of subject, and strengthening cooperation between industry and academies for cultivating skilled-workers. However, according to Kim (1983), the 3rd National Curriculum of vocational high school was not successful because of the lack of demand for discipline-centered curriculum, teacher training, parental understanding, teaching method, equipment and facilities.

4) The 4th National Curriculum (1982~1988)

The 4th National Curriculum was revised by the Korea Educational Development Institute, it was different since the education curriculum was developed by the Ministry of Education. It was become a research and development type curriculum by entrusting it to the Korea Educational Development Institute.[2]

[2] In June 1978, the Ministry of Education established a policy of entrusting research institutes with the development of curriculum and textbooks, and the Korea Educational Development Institute (KEDI) came to establish the function of the 'Curriculum Development Center' in the articles of association. As a result, the

The 4th National Curriculum was revised to be suitable not only for academic knowledge, but also for the usefulness of knowledge in order to supplement an inadequate education that the overflow and difficulty of learning contents, subject-oriented education, the lack of basic and general education and so on. The contents of specific revisions of vocational high schools were as follows: 1) The fundamental education textbooks required for general and vocational high schools were reinforced by basic education in the 40 ~ 60% of all courses to adopt human-centered curriculum, and 2) the high school curriculum was divided by each different type of high school; however, it was unified as High School Curriculum. 3) In vocational high school, the subjects offered were decreased from 191 subjects to 151 subjects. 4) It provided students with a variety of optional subjects in order to emphasize their basic abilities and adaptability without imposing uniformity on specialized subjects for vocational high school.

5) The 5th National Curriculum (1988~1992)

Since there was no significant change in curriculum reorganization during this period, it is difficult to find significant changes between the 4th and 5th curricula. The administrative rule that school textbooks cannot be used for more than 5 ~ 7 years did hasten curriculum revision. [3] The necessity of the revision of the 5th National Curriculum was the economic development, the establishment of democratization, the coming of informatization age, the increase of

Ministry of Education commissioned the Korea Education Development Institute to research and develop the curriculum and the first-class textbooks (Korea Education Curriculum and Textbook Study Group, 1998).

[3] Ministry of Education (1995). Article 22 (Validity Period) about textbook. 1) The period of validity of the 2nd class of the textbook had to be used 5 years starting from the 1st year. However, if it was deemed necessary to use the same textbook more by the Minister of Education, the period of validity could be extended within a period not exceeding two years for each subject. 2) If the Minister of Education intended to extend the validity period pursuant to the provisions of paragraph 1, he/she had to notify the Minister of Education one year before the expiration of the validity period pursuant to the provisions of paragraph 1 of this Article (Korean Education Curriculum and Research Society, 1998).

international competition and exchange. The basic principle of the 5th National Curriculum was to revise only the parts to be improved while maintaining the basic structure as much as possible. The basic direction of revision was strengthening basic education, corresponding to the informatization society, and improving efficiency of curriculum (Ministry of Education, 1989). However, the extent of the discretion to choose the subject was somewhat large in the curriculum for responding flexibly to the social change of industrialization, fostering adoptable skilled workers in the industry sector and satisfying the diverse needs of students.

6) The 6th National Curriculum (1992~1997)

The most important characteristic of the 6th National Curriculum is that the system of role sharing between the Ministry of Education, branches in prefectures and provinces under the umbrella of the Ministry of Education and schools was clearly established for the first time in the curriculum. The centralized education curriculum, which had been decided uniformly by the Ministry of Education, was improved to a decentralized curriculum. The Ministry of Education decided basic compulsory subjects, the required subjects in each course were organized by the provincial and prefectural offices of education, and the elective subjects in each course were decided by the school. In addition, all high school students' the basic compulsory subjects in common subjects were reduced and the elective subjects were expanded in all courses of vocational high school.

The revision of the 6th National Curriculum was aimed at clarifying vocational high school's education purpose, systematization of education contents, suggesting the appropriate courses responding promptly to students' needs on time, adjusting the name of the department in related subject fields, for liking to promoting industrial development. The curricula was given maximized flexibility at the discretion of the curriculum management and the acquisition of specialized courses of vocational high school for matching between the social communities and the school environment of curricula. The curriculum of the "2+1 system" in vocational

high school (MOU, No. 1997-12, Dec. 12, 1997) was enacted in this period. The "2+1 system"[4] was an integrated form of the course including school-based subjects and on the job training-based subjects. During the first and second year of the course, students studied at school with school-based curricula of vocational education and the third grade at the high school, they needed to train related skills of their major through on the job training in some company of related industries which are contracted schools and companies as curricula. When they reach the third year of high school, they went directly to the industrial system and completed the credits through on the job training out of school. As a matter of fact, the "2 plus 1 System" of the 6th National Curriculum was strengthened as an educational method in school-based vocation education and on the job-training (OJT) linking each industry.

7) The 7th National Curriculum (1997~2007)

The 7th National Curriculum promoted self-directed learning and the autonomy of school curriculum. The main points of the curriculum were: 1) enhancement of basic education, 2) the introduction of curriculum combined with national basic subjects and selective-centered curriculum, (3) the adequacy of education content at the appropriate level in quality and quantity of the education, and the introduction of a level-specific curriculum for individualized education, (4) to maintain a variety of learning methods and education contents regarding

[4] The 2 plus 1 system was introduced as a part of the "Five-Year Economic Development Plan (1993-1997)", which aimed to enhance the international competitiveness of companies and fundamentally solve the problems of functional and technological manpower that lacked qualitatively and qualitatively in Korean industry.
According to the decision of the 2 plus 1 system, vocational high school was divided into two years of school education and one year of industrial field education since school education was not enough to acquire the advanced technology of the industry. Therefore, its main purpose was to train excellent functional manpower. It also aimed to enhance the effectiveness of vocational education and training by existing facilities in the school and fully utilizing industrial facilities. As a result, the demand side of industry, which is the consumer of the workforce, actively participated in the manpower development process and shares the role, thereby promoting industry-school cooperation, securing on excellent functional technical workforce, and increasing utilization of human and physical information resources (Korea Education Curriculum and Textbook Study Group, 1998).

students' potential ability, aptitude and their future career, 5) the introduction of discretionary activities in the formation and operation of curriculum, 6) establishment of a curriculum evaluation system and its quality control, 7) arrangement of the creativity and an information capacity cultivation in information-oriented society. The Department of Industrial Engineering parts in vocational high school had 20 Departments with one more additional department of school in 'Environmental Engineering Department' in the 7th National Curriculum formed from 19 departments of vocational high school of the 6th National Curriculum. In addition, it was possible to select specialized subjects by student needs, and students could also freely choose other subjects in every students of every course.

2.3.1 Administration of TVET

The Ministry of Education (MOE) is the government's focal organization responsible for designing and executing policies targeting key educational objectives. Specifically, the Ministry implements educational policies, designs and publishes textbooks, provides advice and financial support to all levels of schools, overlooks educational institutes at various levels from pre-primary education to university-level studies, manages the teacher training system as well as leading the operation of informal education.

Figure 2-5 shows administration organization, which is the Ministry of Education in Korea. The three offices and four bureaus are the Planning, Coordination Office and Higher Education Policy Office and School Innovation Support Office, and Education Welfare Policy Bureau, Student Support Bureau, Lifelong Learning and Future Education Bureau and Education Safety Bureau under the umbrella of Minister and Vice Minister. The administration of technical and vocational education at secondary and post-secondary and colleges belongs to the Higher Education Policy Bureau.

The administration of technical and vocational education at secondary and post-secondary level schools and colleges is managed by the Lifelong Education Bureau (LEB). The LEB houses the Vocational and Professional Education Policy Division, which is the central

government level office holding responsibility for upper-secondary and tertiary technical-vocational education. As for administrative and academic needs of junior colleges, the Junior College Support Division holds this responsibility. A total of 16 metropolitan and provincial offices of education were evaluated by the Ministry of Education from March through July 1999. Evaluations focused on the degree of satisfaction of students and their parents, who are both consumers of education.

Vocational training is the responsibility of the Ministry of Labor. Headed by the Minister and the Vice Minister, the Ministry has two offices (Planning and Management Office and Employment Policy Office) and four bureaus (Labor Policy Bureau, Labor Standard Bureau, Industrial Safety & Health Bureau and Women Workers Bureau). In addition, eight professional officers are responsible for offices of professional concerns.

The officer in charge of vocational training in the Ministry of Labor is the Ability Development Officer who manages four divisions: The Training Policy Division, Human Resource Development and Qualification support Division. The Korea Manpower Agency (KOMA) is a subsidiary public corporation responsible for vocational training. The main functions of KOMA are: (a) vocational training, employment guidance, and follow-up service; (b) development of vocational training materials; (c) National Qualification Testing and Registration; (d) skill encouragement and competitions; (e) employment promotion; and (f) promotion of private vocational training.

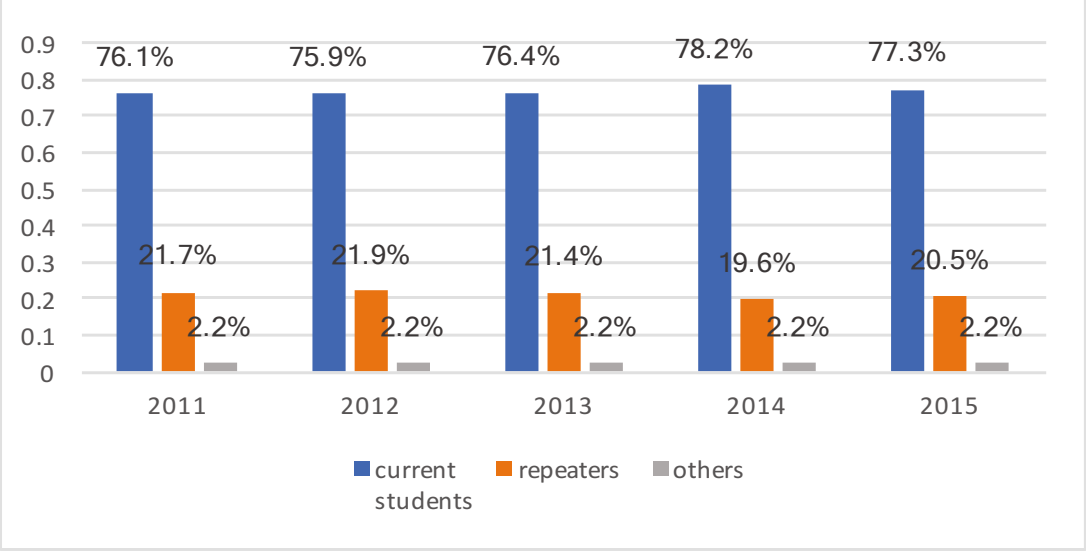
2.4 Supply and Demand side of Labor market in Korea

2.4.1 Supply side of Labor market

The traditional Korean thought respects the status of the people according to the type of occupation shows off the high enrollment rate of university, particularly, in Korea. The credentialism which belief in or reliance on academic or other formal qualifications as the best measure of a person's intelligence or ability to do a particular job widespread continuously to

this century make Korean society with abnormal education environment. (see figure 2-3)

Figure 2-3: University enrollment rate in Korea



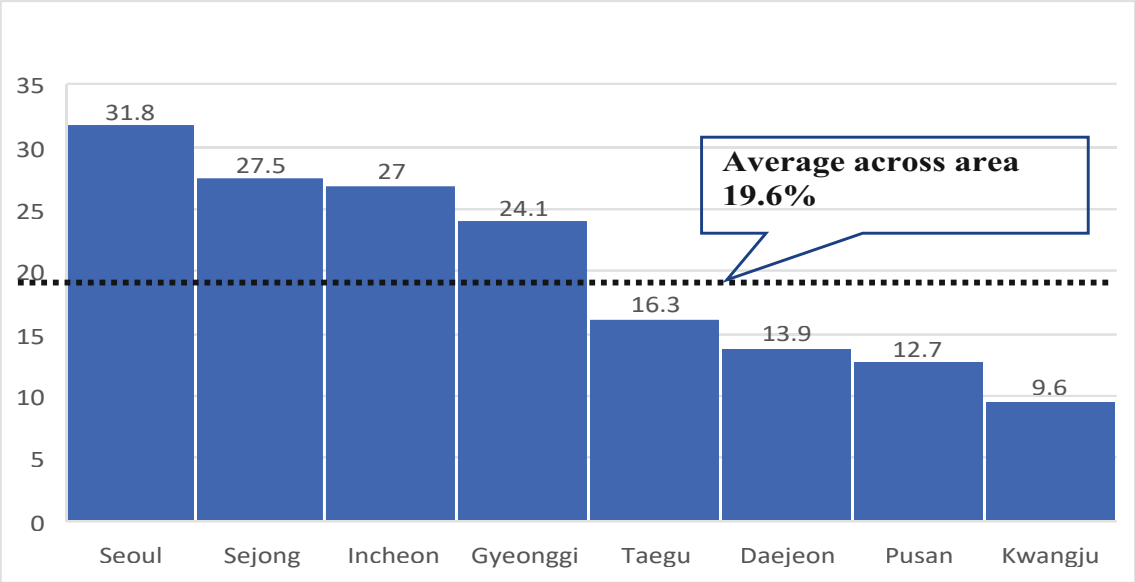
Source: Created by Author based on Statistics Korea (2016)

In modern society, the social recognition based on traditional Korean ideology has continued for a long period of time. It is extremely relevant to the high university enrollment rate

was 30% in the 1980s, booming to 80% in the late 1990s, and becoming stable at over 70% This phenomenon has led to serious repercussions, including an increasing number of prospective students retaking university entrance exams (repeaters), high school students spending more on private tutoring for university entrance exams, and in the labor market where a large number of 2-year university graduates have comparable salaries to high school graduates. The percent of repeaters that enter university in the metropolitan area of Korea is shown in Figure 2-7. The repeaters represent more than 30% of student enrollment in Seoul, and surprisingly 70% of students at the top 10 high schools in Seoul in 2011 were repeaters (See Figure 2-4 and Table 2-2). These repeaters are motivated to enter the three most famous universities (Seoul National University, Yeonse University and Korea University) in Korea.

Under the assumption that they can later secure the limited number of government jobs and jobs available at large corporations. (Choi, Hwang & Kim, 2011).

Figure 2-4: Repeaters to enter university in metropolitan areas (2014)



Source: Created by Author based on Statistics Korea (2015)

Unusually high university enrollment rates as educational inflation are causing adverse effects on job-mismatches such as, increase in youth unemployment, and a shortage of skilled workers in middle-sized companies. In addition, the students in University of Korea are paying relatively high tuition fee compared to other countries' its, however, the education quality of university in Korea is not so competitive to be in the top rank of universities of the world.

Table 2-2: Percent of repeaters to enter University I the top 10 high school, Seoul (2011)

Rank	High school	Districts in Seoul	Repeater (%)
1	Whimoon	Gangnam-ku	88.4
2	Joong-dong	Gangnam-ku	82.2
3	Yeong-dong	Gangnam-ku	81.6
4	Mydungduk Foreign Language	Gangseo-ku	78.8
5	Seoul	Seocho-ku	78.5
6	Kyungbok	Jongro-ku	78.5
7	Sehwa	Soecho-ku	77.7
8	Seoul Foreign Language	Dobong-ku	77.5
9	Gyeongggi	Gangnam-ku	77.4
10	Daeil Foreign Lanauage	Seongbuk-ku	76.9

Source: Created by Author based on Statistics Korean Education Development Institute (KEDI: 2012)

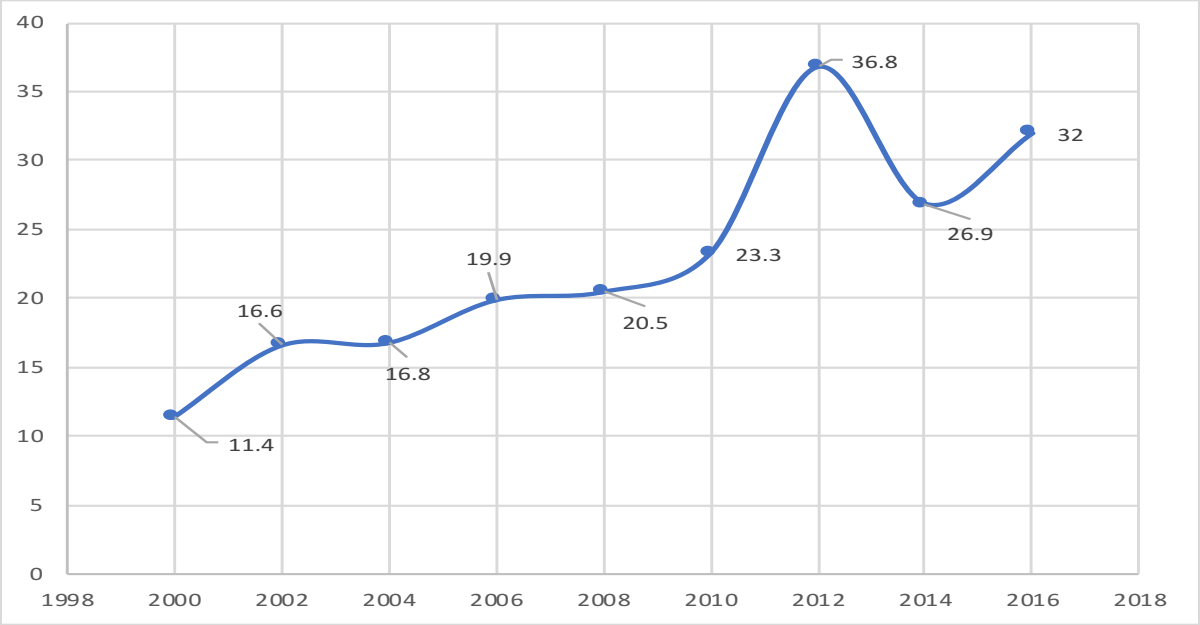
According to a survey by the Korea Chamber of Commerce and Industry (KCCI), many university graduates find that higher education does not contribute significantly to being able to complete tasks in the work-place after graduation, and the number of desirable jobs is totally limited. This environment has delivered on excessive supply of university graduates, which has resulted in the dramatic increase of the rate of young unemployed people.

This increase is not only a phenomenon among students who went to general high schools and normally enter university after high school graduation, but it also impacts to vocational high school students who forgo employment to enter university after graduation. According to the 2010 Vocational High School Status released in May 2011, the employment rate of vocational high school graduates in 2010 dropped to 19.2% from 54.7% in 2001. On the other hand, the percentage of vocational high school graduates to university has surged from 40.8% in 2001 to 71.1% in 2010 (Son, 2010, Choi, 2010 & Choi, 2007). Currently,

vocational high school students entering university instead of entering the labor market after graduation has become the norm. As a result, vocational high school needs to set its curriculum more similar to general educational institution to prepare students for university as well as vocational and training (Byun & Kim, 2011).

In this way, despite the fact that Korean students are going to college excessively to find a better job, according to the Korea Labor Institute at the end of February 2011, out of the 600,000 unemployed, 262,000 are young graduates of 4-year universities. There is a job-mismatch keeping persistently between the workforce high youth employment and the shortage of workers in middle-sized companies. In 2012, the unemployment rate of 4-year university graduates reached almost 40% (see figure 2-5).

Figure 2-5: Unemployment rate of 4-year graduates



Source: Created by Author based on Statistics Korea (2018)

Although this situation, high enrollment rate in university of Korea cannot avoid the high unemployment rate among youth who graduated university. At the same time, the social phenomenon of credentialism is pursuing high enrollment rate in university and easily find that the low share of vocational high school students (see table 2-3) and they are also going to

university in Korea (see figure 2-6). Even though no convincing evidence. The tredictional Korean perception of society solidly settled that entering university is important to link to the labor market whether the students were in general or vocational high school. Based on this, vocational high school has to keep some subjects which general high school deal with to increase their student's high enrollment rate in university. This phenomenon makes the vocational high school's main purpose fade (Ahn & Lee, 2009).

Table 2-3: Schools, Students in Korea (2016)

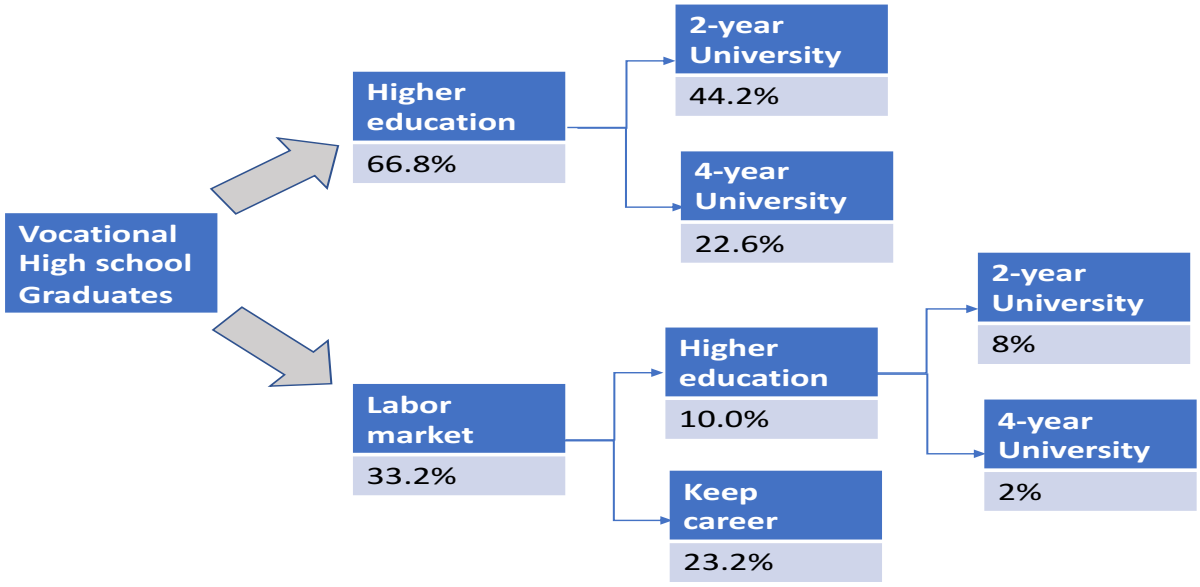
Classification		No. of Schools	%	No. of Students		
				Total	%	Female
Secondary Education	**Subtotal**	**2,402**	**100.0%**	**1,764,350**	**100.0%**	**842,742**
High School Course	Gifted High School	152	6.3%	67,607	3.8%	34,823
	General High School	1,545	64.3%	1,256,108	**71.2%**	625,300
	Vocational High School	497	20.7%	290,632	**16.5%**	125,966
	etc.	208	8.7%	150,003	8.5%	56,653
Tertiary Education	**Subtotal**	**432**	**100.0%**	**3,516,607**	**100.0%**	**1,522,473**
Junior College Course		160	37.0%	746,269	21.2%	298,837
Under Graduate Course		226	52.3%	2,473,50	69.3%	1,060,457
Graduate School Course		46	10.6%	332,768	9.5%	163,179

Source: Created by Author based on Brief of Education statistics on Korean education development by Ministry of Education (2016)

Further, there is a qualitative difference between general high school students and vocational high school students in the academic school performance due to different educational purposes. So, students who attend vocational high school have a difficulty to go to 4-year university compare to general high school students. However, they try to go to 4-year university with the low success rate of entering and also try to go to 2-year university which has a high probability of entering university following social perception of education as well

as low motivation.

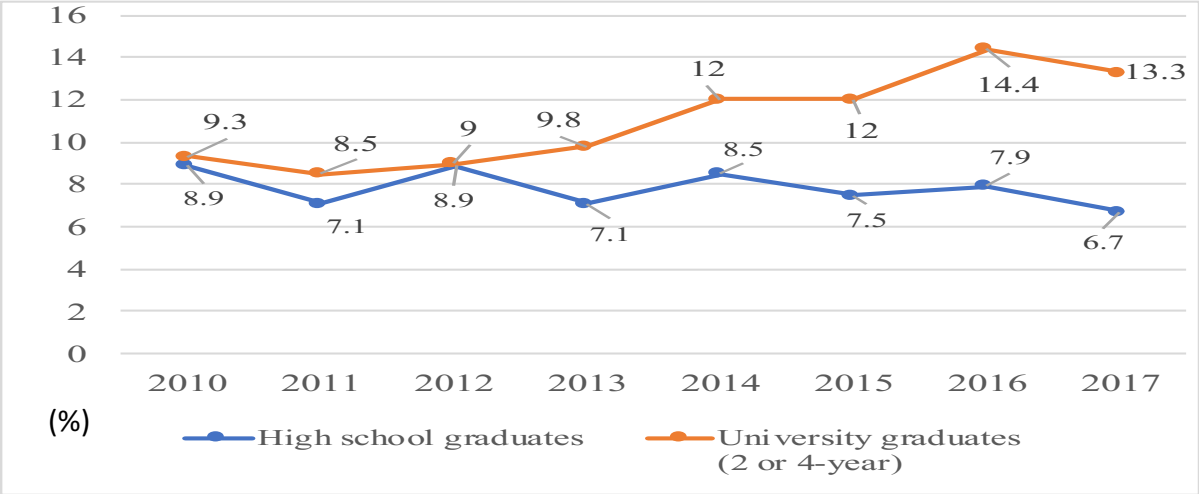
Figure 2-6: The education and career path after vocational high school graduation (2015)



Source: Created by Author based on Shin & Ryu (2015)

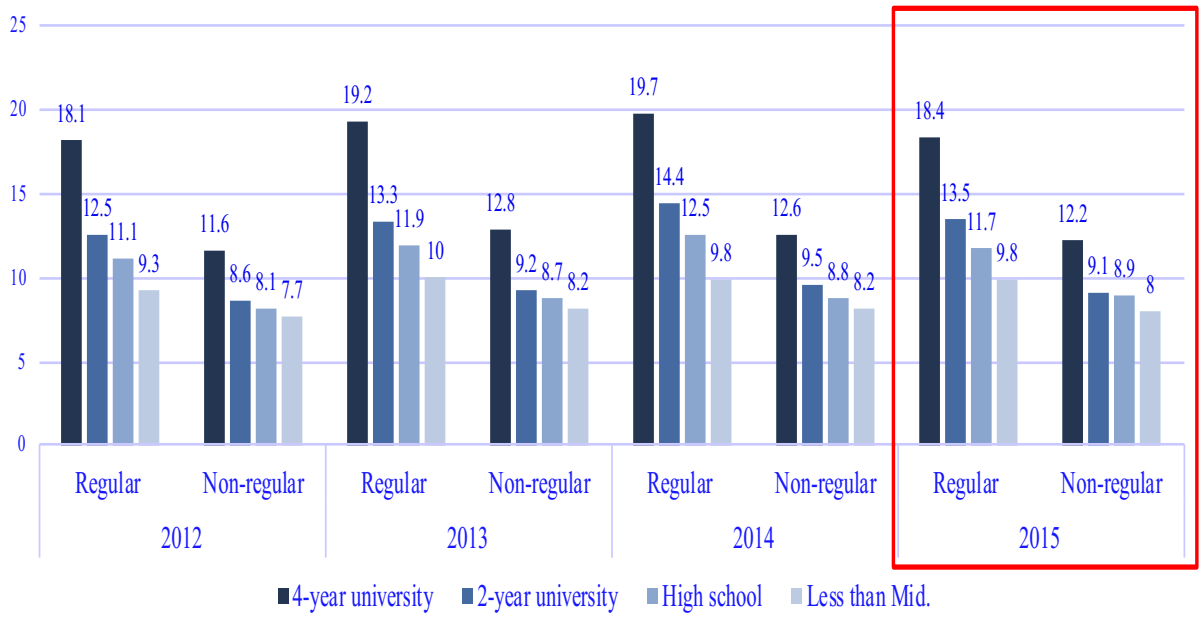
Without the exact purpose to enter university, just having a purpose to get a university degree following the social perception cannot give any guarantees to enter the labor market, and this situation makes more over education and excessive youth unemployment as well in Korea. Comparing unemployment rates among high school graduates and 4-year university graduates, males, aged 25 to 29 for the past several years, the unemployment rate for 4-year university graduates is higher than for high school graduates. In 2017, the unemployment rate for 4-year university graduates is more than twice as high (see figure 2-7).

Figure 2-7: Unemployment rate of 25-29 year-olds by education level (male)



Source: Created by Author based on Statistics Korean Education Development Institute (KEDI: 2018)

Figure 2-8: Regular and Non-regular workers' wage by education levels per hours



Source: Created by Author based on Employment statistics 2017, Ministry of Employment and Labor

Figure 2-8 shows Regular and Non-regular workers' wage by education level per hour from Employment Statistics 2017, Ministry of Employment and Labor in Korea. Despite their is high enrollment of higher education the wage gap is not so deeply different between each level of education, especially in non-regular jobs between high school and 2-year university. This

situation is becoming worse over time.

2.4.2 Demand side of labor market

This chapter minutely examines the current status of Small and Medium Enterprises (SMEs) which cannot adequately fill their human resource needs in the labor market of Korea. Although the unemployment rate of young people is seriously, high which is a big issue every year in Korea, it cannot compare to the lack of labor force in SMEs. The lack of labor force, which is closely related to the productivity of enterprises, causes distortion of distribution of resources in the entire country and reduces the efficiency of human resources in the labor market. Unlike SMEs with the lack of employment, the large corporations never suffer from lack of labor force. On the contrary, the large enterprises are having overflowing applicants to enter every year.

While Korean SMEs have contributed to economic growth by absorbing the impact of economic fluctuations and mitigating income inequality (Nugent & Yhee, 2001), since the 1990s, the productivity gap between SMEs and large corporations has increased, and the gap of employment number has also increased in SMEs. The gap of productivity and number of employees in SMEs make it difficult to contribute the Korean economic growth (OECD, 2016a; Lee, 2014).

It has been pointed out that SMEs suffer from low productivity due to lack of technology, funds and manpower in a vicious cycle even though the government has supported SMEs in various ways and expanded the scale and intensity of their support (Kim, 1994). In addition, according to the Korea Development Institute (2003), the acceleration of technological innovation and the deepening of the Global Value Chain (GVC)[5] have increased

[5] The Global Value Chain (GVC) means that the added value inherent in a commodity is internationally entangled like a chain as production activities become internationalized. For example, if we use Japanese capital goods in our country to produce intermediate goods and then export them to China, and China will process the intermediate

the risk of SMEs being trapped in low-productivity and the low-wage traps. The government should support the labor force, and it is necessary to drastically improve policy to support SMEs to utilize the technology and economic environment change as developing opportunities for productivity in SMEs because SMEs' insolvency with low productivity leads to low competitiveness of the Korean economy.

With increased unemployment problems such as youth unemployment, many countries around the world, including Korea, are paying attention to the role of small and medium enterprises (SMEs) and are expanding support and improving their support policies (OECD, 2009). Up to now, the policy of SMEs has indicated that SMEs' R & D support is more active in Korea than in other countries, however the efficiency of SME support policies is depressed (OECD, 2016b). Revision of SMEs policy is necessary in Korea for the performance and limitations, and the role of HRD in improvement plans policies that have become more important due to technological innovation and globalization in order to solve the low productivity problems of SMEs (Kim, 2016).

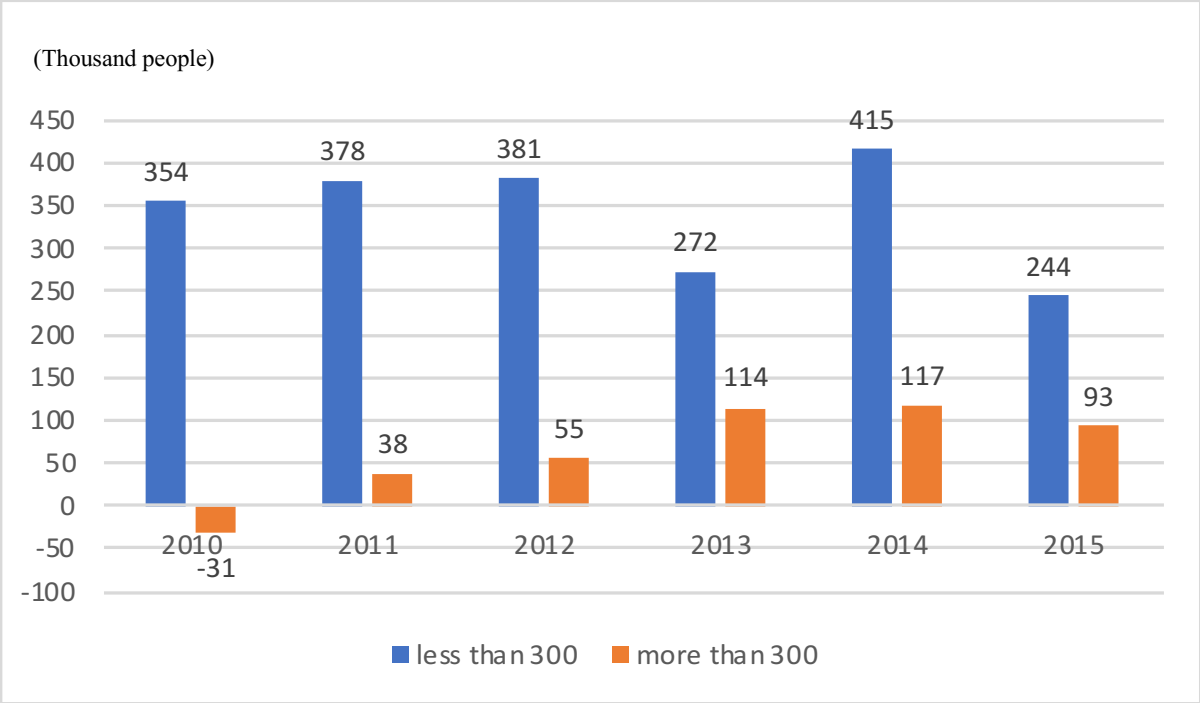
The most important factor for enhancing the productivity of SMEs is technological innovation, and securing skilled manpower is essential for technological innovation.
Support SMEs in Korea have been suffered from a persistent labor shortage and Korean government tried to support SMEs' human recourse. Despite, the government's support, human resource development for SMEs has not worked well because of high cost for training and low-performance in labor market and high turnover rate after training linking to a job (Cho, 2011). The SMEs policy strategy is important to recognize for SMEs and workers that the impact of technological innovation and globalization on skilled-workers, and also the labor markets. In spite of the accelerated technological innovation and the global value chain deteriorating, the

goods again to make final goods, the GVC will be formed between Korea, China and Japan. In addition, it has become a factor that further heightened the importance of the GVC as the World Input-Output Table or Inter-Country Input-Output Table, which shows the relationship between the countries and industries, has recently been systematically developed, a measurement of how the value chain is formed in each country and industry (Chung, 2014).

polarization between skilled-workers and jobs in Korea, the SMEs have difficulty in persistently obtaining skilled-workers due to the unsteady technological innovation policy and human resources development policy, and the gap between vocational education and the labor market, and the weak linkage of vocational education and training.

In this way, the specific situations of SMEs in Korea can be confirmed by the following graphs and tables. According to Figure 2-9 and Figure 2-10 by size of the business between the SMEs and large companies, 25,936 thousand workers, labor force nationwide, more than 90 percent in the labor market were distributed in SMEs with fewer than 300 employees and 9.1% (2,369 thousand employees) are working for major companies with more than 300 employees in 2015. The demand for the number of employees increased by the SMEs with fewer than 300 employees every year, but the employment rate among the total labor force is increasing substantially only in major companies with more than 300 employees.

Figure 2-9: The variation in number of workers by firm-size



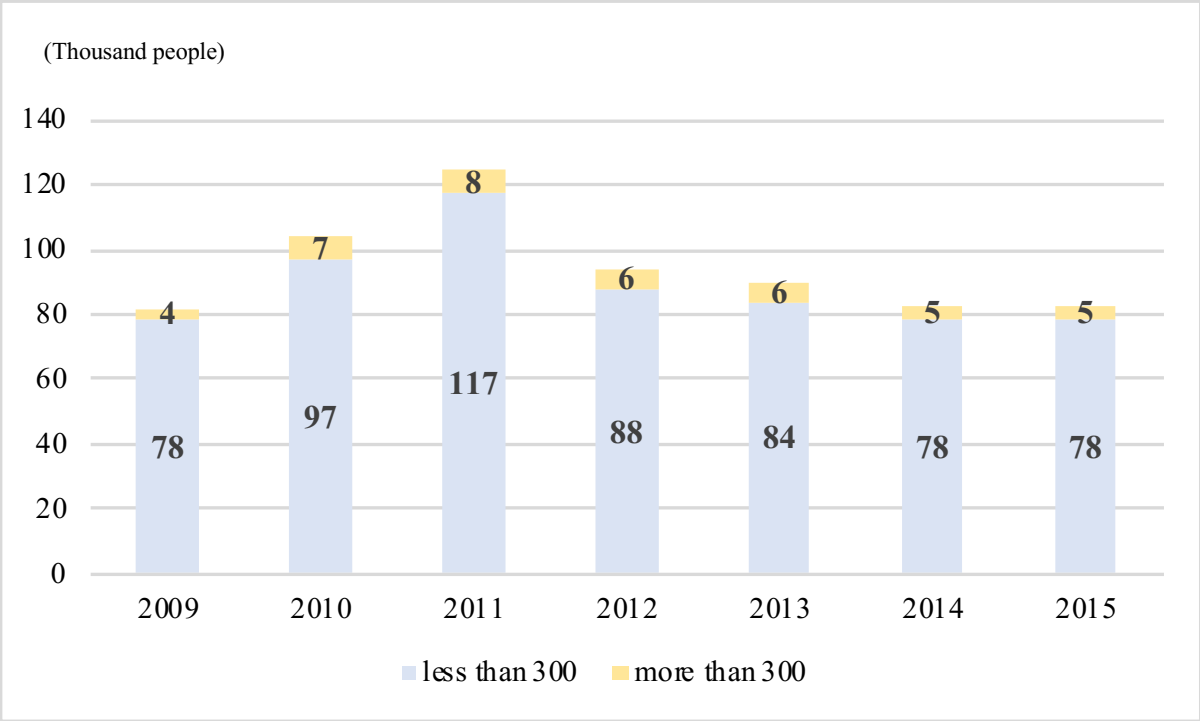
Source: Created by Author based on MOEL (2016)

Figure 2-10: The employment rate by firm-size

Source: Created by Author based on MOEL (2016)

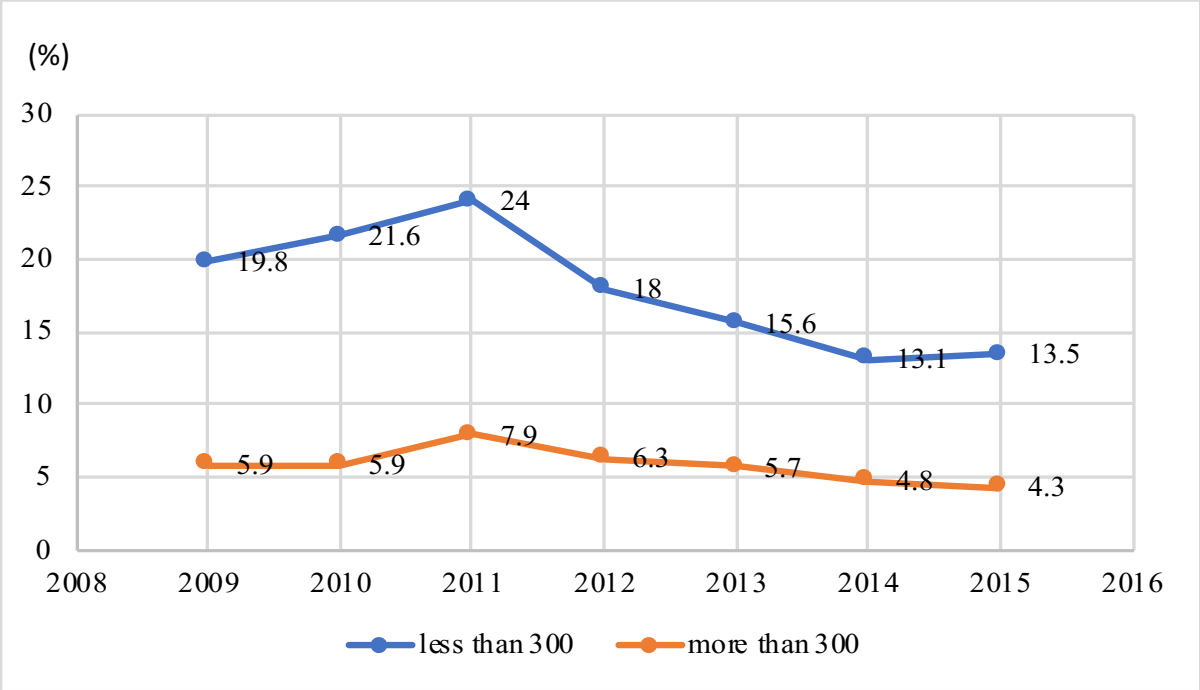
Figure 2-11 and Figure 2-12 show that the number of workers who have not been hired during the labor shortage of SMEs even though the SMEs post notices of job openings for three months. This rate has been slightly declined since 2011. According to firm-size, the amount of labor shortage in SMEs with less than 300 employees is much higher, but the number of labor shortages is continuously decreasing by year. Compared to 2010 and 2015, it decreased from around 20 percent to 10 percent in the SMEs with less than 300 employees and decreased from 6 percent to 4 percent in the major companies with over 300 employees.

Figure 2-11: The number of labor shortage by firm-size



Source: Created by Author based on MOEL (2016)

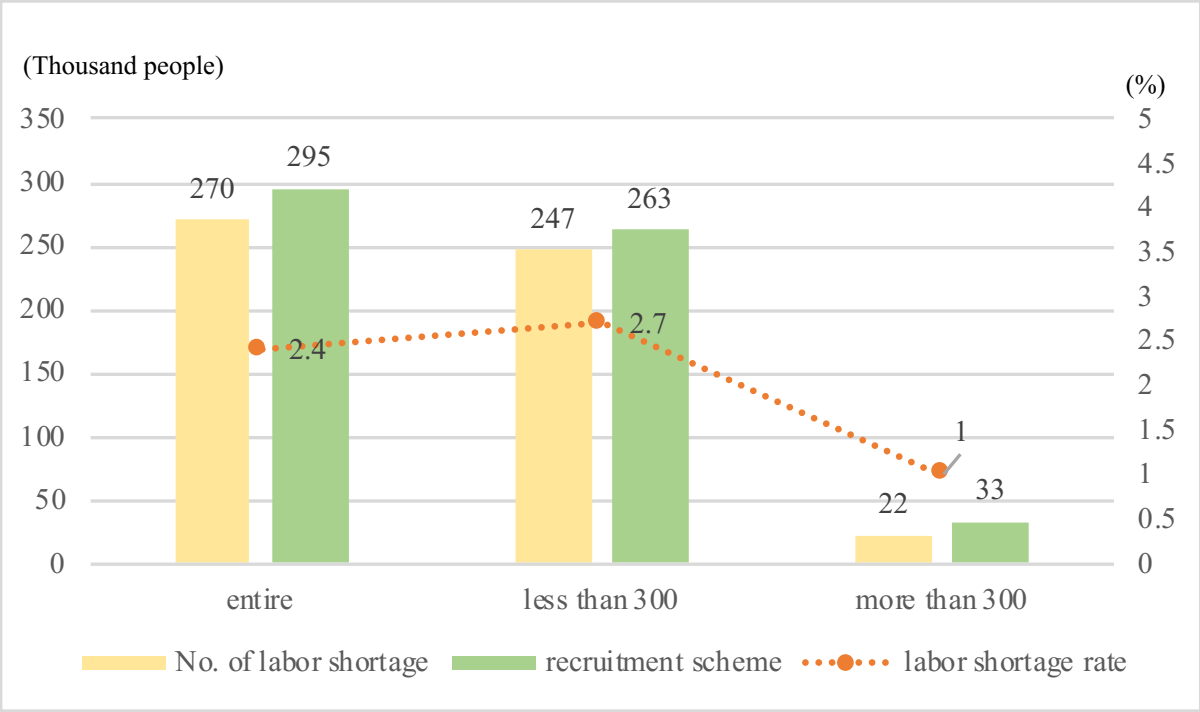
Figure 2-12: The labor shortage rate by firm-size



Source: Created by Author based on MOEL (2016)

The tendency of the labor shortage since the end of 2010, the labor shortage rate decreased from 3.1 percent of the peak and it shows a 2.4 percent in the end of 2015 for the labor shortage rate required by the business for heightened production activities. Recently, the labor shortage rate has minimally decreased due to the large increase of job seekers and the employment rate as the recovery rate of the economy is not clear. The labor shortage rate was high in the SMEs with less than 300 employees in the end of 2015, particularly, the labor shortage rate of SMEs was 2.7 times higher than the major companies with over 300 employees.

Figure 2-13: The lack of worker and recruitment scheme by firm-size (2015)



Source: Created by Author based on MOEL (2016)

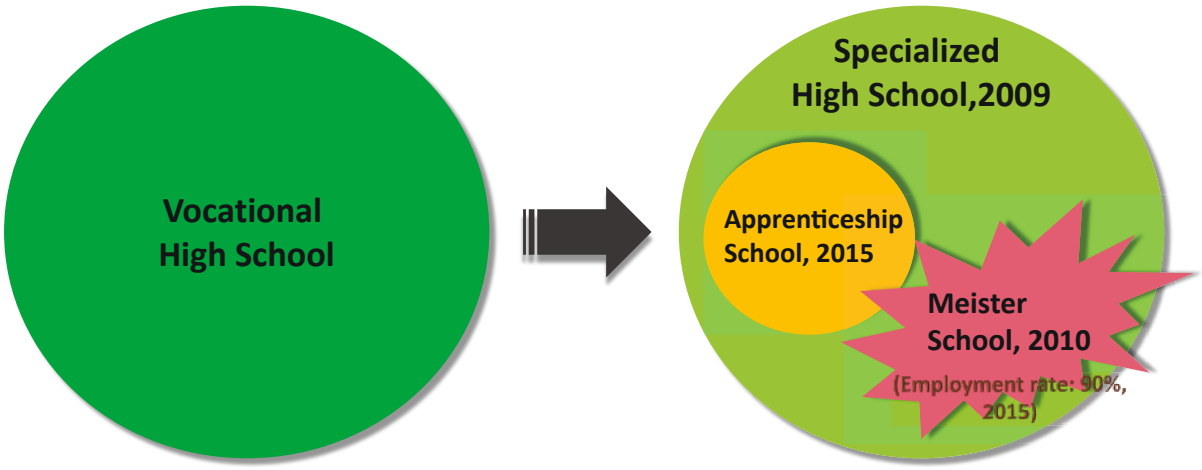
2.5 Government Policy of vocational education for Human development

2.5.1 Skilled development

1) Overview of the human capital development project

This project is one of the government's supporting projects for SMEs with a labor shortage focused on improving the labor force and making job-oriented courses in vocational high school since 2008. Starting in 2009, vocational high school was restructured (see figure 2-14) by dividing it into specialized high school, meister school (2010) and apprenticeship school (2015) that will describe the next secession in apprenticeship program. After this restructiuring of the vocational high school, the government has focused on more specialized high schools with human capital development projects. Currently, there are about 200 specialized high schools out of vocational high schools (594) in 2017. The most specialized vocational high schools among the 181 schools included and supported all kinds of subsidies from the Korean government (MOE, 2016). It calls meister school that already divided from vocational high school in 2010. Meister school students' characteristics are quite different than previous vocational high school students who had a low academic ability and family background. Meister school students need to have great performance when they were in the middle school and the family backgrounds are not socially low.

Figure 2-14: Restructured vocational high school by government policy



Source: Created by the Author based on MOE 2016.

This project is supposed to provide comprehensive support, such as reorganization of the vocational high schools and program operations, and to reconsider public awareness of vocational education. The context of vocational high school's reorganization with this program is that strength of each subject, a new mind-set of curricula, improving flexibility and responsibility to get a job in vocational high school.

The main supporting contents from the government are:

I. Developing teaching documents, career consultancy, student as well as teacher training
II. Managing job-oriented classes
III. Recruiting CEO, training specialist, experts from industry to teach at vocational high school
IV. Developing and Supporting on the job training linked to vocational high school.

In 2016, the government launched a restructuring project to support the reorganization of departments and the expansion of classrooms in areas where industrial demand is reflected in order to mitigate the disparity in the labor supply and demand for high school graduates. Based

on the above goals, the Korean government is simultaneously trying to expand the number of students in vocational high school from less than 20% to over 30% of all students among secondary schools by 2020 through the establishment of new occupational units and restructuring of vocational high school departments.

2) Overview of the employment customized course program

This project as a course is particularly, for SMEs and vocational high schools to reduce job-mismatch between SMEs and vocational high schools with employment agreement from the SMEs for assuring students' employment status. Due to this agreement, SMEs could supplement labor shortage and vocational high school graduates could obtain a job immediately after graduation. The schools are conducting and developing a course for responding SMEs' requirements at the working place. For instance, if the students take this course, they will have a job in SMEs after graduation right away.

The employment customized course is classified into a 3-party agreement (first matching -after training-employment contracts) and a 2-party agreement (first training - after matching-employment contracts) depending on school characteristic. The is a program with schools caring before and after taking the programs between vocational schools and SMEs. This program conducted customized training, and is required by the contracting companies through linking to employment at the SMEs. It is also providing employment contracts among the SMEs and students who have received customized training.

3) Apprenticeship program

The apprenticeship program at the high school level project integrated training between school and companies is a Korean-style apprenticeship system design based on the German and Swiss apprenticeship system in Korea. The apprenticeship program promotes workers capability

based on National Competency Standards (NCS) and firm-specific competency which is required by a large number of companies for competent job performance. Based on this, the NCS is very important to develop firm-specific competency-based curriculum and to provide an apprenticeship program with a skill-based learning process (Park, 2016).

The current government is able to evaluate the apprenticeship program for successful operation infrastructure of industry-academy apprenticeship schools by the development of general curriculum. The evaluation includes details of operating the curriculum, NCS practice, the performance evaluation system for competency evaluation, and the induction mechanism of enterprise participation.

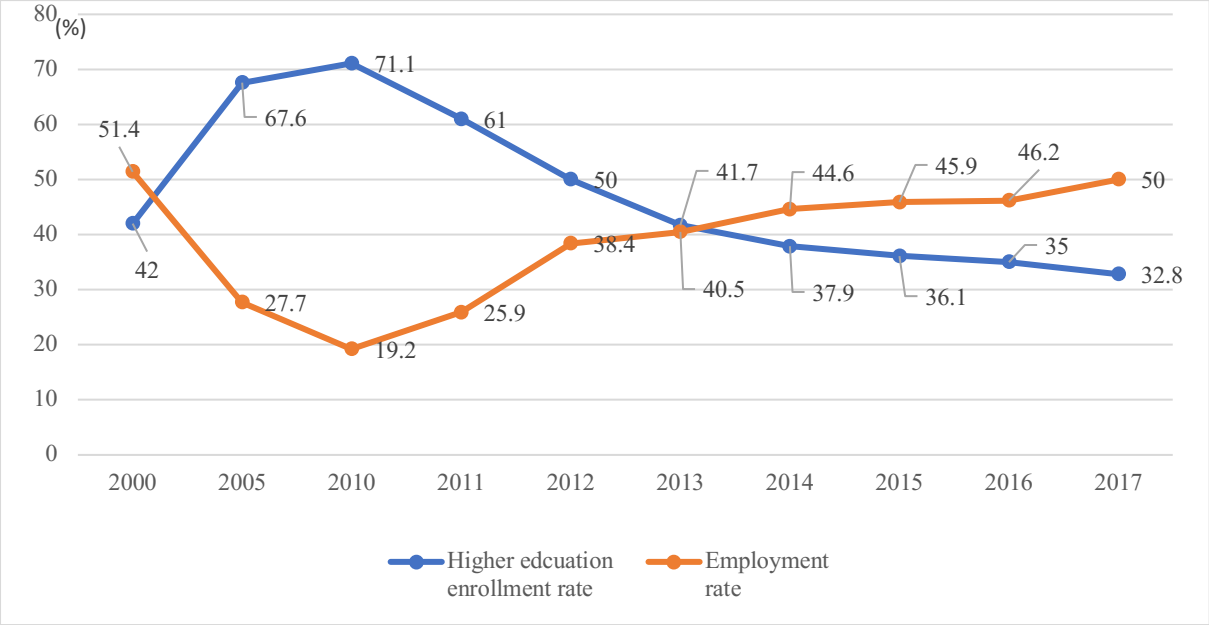
In September 2014, nine schools were selected as apprenticeship schools as an all-in-one schools, such as school-based training and industry oriented on the job training (Byeun et al., 2015). In 2015, 51 restructured schools were selected, and as of 2018, 198 schools are participating. As a result, the apprenticeship school of all-in-one schools and the industry-oriented apprenticeship program have expanded and diversified from industrial fields into IT, commerce and services (Ministry of Education, Ministry of Employment and Labor, 2017).

The high schools provide the apprenticeship program linking to companies collaborating on the job training (OJT) and the off-job training (Off-JT). After the apprenticeship program, students could have an opportunity to work at the linked company. The operation period is set to 1.5 to 2.5 years depending on the characteristics of the school and the company, and the OJT operating system is operated on a daily, weekly, or scheduled basis. Off-JT is centered on theoretical and basic hands-on training by the school's specialist teacher, and OJT is conducted by the on-the-job teacher of the company (Ministry of Education, Ministry of Employment and Labor, 2016).

Since adopting the apprenticeship program among schools and companies, the students receive a suitable education linked to labor market between schools and companies, and can settle down at the employment status after graduation right away. The companies can hire skilled employees, and they save time and cost on human resource.

Since the restructuring of vocational high school in 2010, the employment rate has increased for the vocational high school. The share of vocational high school students was at its highest of 42.2% in 1995. Afterwards, the share gradually dropped to 17.5% in 2017. In the middle of 2010, specialized high school students' higher education enrollment rate is getting obviously decreased from 61.0% to 32.8% in 2017, while since 2010, the employment rate is gradually getting increased from 25.9% in 2011 to 50.0% in 2017 (see figure 2-15).

Figure 2-15: Higher education enrollment rate and employment rate of vocational high school students (Meister High School, Specialized High School, 2000~2017)



Source: Created by Author based on KRIVET (2018)

The higher education enrollment of vocational high school students increased in the 2000s. However, it has declined since the 2010s, which is related to changes in government policies on vocational education. Table 2-3 shows the wage return to level of education in Korea using the Ministry of Statistics Korea survey. The regression has controlled for gender, age, and individual characteristics to investigate the wage effect by level of education which is the benchmark, vocational secondary education. Vocational high school graduates have a 25%

positive wage effect compared to middle school graduates, and a 3.1% positive wage effect compared to general high school students. This result of the wage gap for high school graduates is different from a previous study that showed vocational high school graduates had better effect in wage compared to general high school graduates. However, the interpretation for the vocational high school graduates needs to consider more various aspects such as satisfaction of work place. The employees who graduated vocational high school are having experience at the inferior workplace which they didn't expect before working. For this understanding, the vocational high school graduates have a low probability to transform their social status with cultivating working experience.

Table 2-3: Wage return to level of education in Korea (2016)

Y	Male	Age	Age2	Less mid	GH	2-year	4-year
Wage	0.294***	0.069***	-0.001***	-0.250***	-0.031***	0.217***	0.442***
	(0.003)	(0.001)	(0.000)	(0.007)	(0.005)	(0.005)	(0.005)

Source: Created by Author based on KRIVET (2018)

2.5.2 Restructured vocational education

The youth unemployment rate is relatively higher among the entire unemployment rate, and the labor shortage rate in SMEs is very high in terms of university graduates due to job-mismatch with high expectation in job seeking. The Korean government has established the "Work First-then to College System" in secondary vocational education policy to enhance vocational high school students' employment rate and to mitigate job-mismatch in the labor market in linkage with industry.

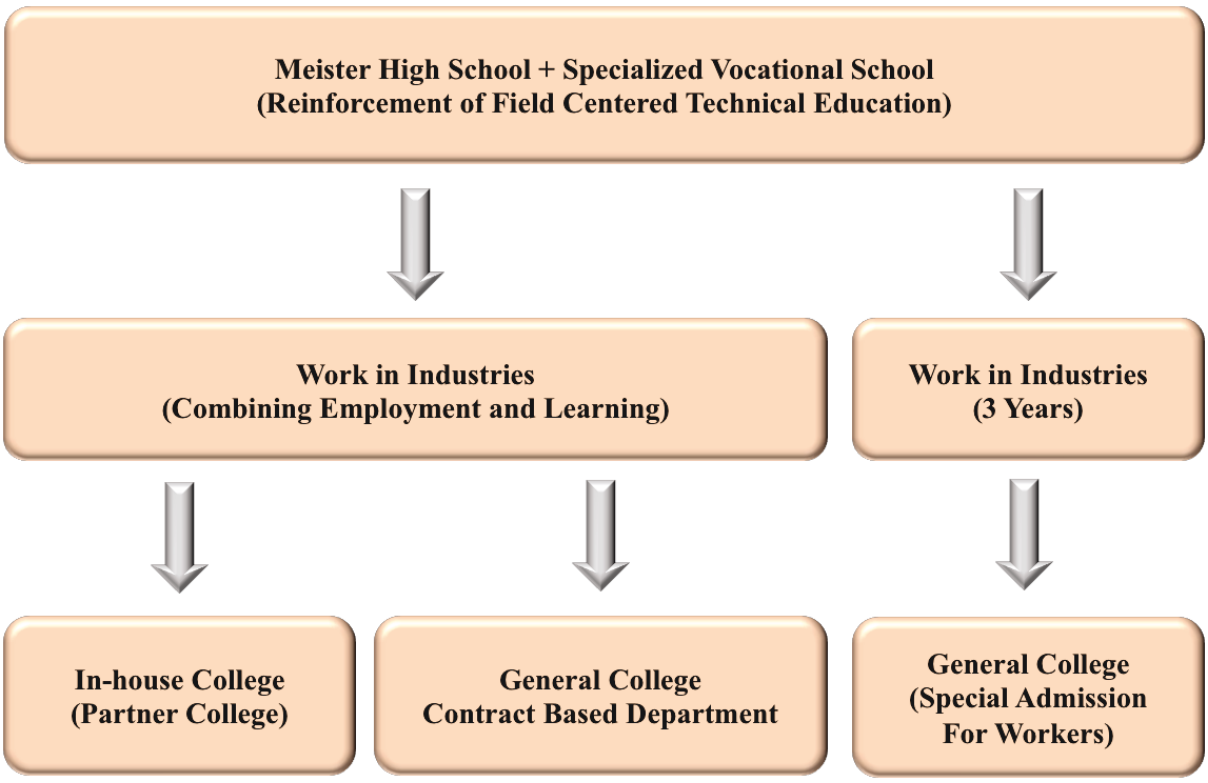
The restructured vocational education, which is mainly divided into two types vocational high schools (Meister school, and typical vocational high school), could improve student and parent satisfaction in the school, the teaching, learning and vocational training.

Meister schools' students are selected by performance on the entrance exam. Also, the government has changed the name of the typical vocational high school to the specialized high school to overcome the negative image of vocational high school. Before the restructuring of vocational high school, there were some problems to ensure linkage of job opportunity after graduation with less information of companies' requirements, less opportunity to link the labor market for graduates who could have a job instead of military service. Thus, the government has introduced the "Korean Meister Promotion Basic Plan (2008)" as part of the "High School Diversification 300 Project" to solve the problem of uncertain careers after graduation. As the vocational high schools are focused on 400 elite vocational education institutions, about 50 of them are designated as Meister high schools, which are defined as industrial high schools customized to meet industry demand with a professional curriculum.

After that, the government announced a new system called the "Work First-then to College System". The Career Advancement System was suggested as the basic direction of vocational high school education in the "Vocational High School Education Advancement Plan" reported at the presidential employment strategy meeting in May 2010. The aim of the "Work First-then to College System" is to clarify problems such as discrimination in employment status, social wastage caused by pursuing excessive education, and an aging workforce in the industry field. In order to establish the "Work First-then to College System", the government has designated meister and specialized high schools as a means of enhancing job-centered vocational education, improving the parallel conditions of employment and study, and expanding employment opportunity in industries participating in the job training.

Thereby, it will be possible to establish an institutional base for parallel employment and academic work, to lower the age at entry into the labor market, to secure a high-quality workforce, to expand technological capabilities and increase productivity, to increase the employment of graduates, and to establish a welfare system for job openings. In the end, the goal of the "Work First-then to College System" is to expand the growth engine through a combination of education and employment (Kim & Rah, 2015).

Figure 2-16: Vocational Education System for "Work First-then to College System"



Source: Created by Author based on News Release by the MOE (2011)

Figure 2-16 shows that, the government established a parallel system between education and employment in 2011 after shifting the direction of career path for vocational high school into the "Work First-then to College System", and developed various post-graduate education paths such as In-house College, General College Contract Based Department and General College with special admission for keeping working status. The "Work First-then to College System" was introduced as a career path for vocational high school education in 2010, but it started with the introduction of Meister high school. The Meister high school education plan announced in July 2008 is to introduce Meister high school system provides promotion of technology master, combining customized education of industrial demand to link the employment status after graduation. Subsequently, in May 2010, the vocational high school education advancement plan classified vocational education institutions as Meister high schools and specialized high schools and enforced and strengthened job-oriented education.

In September 2011, the Korean government implemented a plan to not allow discrimination based on education background of high school graduates and to open employment in society for symbiotic development through job-centered employment rather than education background, and improving wages and the promotion system. Likewise, in July 2012, government departments jointly set up a well-developed plan with the “Work First-then to College System” to strengthen job openings for high school graduates.

CHAPTER3:

LITERATURE REVIEW

3.1 The Debate on Vocational Education

In recent decades, there have been numerous researches works focusing on the dichotomy of general and vocational education. Simply speaking, for general education, academic institutions focus on student requirements of acquiring theoretical knowledge, while vocational education concentrates more on job-oriented skill development, training or practices. The UNESCO Convention has defined it as "All forms and levels of the education process involving, in addition to general knowledge, the studies of technologies and related sciences, the acquisition of practical skills, know-how, attitudes and understanding relating to occupations in the various sectors of economic and social life" (UNESCO, 1995, p.163).

Nowadays, vocational education is gaining popularity globally, though the World Bank has in the past attempted to persuade governments in economically emergent nations about the importance of general education and advised them to substantially reduce public expenditure for vocational education (Bennell & Segerstrom, 1998). Vocational training is meant to qualify the students who required skills according to the demand stemming from the labor market.

Advocates of vocational education argue that all the topics being taught at university require some training at a certain level. This cannot be ignored, since bookish or only theoretical knowledge without any practical relevance may be relatively useless. Moreover, some other proponents go further and claim that some disciplines, falling within the realm of science or technology, require little background knowledge. The greatest challenge for job applicants is the mismatch of their inadequate practical skills and the requirement of instant readiness in the job market.

However, people should not dismiss the role of general academic education and its effect on students. This type of education facilitates the development of one's own knowledge through acquiring different theories. In many countries, students, after finishing high school

education, experience difficulties in university to come up with the appropriate choice of a certain specialty or research topic (Malgwi, 2005; Zafar, 2013; Wiswall & Zafar, 2014). Henceforth, if the students are not exposed to this selection dilemma, it might be easier to narrow their scope of focus, and their choices would become more appropriate. On the other hand, if their study is exclusively based on training, the decisions tend to be arbitrary, and several potential problems may arise in the later years of studies. For instance, due to rapid technological development, the skills taught in class could become out-of-date (Howland et al, 2012).

Furthermore, supporters of general education also argue that international labor market demands, which heavily rely on commercial and service consumerism, require academic flexibility of job applicants. Consequently, higher academic flexibility enables students to switch from one occupation to another as well as adjust fast, keeping in mind the increasing demands of the ever-changing labor market. In other words, students are required to have vision, be more critical, analytical, and creative, and these skills are usually fostered through exposure to academic disciplines.

Therefore, vocational education is considered as relatively disadvantageous for job applicants. On the contrary, comprehensive academic education is perceived to be advantageous as it makes the students more knowledgeable and provides more flexibility to exploit the constantly changing requirements of the modern labor market (Orkodashvili, 2009).

Consequently, the World Bank has argued that vocational education and training, especially in developing countries, have to be managed by individuals, companies and private institutions with a minimum of interventions from government. (World Bank, 1991). However, the argument over the nature of education has taken different paths. The job market requires people with more expertise and skills in this globalized world, with more high-tech and sophisticated industries.

Furthermore, there is another major consideration about the differences in labor market outcomes between general and vocational education. Even though the vocational high school

(VHS) in underdeveloped and developing countries is frequently suggested as an antidote to improve their labor market outcomes, especially for young people, there are different results in the literature on labor market outcomes which show the rate of return in vocational education of upper secondary school. These findings are being cited by policymakers and scholars in academia to imply lack of faith in vocational education's ability to improve labor market outcomes from the policymakers and scholars in academia. At the end of the day, the question of how a general high school graduate would have performed in the labor market had she/he received vocational rather than general education in the high school remains mostly unanswered.

The counterfactual nature of the above question is also partly responsible for the mixed and inconclusive findings reported in the literature. To be precise, there are two related, but distinct, problems associated with the search for the answer to this question. Firstly, data unavailability is a serious concern, especially for developing countries, which reduces the information content of the existing estimates. Secondly, there is a serious selection problem in the sense that those who choose to receive VHS education are non-randomly different from those who choose to go to a general high school (GHS). However, the returns to VHS education did not resolve the latent unobserved variable in the estimation. The data unavailability problem amplifies this selection problem in the sense that it significantly reduces the chances for finding suitable instruments and/or setting up counterfactual variables to address the selectivity/selection issues. The existing literature has put a fair amount of effort in minimizing the noise generated by the data unavailability and selectivity problems but there is still ample room for developing additional empirical perspectives and refining the existing results.

Accordingly, research on the comparison of both general and vocational education is rapidly growing with a focus on the following two perspectives: (1) Returns to education in the labor market; and (2) other labor market outcomes such as the employment rate, etc. Zymelman (1976), Psacharopoulos (1973; 1985; 1994; 2004) and Tilak (1988) made significant contributions and carried out extensive reviews of the literature comparing the labor market

outcomes in terms of earnings and employment of vocational schooling with general schooling at the secondary level. There are not many synthetic reviews on this topic after 2005. This literature review first summarizes their review documents and then adds the most recent academic findings.

3.2 Return to vocational education

This sub-section will review the scholarly debate between those against and those in favor of vocational education. It will be delivered in chronological order from its discourse in the 1970s, 1980s, and through recent years. Numerous empirical studies have been published over the last few decades arguing strongly against vocational schooling based on cost-benefit analyses and argumentation. Towards the end of this sub-chapter, other factors that determine the choice of vocational or general schools are also discussed.

In this debate, George Pscaharopoulos is one of the prominent scholars promoting the need to return to vocational education. Pscaharopoulos provided one of the first comprehensive international reviews on the importance of vocational education using the concept of rate of return (ROR). In a publication in 1973, he reviewed ROR estimates for Colombia (Schultz, 1968), Philippines (DeVoretz, 1969) and Thailand (Blaug, 1971). He concluded that the limited number of case studies on this subject hindered the possibility to draw any general conclusions on the economic choice between secondary general and vocational schools (Psacharopoulos, 1973).

Psacharopoulos then conducted further reviews in 1985 and 1987. In the 1985 review, he was able to collect more evidence from seven countries: Colombia, Cyprus, France, Indonesia, Liberia, Taiwan, and Tanzania. Shortly after, Psacharopoulos (1987) further updated the study by collecting findings from Sri Lanka (Wijemanna & Welkala, 1975), India (Fuller, 1976), Barbados (Oxtoby, 1977), and Swaziland (Sullivan, 1981). Based on the updated review and estimation of social ROR in those countries, the returns on investment in general school curricula are greater than those on specialized subjects (Psacharopoulos, 1985; Psacharopoulos,

1987). Furthermore, Pscharopoulos (1993) presented thirty-two cases of private and/or social RORs for general and vocational education in 24 countries. With these cases, he further concluded that thereturns to general secondary schooling are better than those to its vocational counterpart. In particular, at this point, Psacharopoulos attributed the conclusion to the higher unit cost in vocational education (Psacharopoulos, 1993)

Among scholars with a different point of view, Bennell (1996) argued that none of the evidence presented by Psacharopoulos included any cost-benefit analysis of data for both vocational and general secondary education, which could be used to compute ratios. Out of the total 14 case studies presented, only 4 had cost-benefit analysis. This includes Psacharapoulos' own analysis on Colombia, Tanzania, and Jordanian, as well as the analysis on Mexico (Izquierdo & Rodriguez, 1980).

Bennell (1996) also challenged Psacharopoulos's way of estimating RORs. First, social RORs to both types of secondary education were only available in seven out of the twenty-two developing countries reviewed: Botswana, Colombia, Indonesia, Liberia, Taiwan, Tanzania, and Venezuela. Inclusion of single estimates for any one country may result in a selection bias. For example, the social RORs to vocational secondary education in African countries, like Cameroon, Cote d'Ivoire and Togo, were relatively very low (6.9 percent, 3.9 percent, and 4.0 percent respectively). Simply excluding these three countries' estimates could increase the aggregate social ROR of vocational secondary education from 11.7 to 12.9 percent. Since no corresponding social RORs to general secondary education are available for all the countries reviewed, it was not possible to say how their inclusion affected the aggregate ROR figure for this type of education.

Second, according to Bennell (1996), Psacharopoulos' work included multiple ROR estimates for a single country, i.e. Indonesia. For Indonesia, there were five pairs of social RORs for a period of 15 years. Bennell (1996) argued that only the most recent ROR estimates should be used for both general and vocational education. He demonstrated that estimations for seven countries may reduce the aggregate of social ROR differential by two percent.

Accordingly, any policy inference is basically weak due to the margins of error derived from ROR calculations.

Third, the ROR estimates were calculated using both the comprehensive method (for Botswana, Indonesia, Taiwan, and Venezuela) and the short-cut method (for Colombia, Liberia, and Tanzania). Thus, these cases are not strictly comparable. This undermined the overall validity of the aggregation process. Similarly, the extent to which individual incomes were adjusted for each country could vary substantially. For example, the RORs in Botswana were largely unadjusted whereas those in Tanzania were adjusted downward to accommodate independent variables such as ability, socio-economic background and work/employment characteristics. In this context, for each case there was a risk of sample selectivity bias, which usually under-estimated the social and private RORs to vocational schooling. In particular, where the general enrollment levels were low, regardless of the type of school, only wealthy students were usually able to gain admission to general academic schools; while often poorer students were streamed into vocational education. Thus, it was obvious that simply comparing the RORs of these two groups of individuals without explicitly controlling for background differences would likely cause an upward bias in the RORs to general secondary education. Bennell (1996) argued that almost all ROR estimations in the studies reviewed by Psacharopoulos did not control for other variables.

However, Psacharopoulos (2004) responded that estimates are rarely fully comparable. There are two main sources of non-comparability: data and sample coverage as well as ROR estimation methodology. In an ideal scenario, ROR in education should be based on a representative sample of an entire country's population. Yet, such an ideal scenario is very rare. Furthermore, Psacharopoulos (2004) was very realistic in explaining that survey costs should be considered. Often, in order to manage costs, surveys were mostly carried out at the firm level rather than at the household level. This raises several issues; first, often it became too concentrated on large-companies; second, samples were sometimes biased towards urban areas due to convenience in sampling; and third, it was not unusual to learn that the survey was based

on the input of the human resources department of a firm rather than the individual employees themselves.

Psacharopolous (2004) also noted that a different set of problems also persist if the ROR was based on samples that included civil servants since public sector wages do not always reflect market wages. Furthermore, parallel with a general observation in development studies (see Pissarides, 2000), another issue sometimes arises if the majority of the top cohorts of university graduates are concentrated in the public sector. Regardless of this factor, civil service pay-based rate of return estimates might be useful in private calculations regarding the incentives set by the government to invest in education and, in turn, incentivize people to work in the public sector.

Another fundamental issue is when wage effects are confused with the returns to education. In this context, one may want to follow the school of thought of estimating through the use of the semi-log earnings function (Becker & Chiswick, 1966; Mincer, 1974). However, the fact is many researchers use the raw coefficients of education in the form of a dummy model to report ROR, whereby it is significantly influenced by wages effects.

Another methodological limitation arises if inappropriate regression is undertaken regardless of the relevance of the independent variables used (Becker, 1964). For example, a researcher may be tempted to use occupation as an independent variable. But, without careful consideration, this procedure may confuse the effect of education on earnings with the effect that actually comes from occupational mobility. The risk is if the general reader of a study interprets the schooling coefficient as a Mincerian rate of return, while often researchers who introduce occupation as a dummy variable actually tend to model earnings and not the rate of return to schooling per se.

Perhaps the several returns to education estimates which draw on twins and other natural experiments are the most reliable (Ashenfelter & Krueger, 1994; Miller et al., 1995; Ashenfelter & Rouse, 1998; Rouse, 1999; Behrman & Rosenzweig, 1999). According to these works, the overall private rate of return to investment in education in the United States is around

10 percent. This figure established a benchmark for what the social rate of return would be. Albeit researchers have known that it may be a couple of percentage points lower, if not adjusted for externalities. Also, the rate of return in a country with a lower per-capita income than the United States will be several percentage points higher, due to extrapolation of the non-comparable returns to education.

Incidentally, estimates of the returns to education based on analysis of twins' earnings and estimates using IV measures resulted in an average rate of return that is very similar to the global average discussed by researchers in the previous point, i.e. around 10%. The returns are mostly based on large random samples of the population, and no external variables such as occupational or personal characteristics, such as marital status, were included in the right-hand-side of the earnings function. Selectivity bias was accounted for in the case of women in most Latin American countries (Psacharopoulos & Tzannatos, 1992), although such correction was not statistically significant. Few studies instrumented years of schooling. Psacharopoulos extended his argument into more details of the social RORs. This extension caused a concern in the literature, as whether it might be called the 'social' rates of return that include true social benefits, or externalities. There are many studies was found by ROR, however the results very and wide at the value. The earnings of educated individuals do not reflect the external benefits that affect society as a whole,and are not personally consumed by the individual. This benefit can be the external advantage or superfluity, if they spread their knowledge to other people in society.

Externalities of education are basically hard to identify, let alone measure. Existing studieshave succeeded to identify many positive externalities of education, but some externalities could not be quantitatively analyzed (Weisbrod, 1964; Haveman & Wolfe, 1984). If one person can increase the education externality to the others, the social benefit from education will increase, additionally, as the benefits also influence both the society and private individuals. However, a literature review of empirical evidence found that the externalities of education to support human capital was incomplete and insufficient with weak magnitude of

results (Venniker, 2001). These findings have been estimated by externalities of education for the human capital improving productivity without considering of internality of individuals which other determinants can affect productivity. Venniker (2001) mentioned, the analysis results are very clear, but the correlation was negative with high magnitude of coefficient and significant.

A few studies that express the rate of return to education with cross-sectional data regressions have used the log of Gross Domestic Product per capita interpreted by years of education and additional control variables, such as individual characteristics and family characteristics. More specifically, the average of log wage per person interpreted by individual years of education, average years of education in each region where those graduated, as well as additional control variables which already mentioned before. The coefficients in total amount of years of education can be interpreted by individual endorsed the social returns to education (Heckman & Klenow,1997).

In contexts where technological or teaching method variations are considered, private returns and social returns have similarities. Rauch (1993) looked at the wage effect on workers' background with average education and detected externalities at the significant level. Several studies in African countries have focused on evaluating the externalities of education among neighboring farmers on agriculture. If one-year schooling of neighboring farmers in primary school increased, the social returns was correlated with 4.3% in comparing private returns with a 2.8% in Uganda (Appleton & Balihuta, 1996; Appleton, 2000).

In the early 1990s, there was a so-called "new wave" of research on the school-based vocational education to improve national growth (Middleton, et al., 1993). While many of these studies relied on the US data, the studies gradually influenced developing countries. Neuman & Ziderman (1991) emphasized recognizing the strengths of vocational education capacity in a cost-benefit analysis to make sure there is an appropriate understanding of vocational education's relationship to labor market outcomes in their study of vocational education in Israel. They copared earnings between general and vocational high school graduates who

eventually worked at corresponding sector/occupations using the 1983 Census of Population and Housing data. The data quality was very skillful and useful -- as mentioned many studies relied on US data for this.

Although the students who have high achievement in school and came from more favored socio-economic countries are pursuing to go to the general high school, the estimation results of earnings between general and vocational high school graduates demonstrated that: 1) vocational high school graduates have more appropriate occupations relative to their major (more than 40 percent students among the total observation) and higher wages from 8 to 10 percent than general high school graduates in comparisons; 2) however, the results were not at the significant level for differences in earnings and appropriate occupations matched with those majors when they were in school between general and vocational high school graduates; and 3) in terms of overall context of this study, the advantage of vocational education at the upper secondary level has higher returns in earnings and obtaining appropriate jobs than general education.

There are two different studies that utilized the very similar or same in parallel with the methodology of education-occupation. In Brazil, Arriagada & Ziderman (1992) showed that the vocational school graduates' earnings in paralleled with jobs have more opportunity in higher wages with 16-28 percent higher than those who graduated from general school, and in Hong Kong "the 'users' of the vocational and technical education had higher earnings than the general education group" (Chung, 1990. p. 349). However, these results could not bring the overall social rate of returns to education presenting proper method which need to include all costs of different type of education. Because these analyses used Mincerian earnings function they could not include unobserved heterogeneity in the model method as well as the results could not explain what kind of vocational education was more valuable in the social of these two countries.

Through updated literature review, the author finds additional studies published within the last five years that use traditional cost-benefit analyses to calculate the proper value of

general and vocational education at the upper secondary level including in Chile, Indonesia, Peru, and Thailand. In three countries, the social rates of return to vocational education at the upper secondary level were not significantly lower than those to general education at the upper secondary level. Utilizing good quality data from Peru dating from the mid-1980s, Bellew and Moock for identifying earnings found that, "the returns to investment in vocational and technical education are comparable to the returns to investment in general education...In most other studies, the cost of VET exceeds the costs of general education. In Peru, no such cost differential is clearly evident" (Bellew & Moock, 1990, p. 370). In the study of Thailand, the social rate of return to vocational education at the upper secondary level was 11.4 percent compared with 6.7 percent for general education at the upper secondary level. Vocational education ia also more valuable than general education in Thailand (World Bank, 1990).

In many studies of Sub-Saharan Africa and other developing countries for the difference in returns to education, normally general education has much higher returns than vocational education. However, the cost of vocational education is much higher than general education, especially in African countries. Further, the results cannot define clearly to suggest the policy implications in vocational education at the upper secondary level based on investment outcomes on one continent where prevailing labor market and other conditions do not match with others, in many key respects. Hence, a more detailed description on the Sub-Sharan African region will be placed below, following the introduction of programs in other developing countries.

David Atchoarena & Paul Esquieu (2002) worked on a Sub-Saharan regional review. They embodied the results into the private assistance in selected countries where officially speak French, including Côte d'Ivoire, Cameroon, Mauritius, Madagascar, and Niger, as well as private support in selected countries where officially speak English and Portuguese, such as Botswana, Eritrea, Ghana, Kenya, Mozambique, South Africa, Tanzania, Zimbabwe. They argue that private technical and vocational education institutions have to meet the demands of the market in order to survive and so have to have flexible managements and flexible programs

if they are to be effective in preparing their students to join the world of work. While the curricula of private institutions are often laid down by the state, they are able to be very flexible in terms of such things as the number of pupils, their teaching methods used, the qualifications of their instructors, how they recruit, and so on. In theory, it should also be much easier for inherently more flexible private institutions to enter into agreements with private sector employers to enable vocational students to get practical experience; to get used to modern equipment and machinery that the private institution itself may not have; to learn from instructors from industry; and ultimately to obtain employment. This is not necessarily so, however, for example in Mali and Senegal (Atchoarena & Esquieu, 2002); sometimes private institutions operate very much like public ones both in how they teach and how they are managed. Not all of them adapt quickly to changes in the labor market. Private institutions could enter into agreements with the private sector to enable their students to obtain specific occupational sector internships and get to know the realities of their sector. However, this possibility mainly only exists for highly specialized technical education, an area with few private institutions compared to more general vocational training.

There is insufficient empirical evidence to test fully the assumption that flexibly-run private institutions can quickly adjust their training programs to the needs of local labor markets and so become well-known and effective partners to local industry and business and attractive to potential new trainees. Students and their families also tend to demand recognition through diplomas, that could imply social success, although in practice diplomas do not necessarily guarantee access to the job market -- as demonstrated from findings in Senegal (Atchoarena & Esquieu, 2002). As a result, private institutions often establish their own 'house diplomas', obtained by passing the examinations set by the institutions themselves. Indeed, the prestige of the diploma providing access to the labor market will be the deciding factor for families preferred to select one institution rather than another. The result is that private institutions are not necessarily as flexible as they might seem in theory, as in practice they have multiple objectives: both training students for work but also preparing them to pass diploma

examinations.

In several sub-Saharan African (SSA) countries, like Cameroon, Roman Catholic-based private vocational schools had been highly regarded by both public and government due to their prominent examination results. Generally, the results are attributed to their better-qualified teachers, better facilities and equipment facilitated by the international linkages of the Church. Those schools are also usually performing a more careful selection process to get good input of students. Nevertheless, generalizations cannot be made or transferred to all other private schools since it is not the private status that made the difference, but rather the availability of access to resources (Péano & Esquieu, 2000). There has also been a lot of country level analysis in Africa. For example, El-Hamidi (2006) determined, using an ordered logit model, that Egyptian students from better-educated families tend to pursue general education, that having young children in the household can result in parents enrolling daughters (but not sons) in vocational education, and that vocational secondary education has higher returns (in terms of earnings) than general secondary education for men, though this is not true for women. They also found that men with academic degrees could earn higher incomes than men without degrees (the "sheepskin" effect); yet for women their level of income was relatively similar regardless of academic degree.

Godius & Francis (2008) found that in Tanzania, highest levels of general education had much higher returns than those took the vocational or lower levels of academic education. However, at the lower levels of education, those below the upper secondary level, the vocational education return could have more advantage of earnings than those from general schools. They used data from the 4th and 5th rounds of the Tanzanian Manufacturing Enterprise surveys, covering 192 manufacturers in 6 major industrial locations among total sample of 2,527, identifying the highest level of education employees had reached prior to going to vocational schools or technical colleges, whether they pursued professional qualifications or went on to university for either undergraduate or post-graduate degrees. Two conclusions stood out. First, the return to vocational and technical education was lower the later the student

started TVET. Second, firm size was not important in determining the returns to all levels of academic education – returns were not necessarily higher in large firms compared to small ones. By contrast, firm size was very important for the returns to vocational/technical education. In addition, the returns to post-primary vocational education were much higher than the returns to primary education and also to O-level, though they were lower than the returns to A-level and above. Post-A-level vocational/technical education could also have negative returns.

In addition, to the systematic review above, there were also many active researchers contributing to the RORs comparison in the developing countries worldwide. Chung (1995) have found the high rate or returns to vocational education in 12 developing countries from the 1970s to the early 1990s which also revealed some literature. 10 studies addressed the returns to vocational education is lower than general education or no difference from different type of schoolings and five studies made a conclusion that there was no reason comparing with other different type of learning. Moreover, Middleton et al. (1993) provided a review in policy-oriented vocational education's cost-effectiveness in developing countries.

Zymelman (1976) found that five comparative studies produced "contradictory" findings about the relative efficiency and effectiveness of general and vocational secondary schooling in the United States. Two studies showed higher returns to vocational secondary education, two to general secondary education and the fifth showed that they were the same. A similar study was conducted in the Asian region, which found problems due to VET policies adopted by governments (Bennell & Segerstrom, 1998).

There were many other single articles working on one country and trying to draw conclusions from specific country context datasets. For example, Thammarak & Christopher (2003) also used the probit model in the context of Thailand, and their study found that an individual from prosperous family background was more pursuing to take vocational education. The data was derived from Thailand's Labor Force Survey from 1989 to 1995. The sample was pooled from the sample of total individuals which can represent, N=4886 who were not attending any school among 15 and 60 years of age when the survey collected. Though the

sample had the limitation that it excluded children who were not resident in the household, the conclusion was that vocational education resulted in higher returns than general education, after controlling for self-selection, leading to rethinking the common impression that general education plus on-the-job training would produce higher returns than vocational education and so leading to the conclusion that it might rather be more effective to improve access to vocational education. By contrast, a follow-up study of vocational graduates in Malaysia suggested that schools with general curricula had higher returns than vocational schools, with graduates earning higher salaries and having less unemployment and with general education costing much less than vocational education (Lourdesamy, 1972).

In a study of Indonesia, David & Daniel (2011) not only explored the dynamic between vocational and general schools, but also those between public and private ones. First, using students' entering exam scores, they sorted students into different school types. The top students went to the public schools and those with the lowest scores went to private vocational schools. Second, after controlling for test scores and other characteristics, there was a substantial wage premium for male public-school graduates compared to those from private schools. In addition, private vocational school graduates fared the same or better than private general graduates, despite their socioeconomic disadvantage. Finally, recent returns to public vocational education were sharply lower for the most recent male cohort than for their predecessors.

In a study on Israel, where vocational school represents half of all secondary enrollment, it was found that vocational schooling may have been more economically effective than general schooling (Neuman & Ziderman, 1989). This was based on a comparison of workers earning of those attending vocational school against those attending general school. As a follow up study, Shoshana & Adrian (1993) selectively looked at the vocational schools' performance in Israel using some 14,000 individual records from the 1983 Census of Population and Housing, nearly 10,000 who had attended vocational schools and about 4,000 who had been to general secondary schools. The follow-up study confirmed that vocational schooling, which accounts

for half of all secondary school enrollment, is more effective than general education for those not pursuing higher education. In particular, vocational school students whose work was related to their school courses earned up to 10 percent more than both general secondary and vocational whose work was not related to their courses.

For Suriname, Andrew & Christoph (1999) studied both private and social returns to technical education, to vocational education and to general education, the latter including both a mathematics and a language stream. They used a random sample of households drawn by the General Statistical Bureau, that included Paramaribo, the capital, and the neighboring Wanica district, representing more than 70% of the total population. In sum, a total of 7,010 individuals from 1,454 households were selected as the sample. They calculated rates of return separately for men and for women, using gender-specific wage equations, adjusting for sample selection bias and for unemployment. Returns to both general streams were greater than those to vocational and to technical education, for both men and women. In general education, women earned higher returns (both private and social) from the language stream compared to the mathematics stream. For men, it was the other way around, with the mathematics stream returns above those for the language one. Returns to vocational education were particularly poor in terms of unemployment. Returns to technical education were consistently higher than those to vocational education, the former being the main non-general education option for me, while vocational education was the main option for women.

In the United States, Hollenbeck (1993) calculated the returns to post-secondary vocational education in 1972 significant only for women. For men, Trost & Lee (1984) found the returns to be higher in that in upper secondary vocational education than in upper secondary general education. Trost & Lee (1984) did not analyze the returns for women. Several US studies using standardized tests concluded that general education high school students perform better than vocational ones (Rumberger & Daymont, 1984; Alexander & Pallas, 1983 and Bishop, 1996). These studies, however, cover only the link between the type of curriculum and test scores, but do not consider also effects on productivity and earnings. Indeed, Zymelman's

(1976) review shows that the evidence from the United States is contradictory in terms of the comparative returns to general and to vocational high school education.

That contradictory evidence helps explain the long-held view in the United States that the type of secondary education was not important, with the returns to an extra year of schooling being very similar, regardless of the type of curriculum. In Britain, by contrast, the distinction between the different curricula was much more widely recognized. Despite this, several UK studies used the years of education approach, either to make comparisons or because of data limitations (Harmon & Walker, 1995, 1999, 2000). Standard OLS models generally show the return to an additional year of school in the UK to be in the 6–10 percent range (Blundell et al., 1999), although some estimates (e.g.Harmon & Walker, 1995) were double this.

Dearden (2002) used data from the British National Child Development Study (NCDS) to estimate the returns to different qualifications (school and post-school), rather than just to a year of schooling, controlling for effects that could determine decisions about school types, like ability and family background. Dearden used the highest qualification that a person had achieved as her indicator, and calculated the returns to these different qualifications. She also investigated the bias arising from self-selection among employment. In general, Dearden found that simple OLS estimates showed the impact of qualifications on wages; the exception was for O and A-level qualifications where OLS estimates appeared to result in exaggerated returns in terms of wages. She also showed that biases stemming from measurement error and from selectivity could offset those from unobserved ability and family background. Dearden's work is limited in that she only used a person's highest qualification, without looking at whether or not they had pursued general or vocational education. She also only studied one cohort.

While contrary to both approaches, Lorraine et. al (2002) contributed to a similar study in the UK, using data from the 1991 survey of the National Child Development Study (NCDS) and the 1998 Labor Force Survey (LFS). They explicitly compared the labor market returns to general academic and to vocational qualifications. The NCDS is an ongoing longitudinal

survey of people living in Britain born between 3-9 March 1958. The last full NCDS survey was in 1991 when those in the sample were 33 years old, and the 1991 survey was the source of the wage data. Biases were corrected by assuming that the factors determining a person's choice of qualification were observable or had proxies that could be observed. The analysis also assumed that each qualification had the same outcome for all people with that qualification. The study showed that those with general qualifications earned more than those with vocational ones. The difference was less pronounced, however, when controlling for the time needed for different qualifications, crucially important for vocational qualifications, which were usually obtained more quickly than general ones. Lorraine et al. (2002) also investigated the impact on returns of gender, post-school qualifications, and natural ability. They were also able to use the LFS data in comparison to that from the NCDS to estimate the show the importance of controlling for natural ability and family background and also for measurement error. The results found the rate of return to education using the LFS data and NCDS equations with independent variables, ability, family background which are very similar with simple OLS estimation. This method could make the results offset from the biases.

Elsewhere in Europe, Lechner (2000) contributed to the ongoing discussion of the effectiveness of publicly funded training in East Germany by analyzing the participation decision before obtaining micro econometrics. He adopted the dataset of the sample for the empirical analysis drawn from the German Socio-Economic Panel (GSOEP), which was very similar to the Panel Study of Income Dynamics conducted in the United States. About 5,000 West German households had been surveyed each year beginning in 1984; following reunification in 1990 the sample was expanded to include also just under 2,000 East German households. The GSOEP has very complete sociodemographic data, including extremely useful monthly employment and income data.

Lechner (2000) found that public continuous vocational training and retraining (CTRT) negatively affected both earnings and employment in East Germany. CTRT did result in some increased unemployment immediately after the end of training, but this was a short-lived effect

lasting no more than a year. The findings suggested CTRT reduced job search during training, compared to the job search that would occur during a similar amount of time being unemployed. Within a few months of the end of training, however, there were no statistically significantly different results between those who had been in CTRT and those who had been unemployed. Thus, training did not help individuals' participation or earnings in the East German labor market.

Another case is Romania, which, like East Germany, underwent massive changes with its transition to a market economy and the resulting major sectoral shifts within the economy. Ofer & Cristian (2010) used regression discontinuity analysis to examine if Romanians with general education did better in the transitional labor market compared to those with vocational training, using data from the 1992 census (including occupations, employment and earnings) early in the transition. They compared this data with that from the 2002 census, allowing a comparison of labor market outcomes at the beginning and at the end of the transition. There was enough statistical power in the data from the two censuses to permit regression discontinuity analysis and to estimate accurate labor market outcomes. Ofer and Cristian also combined living standards data from six annual household surveys from 1995-2000.

Romania introduced an education reform in 1973 that gave the researchers an opportunity to avoid selection bias. Government made those born after 1958 complete two extra years of general education before attending vocational schools, compared to those born before 1959, moving about 15% of vocational high school students into general high schools in one year. The reform also shortened vocational courses, meaning that all vocational students spent less time on vocational courses after the reform, quite apart from their two extra years of general education. Although, the average years of schooling through the change of government policy did not significantly advocate increasing of years of education at the secondary level. The main findings were that the reform, and its consequent differences in years spent in both general and vocational education, made no difference to earnings or employment, even towards the end of the transition. The one exception was that men worked less in manual labor and as

craftsmen compared to men who completed their education before the new policy could affect them (Ofer & Cristian, 2010).

We have reviewed the major empirical literature that compares earnings of workers educated at secondary vocational schools with the earnings of workers who followed academic education. In general, in the literature, many works of literature, earnings of those with vocational education are lower than those with academic education. The pattern is different, however, in some developing countries. Vocational education has had more positive effects in these countries, with their overall growing employment but also specific skill shortages and a good fit between vocational skills and available jobs.

With this background of some studies finding negative results of vocational schooling, Neuman & Ziderma (2003) examined how well recent immigrants, who had been deprived of their educational opportunities at the secondary education level, did in the labor market of Israel. They uncovered that Israel sets up a case in point. However, only little attention has been paid to examining the prosperity of vocational education in terms of the increasing wages of various sub-sections of the labor force, particularly in view of disadvantaged groups and minorities. In their paper, Neuman & Ziderma find the efficacy of vocational education in raising the wage levels of four such groups: recent immigrants, Jews of Eastern origin, Israeli Arabs and females. The results are partly paralleled with previous researches Eastern origin, Israeli Arabs and females. The results are partly paralleled with previous researches. In another way, it is showing a mixed result, differing from group to group, for this reason explaining the approach of examining the impact of vocational schooling on finer breakdowns of the population of secondary school completers. For the whole sample, for all those whose education was forced to be stopped at the level of secondary school education, information was available about the type of education that they had experienced: vocational or academic. The Census for 1983 included specialized fields of vocational education, unlike the Census for 1995.

Moenjak & Worswick (2003) look at the determinants of choice between vocational and general education in Thailand. They also calculate the returns to these two different types

of education at the upper secondary level. They use a probit model to investigate school choice between vocational and general education at the upper secondary level of the first stage, and a self-selection corrected earnings model to compare the relative returns to each type of education at the first stage of estimation. Their study of vocational education in an industrializing country contributes to knowledge about the relative benefits of upper secondary vocational education and of upper secondary general education. They find that an individual's better background makes the students are more pursuing to undertake vocational education. The study also finds that vocational high school graduates have the higher wages than general high school graduates after correcting for selection bias of estimation. These findings might have questioned the belief that vocational education has been underestimated and supporting more general education, and providing the on-the-job training of vocational education would have more benefits in the workforce. Surely, the vocational education might prove more beneficial than general education at least secondary education.

However, the analysis is confined to the children of the heads of household who are still living in the household. Thailand's Labor Force Survey does not include children who are not still living in the household. This implies a selection bias, especially if those who live with parents probably cannot earn the salary by themselves and to live independently. It is undeniably real of the possible sample-selection issue in this study.

Margolis & Simonnet (2002) examine school choice in France, specifically whether the difference between a general and a technical/professional education affects the labor market network that an individual can take advantage of throughout his or her working life. Their hypothesis is that technical and professional tracks, because they involve fewer students who are in more regular contact with each other and focus on a common, relatively narrow subject, enabled students to build on networks sufficiently to approach their technical/professional careers. This study estimates which school choice of the educational track has more effect on obtaining the first job on the time or at least six months, what kind of the job has an efficiency on the spending time of job seeking period in France. The results found that the educational

track (technical/professional education) has no significance of effect on dependent variables with first or later jobs. However, technical/professional education with professional networks has an effect on outcomes, especially, students who are attending a professional or technical "baccalaureate" similar in a general "baccalaureate" or obtaining a degree from a "grande ecole" or engineering school similar to graduate-level university studies. However, there is an issue about an alternative explanation, has connection with unobserved individual heterogeneity. It might have a probability the case of unobserved characteristics to make an individual pursuing a professional or technical education. It also makes the individual having less probability to take advantage of alternative means of finding a job, for instance personal networks, national job competitions or market-based methods. The unobserved individual heterogeneity influence on labor market outcomes, "mode of job obtainment" in measurement to cause omitted variable bias.

Heyns (1974) and Vanfossen et al. (1987) have also discovered that students with lower social status has fewer chances to receive higher education than are those with more than middle-class background. It is still largely discussed that tracking actively regenerates disparity all across genders and generations, children from lower status being placed in paths that hinder their already narrow chances of pursing college education and of opening a door into socially more desirable jobs. The main weak point of this study discussion that a few students due to their lack of ability or motivation, are unlikely to finish academic curriculum in high school, so that pursuing higher education with such a great investment of resources would make the whole practice not worth considering.

Followers of vocational education claim that these students would simply drop out unless they were provided an engaging and significant curriculum. Drawing on the logic of human capital theory, they claim that vocational education teaches students that having marketable skills and attitudes that can eventually help them find socially better-considered jobs and reduce their risk of being unemployed or employed with lower-pay. In the late 1990s, Arum & Shavit (1995) reassessed the impacts of high school vocational education on students'

unemployment ratio and students' occupations during the transition from education to work in the United States. The authors claim that, on the one hand, vocational schooling reduces the chances of students going to college and later working in professional and managerial occupations. On the other hand, vocational schooling has a lower level of unemployment and indeed results in a higher employment rate among skilled workers. Thus, vocational education can represent a safety net for students unlikely to go to college, preventing them from falling to the bottom of the labor chain.

Hall (2016) discusses if the number of years of general education will reduce the risk of being unemployed in the future by exploring a Swedish educational reform that lengthened upper secondary vocational programs and included much more general content in them. This research structure investigates what happened during the reform and also with a pilot program for lower secondary students who had not performed well, in advance of their joining the upper secondary program. This study examines the students' labor market experiences during the 2008−2010 recession, at the time they had reached their late 30s. The results found no evidence that having attended a longer program with more academic content reduced the risk of unemployment. However, the pilot program for students who performed poorly in lower secondary education did help reduce the probability of unemployment risk. This path has a strongest significant among male students and the impact also has more probability to be exonerated by the increased dropout rate which resulted from the change of the programs.

Hanushek (2015) measured the results of vocational education concentrating on school-to-work transition for the USA, European and other developing countries. In the case of the USA, vocational education has been shown to hardly be existed in the secondary education level for there is disagreement on the efficacy of vocational education. It is surmised that skills, needed for vocational education are being out fashioned increasingly in some specific sectors, it is needed to train individuals with appropriate ability to adjust to new technologies. While many developing and European countries have ingeniously designed truly fruitful vocational education and training systems. For example, Germany's well-known "dual path way system"

gives extensive vocational education and training at the secondary level to pupils which also allows the direct involvement with the industry through apprenticeships. It seems safe to assume that the basic focus on particular vocational skills can enhance the entry of the workers into the economy with highly productive industry from the environment, leaving positive impacts on both employment rate and productivity.

This study scrupulously analyzed the probable outcomes, such as employment, wages, and career-related training between vocational and general education in different life cycles by utilizing an international micro data, Adult Literacy Survey (IALS) and using a difference-in-difference (DID) approach in 18 countries (15 European countries plus the US, New Zealand and Chile). The DID has fostered the solution of selection bias into different types of education inherent in the potential impotence of unobserved heterogeneity in contrast to many previous studies have been problematic on it. The findings show that in the group of vocational countries, although the individuals with vocational education have higher possibilities to be employed when young, this employment advantage tends to diminish with age. The estimation of crossover ages is quite imprecise and it varies across specifications. Usually, the individuals completing a general education, seems to experience higher probabilities of employment as early as age 50. Even though it is likely to be some late but it must be taken into consideration that this research indicate employment and only to males. It seems proven right in the previous literature that the head of the household role models or other factors may result in the males to acquiring major employment hardships before facing themselves unemployed during their prime time of age when it comes to working actively.

However, the findings of these two earlier studies cannot be completely relied upon for distinction with the Korean case, as Korea is quite differentiating in many aspects. The Korean vocational education system as well as the social perception regarding it, are unique. Concepts of pursuing vocational education path or apprenticeship courses through academic institutions such as middle school, high school and university are yet to be percolated in Korea. And the whole social perception has consistently been in favor common-general education path,

definitely over vocational education for long time.

3.3 Case Study in Republic of Korea

As the world enters a full-fledged low-growth era, concerns remain over the unemployment rate for young people. Young people who have jobs also experience job mismatches in various forms, from high frequency of job changes to unemployment and vice versa. A typical way to address these problems is to strengthen vocational education, thereby making facilitating smooth school to work transition and reducing the gap of mismatch between the school and the labor market (CEDEFOP, 2013).

For a long time, in Republic of Korea (below Korea), the problem of youth unemployment is so serious that it draws attention to the national and also personal level. In particular, the unemployment problems of university graduates are becoming a social problem from individuals and universities themselves persistently based on the vast majority of young people enter college which called over education have brought main problem of the job-mismatch. (Jung, 2017; Ministry of Employment and Labor, 2016). More specifically, the average employment rate of graduates by 2014 was only 64.5% (Ministry of Education, 2015), while the youth unemployment rate remained high level of 11.6% as of March 2018.

For solving these problems in Korea, the government has introduced a policy to revitalize secondary vocational education. (Ministry of Education, Science and Technology, 2010). The Ministry of Education, Science and Technology (MEST) has been promoting the reform of the vocational education system through excellent quality management improving. Because the ability of vocational high school students has long been disputed. The things are that they have a low educational ambition such as labeling vocational high school students are dull and unmotivated, and relatively the cost of vocational education is higher than general education and the content of vocational education is functioned as a useless skill. Thus, Korean government have endeavored to escape disgraceful label for vocational high school students (Sung, 2010), and prevent excessive college entrance, and revitalize the role of vocational

secondary education as a career specialized secondary education institution for young people can explore future careers and jobs by themselves after their graduation.

For these reasons, the students in Meister school which was established for different and special purposes as a type of vocational high school leading to a career, and required strong academic performance during middle-school for entrance are achieving impressive performance after its graduation. Nonetheless, the students of typical vocational high school which has just changed its name to specialized high school, haven't escaped the stigmatized label, they are still entering vocational high school without autonomous motivation. (Kim & Sohn, 2011).

Previous studies found that vocational high school students who are motivated to enter university have high attention of academic performance (Ahn & Lee, 2009), mainly there are quite many studies in Korea in the career analysis of vocational secondary education compared with general high school students (Shin & Kim, 2005; Ahn & Lee, 2009; Oh, 2010).

While current literature (Cho. et., al. 2011; Oh, 2012) after the policy change of vocational high school shown enrolment rate in vocational high school have increased in student who has high motivation of job career with desirable occupation. Background of this, the higher education enrollment rate is getting decreased and it seemed the students does not blindly follow the perception of higher education leading to desirable occupation any more. Recently, slightly notice that the Korean society is trying to change its perception of higher education to work transition gradually, and transform to pertinent decision of schooling depends on their purpose.

An empirical study (Chea, 2003) about estimating labor market outcomes of vocational education assumed that students who enter vocational high school have a reason that they do not have any interest in vocational education for obtaining a job and haven't shown good academic performance in middle school. This study has two main purposes to identify that first, comparing the job seeking period from the beginning to the end of obtaining the first job after graduation between general and vocational high school student. Second, to figure out

earning from education between general and vocational education regarding the quality aspects as many studies have examined it such as typical index of labor market outcomes. The results show that those who graduated from vocational high school have a significantly higher exit rate from their first job than those who have completed normal high school education of Korea. The fact that vocational high school graduates are much quicker to escaping from their first job can be interpreted as reflecting some of the effects of vocational high school education and if it is aimed at quick employment, it is more reasonable to go to vocational high school than general high school if they can choose. There is no big wage difference between general high school graduates and vocational high school graduates, but the wage in vocational high school graduates have been shown slightly higher than those who completed the general high school graduates. However, the results of this study show that it is an outcome of employing cross-sectional data without solving various bias such as self-interest problem or selection bias, so it may change the coefficient and is difficult to see the effect of labor market as long-term effect.

Nam (2005) did similar study based on Che (2003) study regarding Che's limitation on wage effect and job matching with major between vocational and general education. Further he identified wage premium when matched with individual's wage and academic major.

Nam (2005) analyzes whether vocational high school graduates receive higher wage levels than high school graduates and higher wage premiums when they are employed in jobs that fit well with their majors. This study utilized the youth panel survey data of 2001, 2002, and 2003 published by the Korea Employment Information Service and estimate the wage function by employing the random-effect GLS method. The data regarding majors and jobs indicate whether the content and level of work doing in the current job are 1) not at all matched with the majors, 2) comparably matched, 3) fit very well. The respondents who answered that they fit very well are classified as 1 and those who are not so as 0, and this subjective index is used as a variable related to major fitness. As a result, the wage level of vocational high school graduates did not show the effect of wage increase which could be caused when the high school education of humanities is well connected with their future occupation that matches the major.

From the wage perspective, vocational high school education is not showing clear achievement. However, there is a risk of imperfection if it solely depends on individual subjective judgment as to whether or not the individual 's occupation is well connected with the major in previous vocational education. The most crucial limitation of this study is that it does not systematically control the quality of students between vocational high school students and ordinary high school students. Simply analyzing the ratio of going to college cannot eliminate the selection bias that may exist between the two groups.

Again, Chae (2006) examined the career choice of vocational high-school graduates. This study used the first and second wave of Korean employment panel data from the Korea Vocational Training Center using the multinomial logit model. The study is aim to find out what kind of career (more education, employment, unemployment, and uneconomical activities) he / she chose after graduation, and what are the factors to career decision after graduation of each level of education in the characteristics of school and school life (characteristic of department in school, academic performance during school attendance, disciplinary action during school attendance, working experience during school attendance), characteristics of households (parental existence, monthly household income, guardian's level of educations, number of siblings). As a result, male graduates have a higher rate of choosing college education than employment. The school affiliation also affects career paths. In particular, graduates with high grades are more likely to go to college than to be employed. Later, they also have high chance to find an occupation than to be unemployed. On the other hand, unlike expectations, disciplinary experiences during school did not significantly affect career paths. Consistent with the results of previous studies, working experience at school increased the likelihood of being employed rather than unemployed but lowering the possibility of going to college. When the household income is high, and both the parents are alive or the guardian has high academic ability, the chances of their children going to college are significantly increased. On the other hand, when other conditions were controlled, it was found that the number of children did not have a significant influence on career paths.

In addition, similar empirical studies of vocational training have been gradually increasing in Korea, though not many. Choi and Kim (2010) investigated career patterns not only just for high school graduates as final education but also considered a different type of education course as high school decision aspects. First, the career patterns of graduates of general high schools and vocational high schools showed a great difference according to gender. Especially, the gap between general high schools' graduates was much larger than that of vocational high school graduates due to the necessity of military service obligations that men bear in South Korea. In this study, because career patterns are typed on the basis of a rather short period of years, common career vacancies of the year would have a great influence on the results of the research. Second, as a result of analysis of career patterns based on the career status of general and vocational high school graduates, it was observed that the common pattern was found. However, the internal variables were found to be different from each other when the factors related to this type. For example, in the case of general high school graduates and vocational high school graduates, career patterns that they could not find one secure job but wandering jobs to jobs after high school graduation were derived, but it is presumed that the general high school graduates maintained their unknown state in positive direction such as studying abroad. In fact, the higher probability of belonging to this particular type is observed when a general high school student has higher GPA in math, secures high aspiration. On the other hand, in the cases of vocational high school students, the chances are higher when they are from a single parent family and they have less certificate with them.

However, in the family when their perception of the economic level is high, the probability of belonging to the migratory type of occupation after the high school graduation of the general high school graduate is also high. Therefore, it is necessary to check the subtypes inherent in this type in depth. Third, in the graduates of the vocational high school, it is difficult to confirm the career history of the students who entered the university since the maximum length of the career pattern is years. However, some of the graduates who finished their

education in the colleges with short period of teaching have not been able to move to the next career stage easily or their status in terms of occupation is unaware after graduation.

Even though the studies of vocational high school are still not enough in Korea but, Interestingly, it getting widespread in diversified views. Many graduates of vocational high school go on to college, but the function of presupposing their jobs for the future, training valuable human resources to meet industrial demand in terms of job seeking and social dimension after graduation from high school is still set as an important goal of the vocational education curriculum. (Lee & Jyung, 2004)

Curricula relevant to labor market needs are often designed with the goals of individual employment and regional development at the forefront. To date, research has not examined the regional scope of Korea's labor market-related curricula. This study provided information on regional scope by investigating the extent and determinants of the geographic mobility of vocational high school graduates and the effects of that mobility on first-job wage rates. Geographic mobility was defined as being employed in other provinces in which vocational schools were located. About 38% of graduates were employed in other provinces. Geographic mobility was positively related to gender and human capital such as health, course of study, vocational certificate, and job training. Further, mobility led to higher wage rates even after controlling for sample selection bias. Taken together, mobility is an intentional behavior which focuses on achieving better working conditions suitable for individual human capital endowment. This was supported by findings which indicate that wage increases gained by mobility are direct effects influenced. The implication is that vocational high school curricula which focus excessively on provincial concerns may weaken a workforce's effectiveness (Kim, 2010).

Although a few studies have explored in vocational secondary education with diversified views, the study interest of vocational education in Korea has limited mainly two topics between its outcomes in labor market and impact of career decision on entering higher education or labor market. The high enrollment rate in higher education is the problem not only

for the general high school students but also the vocational high school students for a long time. Byun & Kim (2011), Lee (2011), Oh (2012), Kim (2013) focused on career decision determinants of enrolling higher education for vocational high school students. As a result, it was found that the higher the level of academic achievement and desired education among the students, the more common effect was on the college entrance of the vocational high school graduates. The reason for admission to a vocational high school has a meaningful effect on the reason for choosing a college to go to college instead of employment. Unlike the vocational college entrance, their high school record, parents' income and academic ability have a significant effect on entering 4 years of schooling. For those who choose vocational high school in order to go to work or to study their field of choosing in the future have a less change to go to college and students who have advanced from junior high school due to their high middle school record or for university entrance are more likely to choose to go to college instead of employment. High school grades and high parents' income and educational backgrounds indicate that they are more likely to choose to go on to college. In addition, the students who entered the college due to their low grades were more likely to re-enter the 4-year college after graduation than the students who selected the college for employment.

Unlikely Oh (2012) which is aimed at students in the first year of vocational high schools, observed overwhelmingly the greater number of students who wanted to work and overall, few students wanted to go on to college. In addition, students who collect a lot of related to college admission tend to decide to start working rather than going to college at the last moment. In-school career counseling and career-related conversations with parents were also found to be the important determinants of employment rather than college entrance.

As a result of using relatively recent data, we can see that the perception of Korean vocational high school students is changing little by little. However, the results above are limited in that they do not take into consideration any endogeneity or potential variables that may arise in the analysis process, even though they are all from empirical analysis.

Currently, the other research pattern on the vocational education in Korea is the

examining of satisfaction degree in workplace after vocational high school graduation (Kang, 2013; Ahn, & Lee, 2013;2015). The major results of these study are as following. First, the employees from the vocational high school (VHS) are generally satisfied with their working life, and the employees who have high working life satisfaction (WLS) tend to decide on a career for continuous employment or job-related areas after their current status. Second, the higher the influences of on-the-job training (OJT) sub-factors on deciding on a career for employment (DCE), such as ‘the correspondence of personality and working life', ‘the correspondence of interest and job', ‘the feasibility in growth of industrial institutions', ‘the equality in work organization', ‘the stability of employment', and ‘the geographical location of industrial institutions', the higher WLS. Whereas, the higher the influence of OJT sub-factors on DCE, such as 'the correspondence of major, certificate and job' and ‘the wages', the lower WLS. Therefore, VHS should do as follows to improve WLS of students who takes part in the OJT. SHS should operate the OJT considering the information of industrial institutions related to job, the growth potential, the stability of employment, the equality in work organization, the geographical approach and so on and the individual characteristics of students such as personality, interest, and work value more than the wages, major and certificate of students. Moreover, SHS should improve the student's job ability through the operation of curriculum which meets the needs of industrial institutions.

Despite many studies in Korea do study about vocational education in diverse aspects, virtually the main topic is its outcomes in the study characteristic of vocational education. However, the results vary in previous study of Korea and currently there is a lack of empirical studies about vocational education, especially at the secondary level.

The most recent research regarding achievements of vocational high school students has been done by Choi (2018), Ahn and Lee (2015). Choi (2018) conducted empirical studies using PIAAC data in 2013, and the employment premium of vocational high school graduates gradually decreases when they age, and becomes equal to the general high school graduate at about 62 years of age. In the case of regular workers, the rate of decline was found to be steeper,

and at around 53 years of age, the probability of being in employment is at the same as that of general high school graduates. In Korea, white-collar workers face a sudden unemployment risk after their 50s, while blue-collar workers have a relatively longer job life. Therefore, it is a valid result. There was no statistically significant difference in the wage gap between vocational high school graduates and general high school graduates through propensity score matching. Only the wage gap between the vocational high school graduates and the college graduates was confirmed.

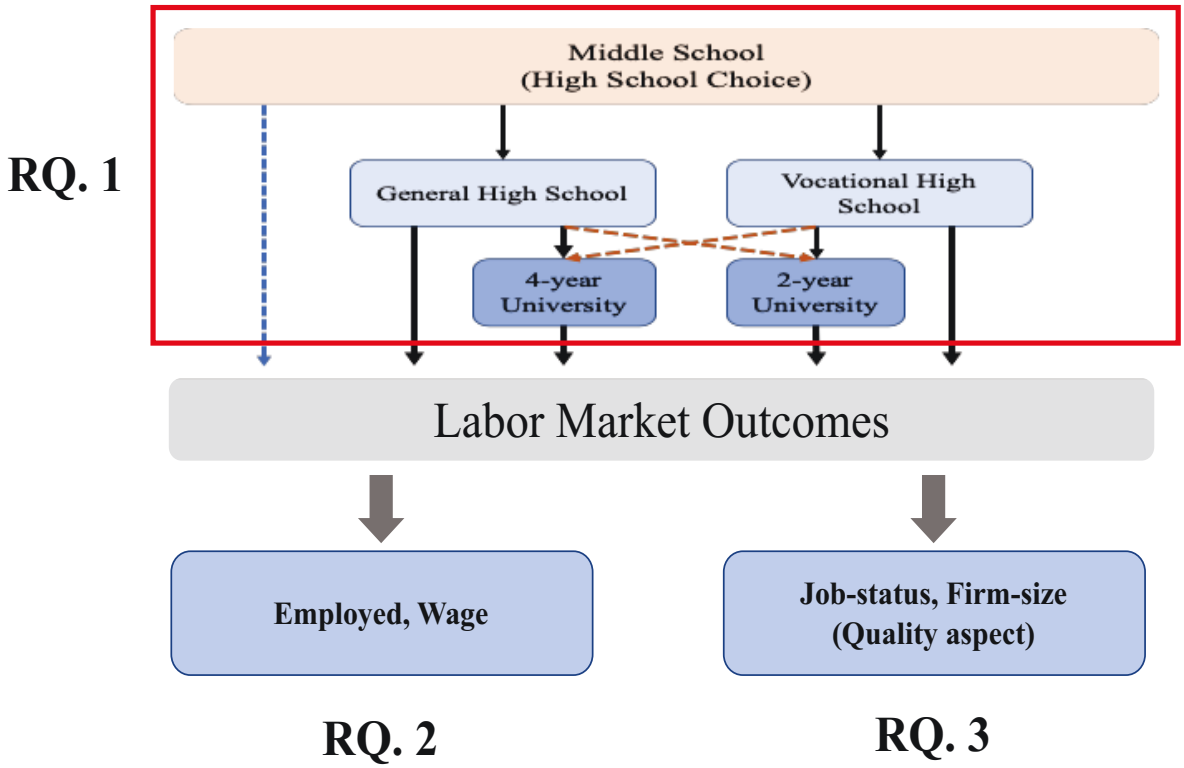
Kim & Byun (2006), who conduct an empirical analysis of Korea with respect to school choice concerning family background and academic performance, use hierarchical generalized linear models (HGLM). The research found that parents' socioeconomic status (SES) has correlation with children's educational aspiration, academic achievement, choosing different types of high schools (i.e., vocational high school or general high school) and universities (i.e., 2-year university or 4-year university). In addition, the higher parental socioeconomic status (SES) have more power to push their children to send general high school and 4-year university expecting to obtain desirable occupation and also retry for entering examination of university to enter the best university. These results have more significant in males than females to pursue higher education and entering better university. However, this study could not eliminate the unobserved heterogeneity properly.

CHAPTER 4:

METHOD

4.1 Analytical Framework

Figure 4-1: The Potential education pathways leading to Jobs



Source: Created by the Author based on Oshio (2010)

Figure 4-1 shows the analytical framework for helping to understand about this study as some potential education pathways leading to jobs as well as the analytical framework is related to each research question of this study in Figure 4-1. The research question 1 can be explained in the first box of Figure 4-1 to identify the student's schooling decision at the high school level when they were at 3year middle school student. For the research question 2 investigate schooling decision of university with 2-year or 4-year background with general and vocational high school. Research question 3 examine labor market outcomes in employment, wage, job-

status (whether in regular job or non-regular job) and firm-size (whether a large company or not) through the school choice which also consider school path way.

In addition, there are 7 education pathways can be existed before getting a job in Korea; 1) middle school graduates, 2) general high school graduates, 3) vocational high school graduates, 4) 2-year university graduates who attended general high school, 5) 2-year university graduates who attended vocational high school, 6) 4-year university graduates who attended general high school, 7) the 4-year university graduates who attended vocational high school.

4.2 Hypotheses

The Hypotheses below follow the research questions based on previous studies on the factors of school choice and labor market outcomes on the different curricula. The first hypotheses in this study are formulated in accordance with:

Research Question 1 with two sub-research questions below.

Hypothesis 1-1: Students who have low performance and parents with less education and lower income levels in the middle-school are more likely to go to vocational high school than general high school.

Hypothesis 1-2: Students who have a low performance and parents with less education and lower income levels in the high-school are more unlikely to participate in higher education.

Hypothesis 1-1 is formulated in terms of determinants of high school choice. In order to Hypothesis 1-1, education returns in each education path are compared considering similar conditions of the high school choice to identify the quality of student ability in variables of

individual characteristics, gender, age, siblings and assessment. This comparison helps overcome the difficulty in determining whether the wage gap is caused by differences in the high school curriculum or because of differences in students' ability.

As mentioned in Hypothesis 1-1, vocational high school choice in Korea is expects to be significantly determined by low-ability in school performance. Relevant studies in Korea have shown students at vocational high school are less interested in learning contents, are less willing to learn, and have not adopted well to school life because of a lack of basic learning attitude in terms of learning ability (Kang et al., 2000; Kang & Kim, 2002; Yim, 2011; Ok et al, 2013).

Moreover, hypothesis 1-1 proposes that family factors play a significant role in student choice of attending general high school or vocational high school students of fathers (as well as mothers) whose highest level of education in high school are more likely go to the vocational high school. The majority of studies in Korea have found a strong correlation between student school choice and family background. Specifically, the higher the level of parent education and family income as well as student's academic achievement and educational aspirations, the more likely children are to choose general high school than vocational high school (Kim & Byun, 2006; Kim,2006; Kim & Ryu, 2008).

As already mentioned, Hypothesis 1-2 is formulated in terms of determinants of university choice from the different type of high schools instead of participating in the labor market. The career decision means setting the direction related to his / her career since the present, and more specifically in Korea, investing more education is engaged in the selection of the specific career field after graduation (Kim, 1997). Since the enrollment numbers for higher education have increased both around the world as well as in Korea, there is a mass amount of high school students exerting an intense level of effort to enter university even though they graduated from a vocational high school.

It expects that the students who have low performance in general high school or vocational high school, they are more likely to go to the 2-year university, and students who

have good performance in general high school or vocational-high school, are more likely to go to 4-year university. Chea (2006) finds that Vocational high school students are relatively entered to 2-year university or its in rural area compared to general high school students, and grades of graduates also have an important influence on college admissions. the vocational high school graduates have a higher satisfaction for being in college than general high school graduates. However, it is not clear of satisfaction whether the curriculum is well-prepared in high school or low quality of academic capacity is more likely to adapt school life.

University choice predicts that the students who have parents with less education and un-affluent family background, they more likely to go to the 2-year university, and students who have parents with higher education and more affluent family background, they are more likely to go to the 4-year university. The socio-economic background of households will also have a significant impact on the child's career. It is a well-established proposition in educational academia that there is a strong positive correlation between the socioeconomic status of family class and the child's academic achievement. According to Coleman (1996), the factor that has the greatest influence on academic achievement is family background, and the effects of school factors such as school facilities and teacher quality are negligible. This can be assumed that in the high-income level of households, the probability of higher education entrance for the children is much higher. If the education is the normal goods, the investment of education is getting higher.

In accordance with research Question 2 with two sub-research question, the following two hypotheses are formulated as listed below.

Hypothesis 2-1: Obtaining higher of levels education as a 2-year university or vocational secondary education can increase likelihood of employment after graduation rather than other education pathway.

Hypothesis 2-2: Obtaining the highest of levels education can lead to greater opportunities for wages, on the contrary, fewer opportunities to find employment.

Hypothesis 2-1 through 2-2 are mostly concerned with research interests about factors that influence the labor market outcomes by all education level as well as education pathway.

As mentioned in the hypothesis 2-1 assumes that vocational high school graduates and 2-year university graduates, as well as 2-year university background with vocational high school, have a higher opportunity in employment than otherwise. contrastively, the higher education with general education track cannot see the employed status as soon as their graduation. Particularly, vocational high school graduates can have the most benefit in employment. Relevant studies Margolis & Simonnet (2002) and Hall (2016) have found education factors for the labor market outcomes to be significantly affecting especially the employment.

Hypothesis 2-2 anticipates that although there have been some past studies that the vocational education combine with every education level is no dominance over wage effect, the vocational education track has more job opportunity and the more education has not a big effect on the employed or non-employed status in Korea, and contrastively, the higher education with general education track can have the benefit with the generous wage. Particularly, the vocational high school graduates have higher employment rates than General high school graduates, but there are no differences in wages. The 2-year university graduates who attended vocational high school have higher employment rates than after finishing General high school graduates, but there are no differences in wages. The 4-year university graduates who attended general high school have much higher labor market outcomes in terms of employment, wages than after finishing vocational high school graduates.

Moreover, Chae (2004) finds that the first job acquisition rate of vocational high school graduates is higher than general high school graduates when the final educational background is in high school graduates, vocational high school graduates have a relatively shorter period

of time in job seeking than general high school graduates. This can be interpreted as vocational education can reflect in school to work transition. It is also found that the employment of vocational high school students has a positive effect on the wages. However, this wage effect does not appear for 2-year and 4-year universities.

For the Research Question 3 with two sub-research question, two hypotheses are proposed as listed below.

Hypothesis 3-1: Obtaining higher of levels education, particularly, general education track, such as 4-year university based on general high school can lead to greater opportunity for job status as regular job employed compare to fewer taking education.

Hypothesis 3-2: Obtaining higher of levels education, particularly general education track, such as 4-year university based on general high school can leat to greater opportunity for working in large corporation compare to fewer taking education.

Hypothesis 3-1 and 3-2 are about the quality aspect of employment in regards to job status and large corporation. It is created based on Choi (2015) and Kim (2013), who found a huge number of 2-year university graduates remain in low quality jobs over their lifetime compared to 4-year university graduates. In addition, they have difficulty in securing permanent jobs, and the low-quality job and are frequently unemployment status for long. The status of irregular workers, unemployed persons, and noneconomic activities have an unfavorable influence on career advancement, meaning their income levels do not increase. In addition, there are gaps in terms of manpower of wage and occupations between 4-year university and high school graduates remarkably, while it has not appeared between 2-year university and high school graduates.

This study also expects to find, in the case of the students who graduated 2-year university after vocational or general high school graduation, it shows a negative effect on job

quality, while 4-year university graduates with vocational or general high school backgrounds have a positive effect on job quality.

4.3 Models (Identification Strategy)

This section describes the regression models used in the study. The study estimates the impact of school choice on labor market outcomes in Korea using different regression models for each research question. In order to answer research question 1-1, the maximum likelihood estimation of the probit regression model is employed for school decision at secondary education. For research question 1-2, multinomial logistic regression model is applied for school decision at higher education. Since one of the main goal of this study is to examine the labor market outcomes through different levels of education and education pathways, research question 2 and 3 are approaching the first stage of the regression model in the ordinary least squares (OLS) and maximum likelihood estimation of probit regression model, the second stage of the regression model in the conditional expectation correction method (CECM; Dubin and McFadden, 1984).

Traditional maximum likelihood theory, the independent variable uniformly allocated observations $\{y_i \in \mathbb{R}^G : i = 1,2, \dots\}$ starts by specifying densities for y_i. The y_i is a scalar with a normal of poisson distribution, which is the framework used in introductory statistics. However, almost economic applications focus on estimating parameters of conditional distributions. Each random draw is divided by (x_i, y_i), where $x_i \in \mathbb{R}^K$ and $x_i \in \mathbb{R}^G$ focus on estimating a model for the conditional distribution of y_i given by x_i. An example for (x_i, y_i) as a random draw is in a situation in which the population is to treat the conditioning variables x_i as nonrandom vectors in the unconditional distribution of y_i. Then the y_i is not able to identically distribute, and this situation makes the asymptotic analysis complicates. In this fact, there is a problem to bring the strong restrictiveness with x_i as nonrandom for using the maximum likelihood. x_i will have endogenous variables in a

structural model. In order to play the maximum likelihood analysis, need to specify the density of y_i given by x_i that has a parametric model of a conditional density.

The conductional maximum likelihood estimation (CMLE) can carry out a binary response model, specifically the probit model when the maximum likelihood estimation (MLE) is unconditional in nulled x_i (Wooldridge, 2010).

Since the dependent variable is a nominal variable, it is explained with a value of 1 and 0. Suppose the regression model routinely applies the ordinary least squares (OLS) method to determine the parameter of the dependent variable in relation to independent variables. That is, simply write the following model:

$$y_i = BX + u_i \tag{4.1}$$

The conductional expectation of the dependent variable in model (4.1) is called a linear probability model (LPM), because it is given the values of explanatory variables which can be interpreted as the conditional probability. The LPM for binary response y_i is specified as:

$$\mathrm{P}(y = 1|x) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_K x_K \tag{4.2}$$

Mostly, the x_j can be explained underlying explanatory variables which make changing the interpretations of the β_j. There is a strong assumption that x_1 is not functionally related to the other independent variables which can be written as $\beta_1 = \partial \mathrm{P}(\mathrm{y} = 1 \mid \mathrm{x}) / \partial_{x_1}$. Then the x_1 increasing one unit is given the changing β_1 in the probability of success. However, β_1 is just the difference in the probability of success with x_1 as a binary independent variable when $x_1 = 1$ and $x_1 = 0$, holding the other x_j fixed. When the parameters estimate in the linear projection have a consistency, the OLS estimation of the LPM is highly useful. However, when the OLS fitted values are continuous, not between zero percent and one hundred percent, the conditional probability of $\mathrm{P}(y = 1|x)$, i.e. the value $\widehat{y_i}$ cannot be explained by the predicted probability

in negative or positive value. The LPM indicates that one-unit increase / decrease in x_j always shift P $(y = 1|\, x)$ by the same unit without considering the fundamental value of x_j holding all other variables constant. It can be demonstrated that the value $\widehat{y_i}$, P $(y = 1|\, x)$ finally will have the value less than zero percent or greater than one hundred percent probability by the continuously increasing / decreasing one of the values x_j. This situation makes the LPM unsecure to make appropriate value.

With respect to nonlinear variables (i.e. discrete variables which have a value between zero and one), the LPM has latent unlikable qualifications. First, the LPM has an assumption that the probability of coefficient on dependent variable supported binary values, zero or one is in the linear model which normally consider continues variables. Secondly, in common sense, the probability value has to rely on zero or one. However, the LPM assume the values move on liner function and it has some limits to estimate properly with probability values. Because the OLS does not consider the probability variables which has a boundary of the estimation between zero and one values. Thirdly, the dependent variables only zero or one value cannot be held by the normal distribution with the error term. It can be only considered by OLS supported continuous variables. Finally, the LPM will be suspected by making the traditional significance tests because the error term is heteroscedastic. For these reasons, LPM is not the best choice model with dichotomous variables, the logit and probit models are ordinarily recommended and covered the LPM's limitations to deal with dichotomous variables as has been demonstrated all the times in the literature.

4.3.1 Probit Regression Model

This study's major goal is to see labor market outcomes by each level of education as well as the education pathway approach to high school choice. Most of the previous literature about Korean high school choice uses a simple logistic regression or probit regression (Phang & Kim, 2002; Nam, 2005; Oh, 2012), which have a treated limited dependent variable (LDV).

Wooldridge (2013) defined an LDV broadly as a dependent variable whose range of values is substantively restricted. A binary variable takes on only two values, zero and one such as male or female, married or unmarried, employed or unemployed, and in the labor force or not in the labor force.

The LPM model assume that the response probability of parameters, β_j is linear. The equation (4.3) below is considered the form of binary response models. It can also avoid some LPM's drawbacks that the fitted probabilities can be less than zero or greater than one and the marginal effect, which is the partial effect of any independent variable is constant.

$$\mathrm{P}\,(\,y = 1 \mid \mathrm{x}\,) = \mathrm{G}\,(\,\beta_0 + \beta_1 x_1 + \cdots + \beta_K x_K\,) = \mathrm{G}\,(\,\beta_0 + \mathrm{x}\beta\,) \tag{4.3}$$

where G is the taking value between zero and one for all real number z : $0 < \mathrm{G}\,(\,z\,) < 1$. This equation can guarantee strict probabilities between zero and one for the estimated respond probability.

To make sure the probabilities fall between zero and one by various nonlinear functions in the probit model, G for the standard normal cumulative distribution function (cdf) is expressed:

$$\mathrm{G}\,(\,z\,) = \Phi\,(z) \equiv \int_{-\infty}^{z} \emptyset\,(v)dv \tag{4.4}$$

where $\Phi\,(z)$ can be explained as the standard normal density by (4.5):

$$\Phi\,(z) = (\,2\pi\,)^{-1/2} \exp\,(\frac{-z^2}{2}) \tag{4.5}$$

The choice of G, again, ensures that all values of the parameters and the x_j from the strict dependent variable between zero and one. The equation (4.4) and (4.5) are make the G functions stronger at $z = 0, \mathrm{G}(z) \to 0$ as $z \to -\infty$, and $\mathrm{G}(z) \to 0$ as $z \to \infty$.
Furthermore, the probit model can be distinct by equation (4.6):

$$y^* = \beta_0 + \mathrm{x}\beta + e, \quad y = 1[y^* > 0] \tag{4.6}$$

The $y = 1[y^* > 0]$ defines the binary outcome and it calls the indicator function which take the value between zero and one, the y is one if $y^* > 0$ and y is zero if $y^* \leq 0$. e have to be independent from x and it has the standard normal distribution which means e is symmetrically districted about zero, and it has the normality assumption making the probit model more attractive more to use probit model in binary response models than logit model.

$$\begin{aligned} \mathrm{P}(y = 1 \mid \mathrm{x}) &= \mathrm{P}(y^* > 0 \mid \mathrm{x}) = \mathrm{P}[e > -(\beta_0 + \mathrm{x}\beta) \mid \mathrm{x}] \\ &= 1 - \mathrm{G}[-(\beta_0 + \mathrm{x}\beta)] = \mathrm{G}(\beta_0 + \mathrm{x}\beta) \end{aligned} \tag{4.7}$$

Equation (4.7) is totally same as (4.3), however, it can derive the response probability for y and the most crucial purpose to explain the effects of the x_j on the response probability $\mathrm{P}(y = 1 \mid \mathrm{x})$. For the OLS model, we normally intemperate the value of the parameter of change in the response probability when z_3 increase / decrease by 1%. It means that is to compute the elasticity of the response probability with respect to an independent variable. For the probit model, we need to be careful to interpret about value of parameters, β_j which is because of the two-potential problem in binary response models. First, the y in probit model denote only between zero and one, it means the average of the explanatory variables represent no one in the sample. Second, if the explanatory variables use the continuous variables, the

magnitude of effect on coefficient is not clear into non-linear function. For these reason, two models below are helpful to compute certain value of each i :

$$\mathrm{G}\left[\widehat{\beta_0} + \widehat{\beta_1}\bar{x}_1 + \cdots + \hat{\beta}_{k-1}\bar{x}_{k-1} + \hat{\beta}_k\,(c_k + 1)\right] - \mathrm{G}\,(\widehat{\beta_0} + \widehat{\beta_1}\bar{x}_1 + \cdots + \hat{\beta}_{k-1}\bar{x}_{k-1} + \hat{\beta}_k\,c_k) \tag{4.8}$$

$$n^{-1}\sum_{i=1}^{n}\{\mathrm{G}\left[\widehat{\beta_0} + \widehat{\beta_1}\bar{x}_{i1} + \cdots + \hat{\beta}_{k-1}\bar{x}_{ik-1} + \hat{\beta}_k\,(c_k + 1)\right] - \mathrm{G}\,(\widehat{\beta_0} + \widehat{\beta_1}\bar{x}_{i1} + \cdots + \hat{\beta}_{k-1}\bar{x}_{ik-1} + \hat{\beta}_k\,c_k)\} \tag{4.9}$$

The expression in (4.8) and (4.9) has a particularly useful interpretation when x_k is a binary variable, it is called the partial effect at the average (PEA) or the average marginal effect (AME). For each unit i, these estimate the predicted difference in the probability that $y_i = 1$ when $x_k = 1$ and $x_k = 0$. The estimated effect of x_k on y_i is the average of the estimated differences in probabilities. When we use the probit model such as binary or dichotomous dependent variable regression models in applications, we need to compute the scale factors described above for the probit model in making comparisons of partial effects.

4.3.2 Multinomial Logit Regression Model

The school choice has persistently been discussed to identify labor market outcomes through the education investment (Goldhaber, 1996; Schneider, et. al., 1997; Hastings, et. al., 2005). The binary response models solely have two objectives for discrete choices. Yet, there are many cases with more than two objectives which calls nominal response where the values attached to different outcomes.

The multinomial logit (MNL) model response probabilities with x is a 1 * K vector in the first-element population:

$$\mathrm{P}\,(\,y = j \mid \mathrm{x}\,) = \exp\,(\,\mathrm{x}\beta_j)\,/\left[1 + \sum_{h=1}^{J} \exp\,(\,\mathrm{x}\beta_h)\right],$$

$$j = 1, \ldots, J, \tag{4.10}$$

where β_j is K * 1, $j = 1, \ldots, J$. As the response probability must sum to unity,

$$\mathrm{P}\,(\,y = 0 \mid \mathrm{x}\,) = 1\,/\left[1 + \sum_{h=1}^{J} \exp\,(\,\mathrm{x}\beta_h)\right]. \tag{4.11}$$

Simply derive from the equation (4.10) and (4.11) as response probabilities:

$$\pi_{ij} = \mathrm{P}\,(\,Y_{ij} = 1\,) \tag{4.12}$$

where Y_{ij} = 1, if the individual i chooses alternative j which has more than two objectives and Y_{ij} = 0, otherwise.

$$\pi_{i1} + \pi_{i2} + \pi_{i3} = 1 \tag{4.13}$$

The equation (4.13) represent response probabilities with three alternatives outcomes, such as no college, 2-year college and 4-year college. McFadden (1974, 1984) has shown that the density of y given x, the MNL regression model is best carried out by maximum likelihood. In addition, the MNL regression model is the more recommended procedure than the bivariate logit model for several reasons that are first, all of the bivariate logits are based on different sample sizes, and the sample for one of the 3 school choices will be dropped in estimation.

Second, each individual estimation of the bivariate logits does not have a guarantee with three estimated coefficients will not be one. Third, the estimated coefficients in standard errors are become smaller if all logits are estimated together than if each logit is estimated independently.

For generalizing the bivariate logit model discussed above, the MNL regression model in three outcomes can be rewritten as:

$$\pi_{ij} = \frac{e^{\alpha_j + \beta_j X}}{\sum_{j=1}^{3} e^{\alpha_j + \beta_j X}} \tag{4.14}$$

There is a necessity to notice that put the subscript j on the intercept and the slope coefficient which means the value of these coefficients can differ from choice to choose. The choice will have a different weight on their priority and it also cannot estimate all the three probabilities independently. Thus, the three choice obtain the following estimates of the probabilities from equation (4.15) to equation (4.17):

$$\pi_{i1} = \frac{1}{1 + e^{\alpha_2 + \beta_2 X} + e^{\alpha_3 + \beta_3 X}} \tag{4.15}$$

$$\pi_{i2} = \frac{e^{\alpha_2 + \beta_2 X}}{1 + e^{\alpha_2 + \beta_2 X} + e^{\alpha_3 + \beta_3 X}} \tag{4.16}$$

$$\pi_{i3} = \frac{e^{\alpha_3 + \beta_3 X}}{1 + e^{\alpha_2 + \beta_2 X} + e^{\alpha_3 + \beta_3 X}} \tag{4.17}$$

To illustrate, for interpretation of probabilities, logits can use logs of the odds ratio in preference of school choice which means how much alternative j is preferred over alternative i as follows:

$$\ln\left[\frac{\pi_2}{\pi_1}\right] = \alpha_2 + \beta_2 X_i \quad (4.18)$$

$$\ln\left[\frac{\pi_3}{\pi_1}\right] = \alpha_3 + \beta_3 X_i \quad (4.19)$$

$$\pi_{i1} = 1 - \pi_{i2} - \pi_{i3} \quad (4.20)$$

To be concrete, equation (4.18), which gives the log of the odds in preference of school choice 2 over school choice 1, which is a 2-year university over high school graduates (no university) and observations for school choice 3 will be dropped. Similarly, equation (4.19), gives the log of the odds in preference of school choice 3 over school choice 1, which is 4-year university over high school graduates (no university), and observations for school choice 2 will be dropped. Equation (4.20) explains the log of the odds of choosing choice 2 over choice 3.

The MNL model as well as mixed logit model and conditional logit (CL) model implicit the well-known strict assumption that is independence from irrelevant alternatives (IIA) assumption as shown by McFedden (1974). IIA means, all else being equal, that an individual's choice set between two alternative outcomes is unaffected by what other probabilities are available. The choice probability for individual characteristics i in terms of alternative j is independent from the error term in estimating π_{ik}.

4.3.3 Conditional Expectation Correction Method (CECM)

In the final stage of estimating in the analysis following research questions 2 and 3, the OLS regression will be employed for both joint discrete / continuous outcomes. Since the estimating on research question 2 and 3 through school decision which induce unobserved heterogeneity. In this case, the Conditional Expectation Correction Method (CECM) needs to be applied to the OLS estimation of the LPM, which is very attractive to overcome unobserved heterogeneity.

The underlying estimates of the parameters in the linear projection are consistent, as mentioned before, due to this study in labor market outcomes with discrete variables not consider magnitude of coefficients, but seeking positive or negative effects.

In the empirical analysis, we assume that the labor market outcomes for the ith individuals (OCi) can be denoted as follows:

$$\mathrm{OC}_i = \mathrm{OC}_i\,(\,\mathrm{E}_i\,,\mathrm{I}_i\,,\mathrm{X}_i\,,\mathrm{R}_i\,) \tag{4.21}$$

where E is the education level / education pathway mix characterizing each individual, I, X and J, which are properties for individual, job-experience and regional characteristics respectively.

The empirical equation (linear) of the above expressed labor market outcomes is then given by:

$$\mathrm{OC}_i = \alpha'\mathrm{DT}_i + \beta' X_i + \varepsilon_i \tag{4.22}$$

where OC is a measure of self-reported labor market outcomes in employment, wage, job status such as regular job or non-regular job for the workers and firm size such as workers work place in large company or otherwise, DT is the set of dummy variables related to the types of education levels (and α is the interesting parameters for estimating education types), X is the vector of observable individual, job-experience and regional characteristics, βs are the associated parameters to be estimated and ε is the error term.

The OLS model can be used for equation (4.22), underlying discrete / continuous latent variables. Thus, the OLS model can be biased by endogeneity and self-selection in terms of the schooling decision. In this specific case, some additional unobserved properties, such as individual ability, motivation, and information regarding the labor market, may be correlated with education levels in the estimation (Origo and Pagani, 2009).

In order to check whether the potential endogeneity affects the results of the estimation or not, we adopt a two-stage procedure as follows: we first estimate the probability of being one of the three types of education choice (i.e., no-college, 2-year college and 4-year college) and then we estimate the LPM to examine the impact of education on the labor market outcomes with control for endogeneity of education choice. [6]

There is a risk of bias in understanding the effect of educational choices to labor market outcomes. The bias may exist if there is some unobserved individual characteristics that simultaneously affect both education decisions and labor market outcomes, which indicates other unobserved confounding factors. In order to consider endogeneity, this study exploited the richness of the data set in terms of information on individual characteristics. This include variables of job seekers' attitudes toward work and workplace.

To further the empirical strategy of testing estimations for unobserved heterogeneity, the multinomial nature of the endogenous variable is given, and in the first stage estimates the following equation using a multinomial logit:

$$T_i = \gamma_T{}' X_T + \varepsilon_T \tag{4.23}$$

where T is an indicator variable for the three schooling decisions discussed above, X is a vector of observable characteristics, γ_s are associated parameters to be estimated and ε is error term.

From this first equation, the retrieved set of correction terms (similar to inverse Mills Ratios), are added as controls in the labor market outcomes equation; these latter should take account of the possible correlation in the unobserved heterogeneity of the two models as follows:

[6] In order to step forward to the second stage model, the probit model cannot be employed due to a two-stage procedure yielding consistent estimates only if the second equation is a linear probability model (Wooldridge, 2001).

$$\mathrm{OC}_i = \alpha' \mathrm{DT}_i + \beta' X_i + \lambda' E\left(\frac{\varepsilon}{T}\right) + \varepsilon_i \quad (4.24)$$

where all terms are as in equation (4.22) and where $E\left(\frac{\varepsilon}{T}\right)$ is a function of the estimated probabilities from equation (4.23), and picks up the correlation between the unobserved variables of schooling decision and labor market outcomes.

The specification of equation (4.24) means that there is no endogeneity if the estimated λs are statistically equal to zero by contrast, if the estimated λs are statistically significant, the proposed specification results in unbiased estimates of the parameters of interest (i. e., the vector α).

For the endogeneity issue Dubin and McFadden (1984) suggest obtaining the set of correction terms from a multinomial logit like this:

$$\boldsymbol{E}(\varepsilon|T = i) = \sum_{j\neq i}^{m}\left(\frac{P_j lnP_j}{1-P_j} + lnP_i\right) \quad (4.25)$$

where P represents the estimated probabilities from the equation (4.23).

Lastly, we need to consider the identification strategy. In particular, we may use exclusion restrictions for identification, as well as depending on functional forms. So, we need to use a variable that is significantly correlated with schooling decisions but that does not directly affect labor market outcomes.

4.4 Model Specification

4.4.1 Probit Regression Model.

With this background of identification strategy in place, this study now turns to assess the high school choice as a binary variable form for the outcomes, $i = \{0,1\}$, the adults have a secondary

education between general and vocational education, but no college or university in the first stage of regression. The first identification of the model, following research question 1-1 is for school choice at the high school level using the probit regression model, can be written as follows:

$$\mathrm{P}\,(\,y_i = 1 \mid \mathrm{x}\,) = \beta_0 + \beta_1 ability_1 + \beta_2 fa\_edu_2 + \beta_3 fa\_inc_3 + \beta_4 PT_4 + \beta_5 siblin\ \ s_5 + \varepsilon_i \quad (4.26)$$

In equation (4.26), the dependent variable $y_i = 1$ if student i is attending vocational high school, $y_i = 0$ if student i is attending general high school, and the explanatory variable of $ability$ is a teacher assessment at middle school from 1 to 5 for each individual (the lowest grade of 1 means poor academic performance), fa_edu is a father's education levels between less than high school and more than high school, PT is a log of private tutoring cost before entering high school, $siblin\ \ s$ is number of siblings of the individual and ε is the error term.

4.4.2 Multinomial Logit Regression Model

For estimating the determinants of school choice at the university level following the research question 1-2, the MNL model is used. The explanatory variables is used same with school choice at the high school level, the estimation equation can be denoted:

$$Y^*_{ij} = \alpha_i + \beta_{1j} ability_i + \beta_{2j} fa\_edu_i + \beta_{3j} fa\_inc_i + \beta_{4j} PT_i + \beta_{5j} siblin\ \ s_i + \varepsilon_{ij} \quad (4.27)$$

In equation (4.27),

- $y_i = 0$, if the individual is not enrolled in 2-year or 4-year university and is a high school graduate.

- $y_i = 1$, if the individual is enrolled or was enrolled in 2-year university.
- $y_i = 2$, if the individual is enrolled or was enrolled in 4-year university.

Similarly, in equation (4.26), the variable of $ability$ is a teacher assessment at middle school from 1 to 5 for each individual (the lowest grade of 1 means poor academic performance), fa_edu is father's education levels between less than high school and more than high school, PT is a log of private tutoring cost before entering high school, $siblin\ \ s$ is the number of siblings of the individual and ε is the error term.

4.4.3 Labor Market Outcomes' Estimation

The study estimates the impact of school choice on labor market outcomes by simply using ordinary least squares (OLS) for wage and the probit OLS regression model for employment, job status and firm size, respectively.

$$\mathrm{OC}_i = \alpha' \mathrm{DT}_i + \beta' X_i + \varepsilon_i \tag{4.28}$$

where OC is a measure of labor market outcomes which are already mentioned before employment, wage, job status and firm size, DT is the set of dummy variables related to the education levels such as high school, 2-year university and 4-year university and education pathway in 2-year and 4-year university background with vocational high school compared to general high school (and α is the coefficient of interest to be estimated), X is a vector of observable individual characteristics in gender, the period of job seeking, work experience, the living area and industry classification by 3 groups in manufacturing, services and construction (if this estimation use The International Standard Industrial Classification (ISIC) in the industry variable, it will lose a degree of freedom, in this case just classify main 3 industry for the estimation), β is the associated coefficient to be estimated and ε_i is the error term.

4.4.4 Conditional Expectation Correction Method (CECM)

This method it further test the reliability of the main results deal with the estimation of labor market outcomes in OLS or LPM regression. In the previous section, it is already verified whether this study estimates are sensitive to different definitions of the three types of education decision as well as potential education pathway heading to the labor market and here this section endogeneity will be dealt with using a two-stage technique which mentioned in identification strategy part in CECM.

Similarly, only the correction term, $\lambda' E\left(\frac{\varepsilon}{T}\right)$ is added as a function of the estimated probabilities from equation (4.28: estimated by OLS or LPM) to control for endogeneity in the labor market outcomes as follows:

$$\mathrm{OC}_i = \alpha' \mathrm{DT}_i + \beta' X_i + \lambda' E\left(\frac{\varepsilon}{T}\right) + \varepsilon_i \qquad (4.29)$$

where OC is a measure of labor market outcomes which are already mentioned in employment, wage, job status and firm size, DT is the set of dummy variables related to the education levels such as high school, 2-year university and 4-year university and education pathway in 2-year and 4-year university background with vocational high school compared to general high school (and α is the coefficient of interest to be estimated), X is a vector of observable individual characteristics in gender, the period of job seeking, working experience, the living area and industry classification by 3groups in manufacturing, services and construction (if this estimation uses The International Standard Industrial Classification (ISIC) in the industry variable, it will lose a degree of freedom, in this case just classifying the 3 main industry for the estimation), β is the associated coefficient to be estimated and ε_i is the error term.

4.5 Data

4.5.1 Overview of the Data

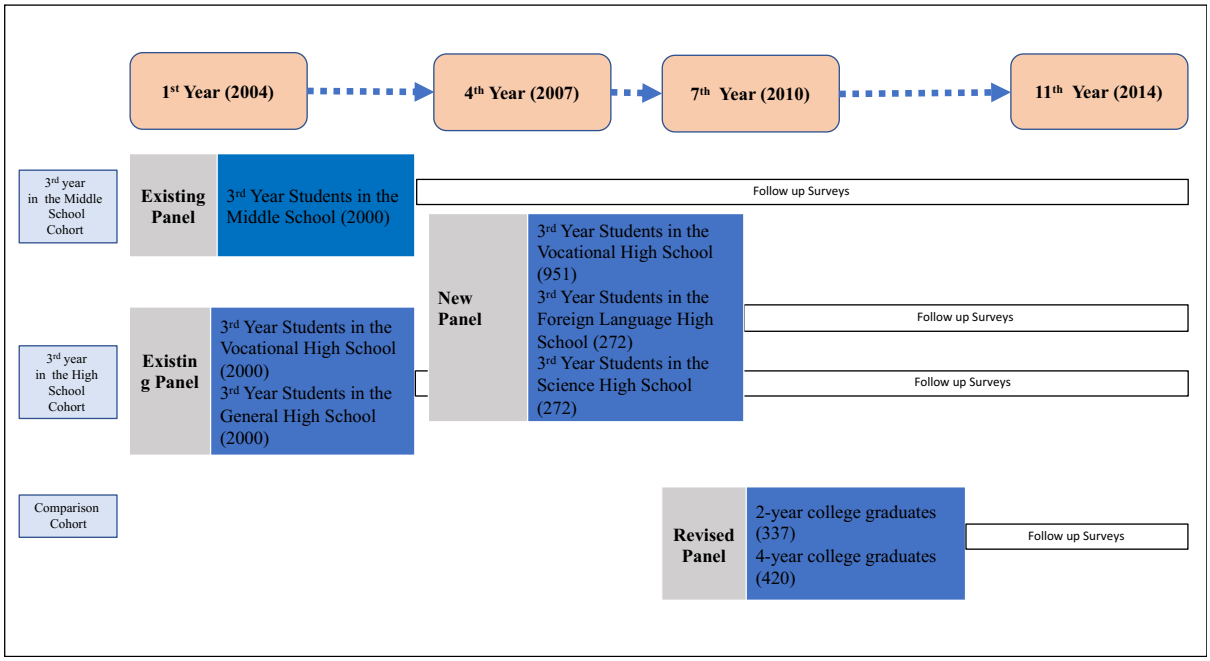
The Korean Education and Employment Panel (KEEP) data from the Korea Research Institute for Vocational Education (KRIVET) started the household survey to identify Korean youth's educational experiences, entrance into higher level schools, career paths, and their transitions into the Labor market from 2004. Since then, it has been conducted for 11 years as panel data annually on the same sample for analyzing diverse types of research in human resources and its accumulation in Korea. The 12th year (2015) data are available, however this study cannot use them due to widely increased data attrition.

Figure 4-2 shows the survey population of the KEEP nationwide consists of 2,000 lower secondary students, year 3 and 4,000 upper secondary students, year 3, including information of households, individuals and teachers for each of the population at the beginning, 2004.
In 2004, the 1st year of samples were 2000 samples in the 3rd year Middle High School Cohort was relatively smaller than the 3rd High School Cohort with 4000 samples. The 3rd year Middle High School Cohort is divided into general high school and vocational high school after the 2nd year. It was inevitable to gather additional samples to determine the balance of the proportion for acceptable analyzing in the 3rd Middle School Cohort, in which just about 30% of middle school students entered vocational high school (Major-fields: industry, commercial and so on). In addition, in order to supplement the inadequate career information of special-purpose high school graduates, the special high school (Major-fields: science and foreign language), separately data is collected in teacher, school admission and household.

In 2007, the 4th year's survey data had a total of 6000 samples in the Middle and High School Cohort and 1500 samples of the 3-year Middle School Cohort. The sampling of the New Panel was designed considering the change of characteristics of the sample according to the over time of the 3-year middle school cohort (going to general or vocational high school, etc.) and the data attrition.

The 7th year (2010)'s research subjects included 6,000 people from the existing cohort of 3-year middle and high school students, 1,500 new panels were selected in 2007 and a non-cohort of 757 people called the Revised panel are added to the panel. The sample for non-cohort has not information about their history of education, school and family, but the final grade of education was described. The men are collected as a non-cohort to reduce the disparity of numbers between male and female to keep the gender ratio on the labor market caused by military service. It has collected by 337 males, 2-year college graduates (Graduated in Feb. 2007) and 420 males, 4-year college graduates (Graduated in Feb. 2009).

Figure 4-2: Structure of Respondents of KEEP (Existing・New・Revised Panel)



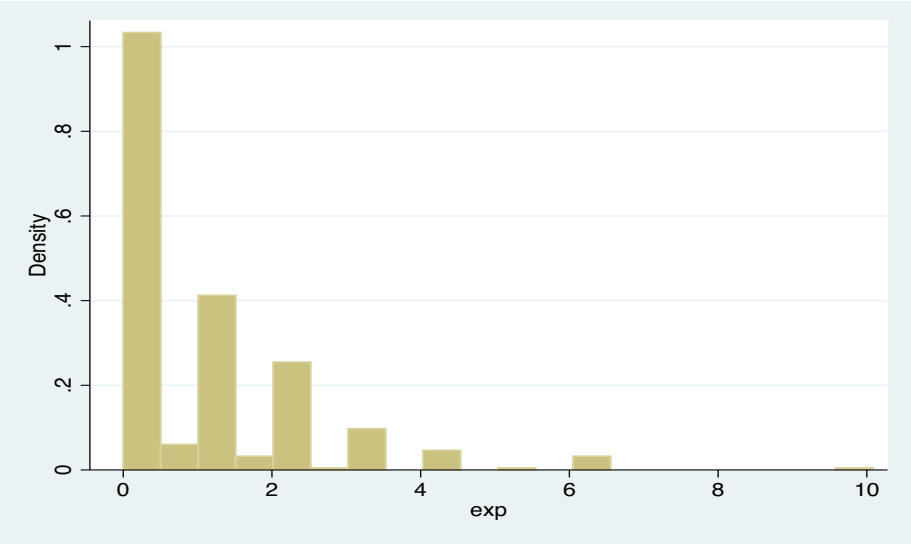
Source: Created by Author based on KEEP data (2014)

This study is able to use the population of only the lower secondary student cohort for the school choice analyzing to the upper secondary education. The next year, 2005, the students graduated to year 3 of the lower secondary education and went to upper secondary school, which is divided into a general and vocational school.

There are some features that social obligation to go to military service for men when they turn 20 years old and repeaters to enter the university are also more than 30% nationally

in terms of the amount of missing data in Korea. The repeaters are not only one times failure to enter university in the more than 30% but also the repeaters existed in a more than two times failure getting into university in data. For these reasons, the amount of data were reduced by almost 30% of individuals and new data was added for males, and adjusted to near perfection, with same age, education level, job experience and so on by 2010. Also, it affects data balance of the analyzing results in gender ratio as well as reducing observation of each models. Nevertheless, this study was not able to use additional data, which does not include household and teacher information. One of the data limitations is that most individuals have less than two years of job experience and the majority of the data participants have less than one year of job experience, which is given in Figure 4-3.

Figure 4-3: Density of Year of Experience on Work Place



Source: Created by Author based on KEEP (2014)

Thus, this study restricted data set to bring out the 3-years data, restructuring cross-sectional data in 2004, 2007 and 2014 from the 11years original panel data. In 2004 included characteristics of individual, household and school performance, 2007 represented those who had a secondary education status at the year 3 before going to university or the labor market, 2014, it included final information in terms of those who have already become adults.

At the end of the analysis, which considers both the regular and company-wide quality of work, we did not select a wage variable sample that either lacks value in the questionnaire or the actual wage is unreliable. In this way, full-time and firm-size analyzes are applied to the entire data sample.

4.5.2 Summary Statistics

This sub-chapter presents the summary statistics of the variables in the sub-sample dataset that the study utilizes in the analysis. As mentioned above, the data sample for this study includes only the 3-year middle school cohort of 15 years at the first wave's data survey and 26 years at the final wave of data survey.

4.5.3. Variables

Table 4-1 to Table 4-4 shows the descriptive statistics as well as variable definitions in the analyses of this study. Each analysis has to have different descriptive statistics due to dropping of the data sample with each model estimation.

Table 4-1 reports definition of independent variables and its descriptive statistics for high school choice of analysis following research question 1-1 using probit model with 1,319 observations. The data combined in 2004 / 2007 / 2014, however, this study cannot include additional data in 2007 / 2010 for data attrition due to it did not include appropriate family and individual information such as high school background and the place of residence. The dependent variable, this study used a binary variable for "high", if a student in vocational high school gets a value of one, ipso facto a student in general high school get a value of zero.

With regards to the independent variables explained below respectively. "Teacher assessment" indicates the students school achievement as 5 levels from 1 to 5, and the highest score is 5 when they were in 3-year of middle school. Regarding the school achievement, the most acceptable index is the examination score, however, there is a data limitation as a missing

value which is more than 50% students are not responded while the teachers assess all student's school achievement during their school life in 5 levels. The variable of "father income" is the monthly income per capita of the student's father, and it is regenerated as log wage in the model estimation. The variable of "father education" is divided by 3 categories as a dummy variable, one denotes the father's final education level is less than high school, two indicates the father's final education level is high school and three reports the father's final education level is more than high school. In analysis of father's education, the benchmark is the father's education level two which is the high school. The "private tutoring" variable means the monthly amount of private tutoring also used log value in the estimation model. The "siblings" implied whether they have siblings or not, no number of siblings per capita.

Table 4-1. Summary Independent Variables at High School Choice

Variable	Definition of variables	Obs	Mean	Min	Max
high	If = 1/0, Vocational / General upper secondary education	1,319	0.41	0.0	1.0
Teacher's assessment 1	Teacher's assessment at lower secondary education (lowest)	1,319	0.26	0.0	1.0
Teacher's assessment 2	Teacher's assessment at lower secondary education	1,319	0.41	0.0	1.0
Teacher's assessment 3	Teacher's assessment at lower secondary education	1,319	0.48	0.0	1.0
Teacher's assessment 4	Teacher's assessment at lower secondary education	1,319	0.42	0.0	1.0
Teacher's assessment 5	Teacher's assessment at lower secondary education (highest)	1,319	0.33	0.0	1.0
Father income	Father income	1,319	262.29	10.0	3000.0
	Log of father income	1,319	5.44	2.3	8.0
Private tutoring	Private tutoring cost at lower secondary education	1,319	27.20	1.0	200.0
Log of Private tutoring	Log of private tutoring cost at lower secondary level	1,319	0.73	0.0	5.3
Father education 1	The father education level in less than upper secondary	1,319	0.50	0.0	1.0
Father education 2	The father education level in upper secondary	1,319	0.40	0.0	1.0
Father education 3	The father education level in more than upper secondary	1,319	0.46	0.0	1.0
Sibling	Having at least one sibling	1,319	0.23	0.0	1.0

Source: Created by Author based on Korean Education & Employment Panel, Korea Research Institute for Vocational Education & Training (KRIVET)

Table 4-2 reports definition of independent variables and its descriptive statistics for university choice of analysis following research question 1-2 using 610 observations. This second stage of the estimation drastically have a data attrition. Because of the missing value, which is not responded in individual status as a student or not, observations of military service and so on. With respect to the model estimation for the research question 1-2, the multinomial logit model is employed. The dependent variable is 3 categorical variables, zero denotes an individual did not enrolled in 2-year or 4-year university just completed high school, one presents an individual is completed 2-year university and two indicates an individual is

completed 4-year university. Independent variables are almost the same with high school choice variables. However, it is added the “region” variables categorized from region 1 to 4, one is the Seoul, the capital city of Korea and two in the region which is nearest to Seoul, and three is a bit further from Seoul and four is the furthest from Seoul because Korea's famous universities are almost all concentrated in Seoul, the capital city of Korea. For this reason, the region variable can be helpful to interpret how region variables affect university choice.

Table 4-2. Summary Independent Variables at University choice

Variable	Definition of variables	Obs	Mean	Min	Max
Region1	Individual lives in Seoul at the high school period	610	0.34	0.0	1.0
Region2	Individual lives in near from Seoul at the high school period	610	0.46	0.0	1.0
Region3	Individual lives in far from Seoul at the high school period	610	0.46	0.0	1.0
Region4	Individual lives in farthest from Seoul at the high school period	610	0.44	0.0	1.0
degree 1	Schooling degree in no college / high school	610	0.42	0.0	1.0
degree 2	Schooling degree in 2-year University	610	0.47	0.0	1.0
degree 3	Schooling degree in 4-year University	610	0.50	0.0	1.0
Teacher's assessment 1	Teacher's assessment at lower secondary education (lowest)	610	0.27	0.0	1.0
Teacher's assessment 2	Teacher's assessment at lower secondary education	610	0.43	0.0	1.0
Teacher's assessment 3	Teacher's assessment at lower secondary education	610	0.48	0.0	1.0
Teacher's assessment 4	Teacher's assessment at lower secondary education	610	0.41	0.0	1.0
Teacher's assessment 5	Teacher's assessment at lower secondary education (highest)	610	0.31	0.0	1.0
Father income	Log of father income	610	0.48	3.9	7.1
Private tutoring	Log of private tutoring cost at lower secondary level	610	0.72	0.0	5.3
Father education 1	The father education level in less than upper secondary	610	0.50	0.0	1.0
Father education 2	The father education level in upper secondary	610	0.42	0.0	1.0
Father education 3	The father education level in more than upper secondary	610	0.42	0.0	1.0
Sibling	Having at least one sibling	610	0.21	0.0	1.0

Source: Created by Author based on Korean Education & Employment Panel, Korea Research Institute for Vocational Education & Training (KRIVET)

Table 4-3 to Table 4-5 indicate definition of independent variables and its descriptive statistics for labor market outcomes (wage, employment status; those are currently employed, those are working as a regular job employee, those are working for a large company as the dependent variables) of analysis following research question 2 (2-1 and 2-1) and 3 (3-1 and 3-2) using 594, 331 and 412 observations. The dependent variables that are “employed”, the employment status as an employee or not when they responded the survey, “wage”, the log wage for monthly wage per capita, “rejular_job”, whether those who are working as a regular job employee or not,「firm-size」, whether those who are working for a large company or not. This final stage of the estimation has almost same independent variables that are dummy variable of “male” denotes a male gets a value of one, ipso facto a female gets a value of zero, “mushoku_year” means the period of job seeking until obtaining a first job, “married 1”, a marriage person gets a value of one otherwise zero, the “region” variables are same with using previous model analysis above, “degree 1, 2 and 3” denote an individual did not enrolled in 2-year or 4-year university just completed high school, an individual is completed 2-year university, an individual is completed 4-year university respectively, “VOCA” if a student graduates vocational high school gets a value of one, ipso facto a student graduates general high school get a value of zero. There are two interaction term variables, “VOCA * 2_year” indicates, an individual completed 2-year university after vocational high school graduation and “VOCA * 4_year” indicates, an individual completed 4-year university after vocational high school graduation. The industry classification has 3 categories, “manufacturing”, “constructions” and “services”.

Table 4-3. Summary Independent Variables at Labor market outcome in employment

Variable	Definition of variables	Obs	Mean	Min	Max
employed	If = 1, An individual in employment	594	0.44	0	1
male	Individual characteristic of male	594	0.48	0	1
mushoku_year	The period of job seeking	594	1.41	0	7
married1	If = 1/0, married an individual	594	0.22	0	1
Region1	An individual lives in Seoul at the high school period	594	0.34	0	1
Region2	An individual lives in near from Seoul at the high school period	594	0.46	0	1
Region3	An individual lives in far from Seoul at the high school period	594	0.46	0	1
Region4	An individual lives in farthest from Seoul at the high school period	594	0.44	0	1
degree 1	Schooling degree in no college / high school	594	0.40	0	1
degree 2	Schooling degree in 2-year University	594	0.48	0	1
degree 3	Schooling degree in 4-year University	594	0.50	0	1
VOCA 0	If = 0, An individual who were in general high school	594	0.44	0	1
VOCA 1	If = 1, An individual who were in vocational high school	594	0.44	0	1
VOCA*2_year	An individual degree in 2-year univesity after vocational high school	594	0.33	0	1
VOCA*4_year	An individual degree in 4-year univesity after vocational high school	594	0.20	0	1

Source: Created by Author based on Korean Education & Employment Panel, Korea Research Institute for Vocational Education & Training (KRIVET)

Table 4-4. Summary Independent Variables at Labor market outcome in wage

Variable	Definition of variables	Obs	Mean	Min	Max
lnW	Log of wage	331	0.34	3.4	6.4
male	Individual characteristic of male	331	0.47	0.0	1.0
mushoku_year	The period of job seeking	331	1.19	0.0	6.0
married1	If = 1/0, married an individual	331	0.16	0.0	1.0
exp	Years of ob experience	331	1.39	0.0	10.1
exp2	Square of job experience	331	8.40	0.0	101.7
Region1	An individual lives in Seoul at the high school period	331	0.33	0.0	1.0
Region2	An individual lives in near from Seoul at the high school period	331	0.46	0.0	1.0
Region3	An individual lives in far from Seoul at the high school period	331	0.46	0.0	1.0
Region4	An individual lives in farthest from Seoul at the high school period	331	0.44	0.0	1.0
degree 1	Schooling degree in no college / high school	331	0.39	0.0	1.0
degree 2	Schooling degree in 2-year University	331	0.48	0.0	1.0
degree 3	Schooling degree in 4-year University	331	0.50	0.0	1.0
VOCA 0	If = 0, An individual who were in general high school	331	0.43	0.0	1.0
VOCA 1	If = 1, An individual who were in vocational high school	331	0.43	0.0	1.0
VOCA*2_year	An individual degree in 2-year univesity after vocational high school	331	0.32	0.0	1.0
VOCA*4_year	An individual degree in 4-year univesity after vocational high school	331	0.19	0.0	1.0
regular_job	Current job status in regular job	331	0.40	0.0	1.0
Firmsize	Firm-size in the biggest	331	0.39	0.0	1.0
Manufacturing	Industry of manufacturing sector	331	0.42	0.0	1.0
Construction	Industry of construction sector	331	0.18	0.0	1.0
Servies	Industry of servies sector	331	0.44	0.0	1.0

Source: Created by Author based on Korean Education & Employment Panel, Korea Research Institute for Vocational Education & Training (KRIVET)

Table 4-5. Summary Independent Variables at Labor market outcome in regular-job and firm-size

Variable	Definition of variables	Obs	Mean	Min	Max
regular_job	Current job status in regular job	412	0.82	0	1.0
Firmsize	Firm-size in the biggest	412	0.20	0	1.0
male	Individual characteristic of male	412	0.34	0	1.0
mushoku_year	The period of job seeking	412	0.46	0	6.0
married1	If = 1/0, married an individual	412	0.03	0	1.0
exp	Years of ob experience	412	1.13	0	10.1
exp2	Square of job experience	412	3.10	0	101.7
Region1	An individual lives in Seoul at the high school period	412	0.14	0	1.0
Region2	An individual lives in near from Seoul at the high school period	412	0.30	0	1.0
Region3	An individual lives in far from Seoul at the high school period	412	0.31	0	1.0
Region4	An individual lives in farthest from Seoul at the high school period	412	0.25	0	1.0
degree 1	Schooling degree in no college / high school	412	0.19	0	1.0
degree 2	Schooling degree in 2-year University	412	0.36	0	1.0
degree 3	Schooling degree in 4-year University	412	0.45	0	1.0
VOCA 0	If = 0, An individual who were in general high school	412	0.75	0	1.0
VOCA 1	If = 1, An individual who were in vocational high school	412	0.25	0	1.0
VOCA*2_year	An individual degree in 2-year univesity after vocational high school	412	0.12	0	1.0
VOCA*4_year	An individual degree in 4-year univesity after vocational high school	412	0.04	0	1.0
Manufacturing	Industry of manufacturing sector	412	0.22	0	1.0
Construction	Industry of construction sector	412	0.03	0	1.0
Servies	Industry of servies sector	412	0.75	0	1.0

Source: Created by Author based on Korean Education & Employment Panel, Korea Research Institute for Vocational Education & Training (KRIVET)

CHAPTER 5:

RESULTS

5.1 High School Choice

This subsection shows the results of the analyses which investigate how individual, households and performance in middle school factors are related to students' different type of high school choice in Korea. The results of the analyses use pooled cross-sectional data to examine 2004/2007 KEEP data. The study conducts regression analysis and divided the analysis by male and female, as well as all observations after having first done a common analysis to understand gender differences in the vocational high school choice. The result of regression analysis, using the tracing data sample included students aged was in year 3 of middle school in 2004, and students aged 18 in year 3 of high school student in 2007. The high school choice is the first Opportunity for students to choose a school under public education system in Korea. This choice strongly affects their career path and whether they enter university or the labor market after graduating high school.

Table 5-1 reports the factors that determine high school choice. Better education performance in middle school, higher education level of the parents along with higher parent income and use of private education show a negative correlation with entering vocational high school. It also displays the Average Margin Effect (AME) of the probit model (Model 1) using 1,319 observations from the full sample. The model has a fitted binary outcome variable on whether a student attends vocational high school or not. In addition, the variables include household and school characteristics, such as teacher assessment, father's final education in high school or 4-year university, father's income, the cost of private tutoring and the number of siblings. These variables are the most typical and influential variables used for school choice based on previous research using the probit model (Hastings et. al., 2005 & 2008; Cullen et. al., 2006). As mentioned above, this data is the 11years tracing data and therefore there is no meaning to use individual characteristics such as age.

First, among the variables on school characteristics, coefficients of teachers' assessment[7] dummies show that the probability of attending vocational high school based on the teachers' assessments 5 categorical dummies from 1 to 5, 5 being the highest score. Results from the full sample analysis, applying the probit model, show that all levels of teacher assessment have a negative effect to attend in vocational high school. And someone in male group who had a highest score in the middle school, they are disappeared from the result, the 74 observations are eliminated in the full sample.

Second, with regard to household characteristics, markedly the family background variables as the father's education is greater than high school and father's income are found to have a statistically negative effect on the probability of sending their children to vocational high school. Father's better education level affect more female group than male group and father's better income affect more male group than female group in nonattendance of vocational high school. The result from the full sample, applying the probit model of the marginal effect, shows that holding all other variables constant, the marginal effect on the going to vocational high school and in terms of the father's education is greater than high school, if father's education increases one-year, the probability of vocational high school attendance decreases 6.1 percent points. In terms of the father's education under high school has a positive effect in vocational high school attendance, however, the coefficients are not statistically significant. Moreover, the father's high income has a negative effect on the probability of the vocational high school attending, and it is strongly statistically significant and in the marginal effect, the father's income increases one unit then the probability of attending vocational high school decrease 6 percent, of course, holding all other variables constant. The number of siblings has a negative effect on the probability of vocational high school attendance and it is not statistically significant. In terms of the education cost factor, private tutoring has a strongly statistically negative effect on the probability of entering vocational high school; and if a unit

[7] The student's score is the most appropriate to measure their ability, yet it cannot use the variable of student's score for huge of missing value from the data.

of private tutoring increases, it has the 5% probability of avoiding to enter vocational high for the marginal effect holding all other variables constant. The magnitude of coefficient in private tutoring is bigger for the male group than female group. The correlation of attending vocational high school with number of siblings has positive effect in whole sample, additionally, the male group has negative effect and the female group has positive effect when it divided by gender, however, it is not statistically significant. Note the blank space in male row of the results, male group dropped 74 observations who have got a good score in middle school. Even though they have a good score they are not in high school as a student in both course, general and vocational secondary education.

Table 5-1: School Choice from middle school to high school

VARIABLES	Probit Model Vocational High School					
	ALL	AME	MALE	AME	FEMALE	AME
teacher assessment_2	-0.608***	-0.220***	-0.594***	-0.210***	-0.591**	-0.217***
	(0.158)	(0.0545)	(0.214)	(0.0718)	(0.238)	(0.0840)
teacher assessment_3	-1.653***	-0.535***	-1.683***	-0.540***	-1.589***	-0.517***
	(0.157)	(0.0495)	(0.214)	(0.0647)	(0.237)	(0.0774)
teacher assessment_4	-2.355***	-0.631***	-2.303***	-0.632***	-2.365***	-0.619***
	(0.199)	(0.0482)	(0.271)	(0.0640)	(0.296)	(0.0748)
teacher assessment_5	-2.944***	-0.660***			-2.629***	-0.634***
	(0.408)	(0.0480)			(0.454)	(0.0762)
faedu_lesshigh	0.163	0.0348	0.169	0.0409	0.199	0.0418
	(0.113)	(0.0246)	(0.167)	(0.0408)	(0.157)	(0.0338)
faedu_morehigh	-0.329**	-0.0616***	-0.264	-0.0578	-0.398**	-0.0694**
	(0.128)	(0.0229)	(0.172)	(0.0368)	(0.198)	(0.0319)
father's income	-0.305***	-0.0600***	-0.512***	-0.116***	-0.111	-0.0211
	(0.101)	(0.0199)	(0.151)	(0.0332)	(0.152)	(0.0288)
private tutoring	-0.251***	-0.0493***	-0.270***	-0.0609***	-0.252***	-0.0478***
	(0.0671)	(0.0130)	(0.0973)	(0.0218)	(0.0978)	(0.0181)
sibling	0.0165	0.00324	-0.189	-0.0427	0.278	0.0526
	(0.192)	(0.0378)	(0.263)	(0.0595)	(0.286)	(0.0538)
Constant	2.951***		4.379***		1.556*	
	(0.586)		(0.874)		(0.873)	
Observations	1,319	1,319	595	595	650	650

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5.2 University Choice

This subsection examines how the likelihoods of 2-year and 4-year university enrollments are affected by individual characteristics, family background, and school performance factors. Unexpectedly, the observation noticeably decreased from high school choice to university choice analysis.

The results of the multinomial regression model are presented in Table 5-2 using the sample of pooled cross-sectional data in 2004/2007/2014, which show a person's status as student or employed. The multinomial logistic regression fits a model with three enrollment alternatives (i.e., enrolled in 4-year university, enrolled in 2-year university and not enrolled). The explanatory variables are teacher assessment, father's final education of high school or 4-year university, father's income, the cost of private tutoring and the number of the sibling, which is similar with the analysis of the high school choice, but the dependent variable is categorical variable, the choice have more than 3 alternatives. The university choice analysis, higher education choice as dependent variable is included the choice variables, no college (high school graduates), 2-year university and 4-year university. This higher education choice analysis included 2more independent variable (high school background between vocational and general education, 4 regions where the student lived in high school from 1 to 4, 1 means the capital of Korea and the larger the number, the farther away students are from the capital) than high school choice analysis.

First, the individual character as high school background in general or vocational education shows vocational high school has a strongly negative and statistically significant effect on the probability of higher education enrollment, especially in 4-year university. Being a male student with a vocational high school background has a higher probability not to go to 4-year university than for a female student. This finding is consistent as shown in the previous study in Korea that that vocational high school students with poor school performance in middle school are unlikely to go to 4-year university, which has relatively more difficult entrance examinations than the 2-year university.

The results of Table 5-2 show that the most important factor regarding school choice is the educational performance. The variables of highest teacher assessment or at least more than level 4, show school achievement is strongly statistically significant and has positive effect on the probability of enrolling in 4-year university. Yet, the significance of the positive association between teacher assessment over level 4, and 4-year university enrollment is stronger in female groups. Low teacher assessment in level 2 also shows a positive effect on higher education enrollment in the female group, but, it is not statistically significant.

Educational performance has been shown to be the most important factor for all students in making the decision to continue on to higher education in Korea, and the highest educational performance which is shown teacher assessment in Table 5-2, is statistically significant, particularly in 4-year university. The magnitude of effect is higher in female group than male group. The female group has a strongly positive effect teacher assessment 4 and 5 level at the statistically significant, however the male group slightly has it only in teacher assessment 4 level.

In terms of the father's low education, the trend of the higher education enrollments is negative, but not female group, and it is not statistically significant level. Only the male group is affected negatively by father's low education when they decide to take a higher education in the 2-year university at the statistically significant of the 10% level. The father's high income has a positive effect for all, but no statistically significant just only for the 4-year university entering at the statistically significant.

The number of siblings has a negative effect on schooling decision of higher education both, male and female and all, and in male's case has more magnitude of coefficient negatively but statistically no significant. For the region effect, remarkably, region 3 where is the second farthest distance from the Seoul has a negative effect for all and both gender but no statistically significant.

Table 5-2: School Choice from high school to university

	Multinomial Logistic Model					
VARIABLES	2-year	4-year	2-year	4-year	2-year	4-year
	ALL		MALE		FEMALE	
high	-0.172	-1.164***	0.0660	-1.735***	-0.483	-1.100**
	(0.270)	(0.321)	(0.409)	(0.627)	(0.411)	(0.445)
teacher assessment_2	0.107	0.465	-0.0492	-0.905	0.0491	0.650
	(0.369)	(0.561)	(0.490)	(1.055)	(0.692)	(0.829)
teacher assessment_3	0.204	1.354**	0.168	1.091	-0.0800	1.173
	(0.393)	(0.562)	(0.534)	(0.900)	(0.740)	(0.867)
teacher assessment_4	0.858*	2.179***	0.222	0.413	1.018	2.673***
	(0.488)	(0.627)	(0.703)	(1.014)	(0.882)	(0.982)
teacher assessment_5	0.283	3.253***	-0.648	2.015*	0.395	3.415**
	(0.819)	(0.814)	(1.379)	(1.203)	(1.340)	(1.343)
faedu_lesshigh	-0.354	-0.305	-0.765*	-0.600	0.0802	0.102
	(0.276)	(0.297)	(0.400)	(0.497)	(0.430)	(0.440)
faedu_morehigh	-0.609*	-0.0818	-0.484	0.0565	-0.562	0.0156
	(0.311)	(0.301)	(0.441)	(0.506)	(0.507)	(0.485)
father's income	0.302	0.514*	0.455	0.620	0.253	0.539
	(0.262)	(0.282)	(0.440)	(0.504)	(0.364)	(0.359)
private tutoring	0.00130	0.121	0.0260	0.0171	0.146	0.344
	(0.185)	(0.208)	(0.256)	(0.331)	(0.290)	(0.313)
sibling	-0.506	-0.556	-0.581	-0.839	-0.189	-0.0189
	(0.482)	(0.526)	(0.665)	(0.884)	(0.972)	(0.975)
Region_2	-0.0637	0.575	0.519	0.839	-0.813	0.0404
	(0.382)	(0.407)	(0.537)	(0.648)	(0.724)	(0.730)
Region_3	-0.348	-0.192	-0.365	-0.359	-0.645	-0.450

	(0.365)	(0.399)	(0.496)	(0.629)	(0.702)	(0.716)
Region_4	0.0163	0.546	0.692	0.825	-1.072	-0.320
	(0.402)	(0.430)	(0.536)	(0.650)	(0.710)	(0.729)
Constant	-0.485	-3.119*	-1.947	-3.317	0.282	-3.416
	(1.560)	(1.698)	(2.591)	(2.899)	(2.397)	(2.478)
Observations	610	610	224	224	386	386

Robust standard errors in parentheses

***p<0.01, **p<0.05, *p<0.1

5.3 Labor Market Outcomes

This section of the Labor Market Outcomes (employment and wage) analysis is considered with unobserved variables in order to take potential endogeneity as employed by the Conditional Expectation Correction Method (CECM). Each empirical analysis was separated into two stages. During the first stage, the probit model for employment estimation or ordinary least squared (OLS) model for wage estimates were used, while CECM estimates were employed for the second stage to eliminate unobserved heterogeneity. For wage effect of estimation in the OLS regression, CECM is shown with industry classification for obtaining the fitted results.

Table 5-3. reports that the probit model estimation results of employment status a is fit with a dichotomous outcome variable if one represents employment and zero represents unemployment in the first-stages, which do not yet consider unobserved heterogeneity. In addition, the explanatory variables include individual characteristics: gender (male and female) job seeking period from the beginning to the end of obtaining the first job after graduation, marital status and region: from 1 (capital of Korea) to 4 (places farthest away from the capital), and educational characteristics: diploma variables for high school, 2-year university, 4-year university (also referred to as, diploma 1, diploma 2 and diploma 3, respectively) and interaction terms for diplomas 1 to 3 with vocational high school. It displays the Average Margin Effect (AME) of the probit model using 594 observations among the full sample. The results of the CECM estimation, which eliminate the unobserved heterogeneity, will be shown together in employment and wage estimations after the general estimation with pobit for employment status and OLS for wage regression.

First, regarding the individual characteristics, the job seeking period from the beginning to the end of obtaining the first job after graduation between general and vocational education background strongly affect employment status at the 1% level and are statistically significant. The effect is more in the female group than in the male group. A married person has negative

correlation to the employed status and is statistically significant at the 1% level, especially in the male group. If a female has marriage status, the possibility of employment decrease more than 40%, which is more than three times higher than the male group. For regions from 1 (Seoul, capital of Korea) to 4 (the place where farthest away from the capital), just female group in significant and has a strong and negative relationship in region 2, at significant level to have employment status compared to capita region, and other regions (i.e. regions 3 and 4 for the female group and every region based on the capital for the male group) have no significance. However, note that the regional dummy variables are not a current region where the observations live now: it is a previous living place when they were in high school.

Second, with respect to education effect, having a degree with 2-year university has correlation with employment rather than a diploma in high school or 4-year university except that the female group is not statistically significant. However, the male group with 2-year university degree is statistically and slightly significant with 15% probability of employment compared to a diploma in high school. In contrast, the 4-year university graduates are unlikely to be in the status of employment compared with high school graduates for all and separately in gender, but it is no statistically significant.

Third, with regard to vocational education effect, only for the high school level between vocational and general education, vocational high school graduates are more likely to be employed than general high school graduates, except for the female group, but it is not statistically significant. For every diploma for high school, 2-year and 4-year university background with vocational high school capered with every diploma background with general high school, both diploma, 2-year and 4-year university background with vocational high school have a negative effect on whether they have employment status after graduation or not capered with every diploma background with general high school, but is statistically not significant. The female group in 4-year university background with vocational high school has a positive effect on employment, and it is also not statistically significant.

Table 5-3: Probit Model estimated **by employment in Labor Market Outcomes**

VARIABLES	Probit Model employment					
	ALL	AME	MALE	AME	FEMALE	AME
male	0.0526	0.0157				
	(0.129)	(0.0385)				
mushoku_year	-0.169***	-0.0507***	-0.158***	-0.0457***	-0.197***	-0.0568***
	(0.0392)	(0.0112)	(0.0589)	(0.0163)	(0.0578)	(0.0158)
married	-1.040***	-0.311***	0.413	0.120	-1.450***	-0.417***
	(0.249)	(0.0711)	(0.554)	(0.161)	(0.336)	(0.0884)
Region_2	-0.135	-0.0413	0.474	0.139	-0.660**	-0.183***
	(0.192)	(0.0577)	(0.295)	(0.0894)	(0.284)	(0.0679)
Region_3	0.0825	0.0235	0.316	0.0980	-0.248	-0.0591
	(0.198)	(0.0572)	(0.290)	(0.0917)	(0.292)	(0.0660)
Region_4	-0.0468	-0.0140	0.0727	0.0241	-0.375	-0.0942
	(0.200)	(0.0594)	(0.307)	(0.102)	(0.294)	(0.0680)
2_year	0.263	0.0787	0.546*	0.158*	-0.232	-0.0666
	(0.210)	(0.0627)	(0.323)	(0.0922)	(0.323)	(0.0929)
4_year	-0.0281	-0.00839	-0.0819	-0.0237	-0.399	-0.115
	(0.195)	(0.0583)	(0.297)	(0.0859)	(0.305)	(0.0873)
VOCA	0.164	0.0491	0.215	0.0621	-0.218	-0.0626
	(0.256)	(0.0766)	(0.334)	(0.0964)	(0.402)	(0.116)
VOCA*2_year	-0.450	-0.135	-0.532	-0.154	-0.107	-0.0308
	(0.329)	(0.0980)	(0.464)	(0.133)	(0.492)	(0.141)
VOCA*4_year	-0.0321	-0.00959	-0.214	-0.0620	0.387	0.111
	(0.397)	(0.119)	(0.787)	(0.228)	(0.521)	(0.150)
Constant	0.800***		0.431		1.599***	
	(0.233)		(0.276)		(0.392)	
Observations	594		211		383	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5-4. displays the wage level comparing in terms of vocational high school and general high school background in the OLS estimation of first stage analysis in Korea. In the analysis of Tables 5-4 to 5-5 (wage estimation of CECM), only the observations of wage earners who have a current job as a dependent variable is analyzed for the wage level of the job from the full data. The dependent variable is the log of wage, and independent variables included individual characteristics, gender (male and female), job seeking period from the beginning to the end of obtaining the first job after graduation, job experience, marital status and regions; 1 (Seoul, capital of Korea) to 4 (the place where farthest away from the capital); and educational characteristics: diploma variables for high school, 2-year university, 4-year university (each can explain in other way, diploma 1, diploma 2 and diploma 3, respectively) and interaction terms for diplomas 1 to 3 with vocational high school. It added more independent variable of dummy variable for employed status has only two categories; an individual in regular job status gets value one, ipso facto, an individual in a non-regular-job gets a value zero. For company scale, a large-scale company with more than 300 hundred employees gets a vale one, otherwise zero. Industry classification is three categorical dummy variables equal to one, two and three, and manufacturing is the base-outcomes in the 3-industry classification for interpretation of estimation, construction and services.

Firstly, with respect to individual characteristics, the male group has a positive relationship with wage effect in contrast to the female group, the male coefficient of 0.139 denotes, holding all other variables constant, that the average male log wage is higher than the average female log wage by about 14%. The job seeking period has positive correlation with the male group and a negative correlation with the female group, but is not statistically significant. Marital status has negative effect and is not statistically significant for the male group, is positive and statistically significant for the female group. The regional dummy variables (4 places, from Seoul; benchmark reference to farthest away from the capital)

consistently have a negative relationship with obtaining higher salary and are statistically not significant except region 2 which is closer to Seoul than other places. However, note again that the regional dummy variables are not a current region where the observations live now, it is a previous living place when they were in high school. More job experience is likely to earn money, and the female group has a stronger positive effect on wage than the male group at the statistically significant level.

Secondly, with regard to effect of educational background, expectedly, pursuing more education provides more opportunity for having a better salary, but is not so statistically significant for every level of education. Regarding high school graduates between vocational and general high schools, the wage effect is higher for vocational high school graduates, and the female group has a stronger effect than the male group, but is not statistically significant. For comparing 3 educational categorical variables, diploma 1; high school graduate between vocational or general education, diploma 2; 2-year university and diploma 3; 4-year university respectively, 2-year university graduates have higher average wage by 9.3% than high school graduates, holding all other variables constant. More specifically, in both genders, interestingly the males are less likely to have a wage than high school graduates and females are the opposite, but it is not statistically significant. 4-year university graduates have more opportunity to obtain wage, especially for males. In detail, for both genders, the average wage is higher by 19.1%, males have higher average wage by 22.6% at the statistically significant level, and females have higher average wage by 17.7%, but there is no statistically significance in contrast with high school graduates, holding all other variables constant.

In addition, vocational education effect with university diploma on employment and wage, 2-year and 4-year university diploma with vocational high school background has a negative relationship with employment, especially for male group and wage in comparison with 2-year or 4-year university diploma with general high school background. There is no vocational education effect in higher education level, however it is not statistically significant.

Thirdly, considering company and industry characteristics, the employed status in a

regular job has 12.8% higher wage on average and is the statistically significant, 13.5% higher wage for males but is not statistically significant; the female group shows statistically significant result having also a positive correlation in wage with 12.7% higher than non-regular job status. The coefficient of firm-size dummy variable has a greatly positive effect by about 19.5% and it is statistically significant, ceteris paribus. Being a female has a slightly higher average salary by about 22.3% than being a male has average salary by about 20.1% at the statistically significant level. The categorical industry variables: the manufacturing industry is benchmark variable to interpret the result of industry and the construction and service industries are otherwise. These mean values are lower than the mean value of manufacturing at no statistically significant level. Next table 5-5 shows the results of the CECM regression, which considered unobserved variables based on probit and OLS models for employment and wage effect in labor market outcomes.

Table 5-4: Ordinary Linear Square Model estimated by wage in Labor Market Outcomes

VARIABLES	OLS wage		
	ALL	MALE	FEMALE
male	0.139***		
	(0.0453)		
mushoku_year	0.000377	0.0159	-0.00364
	(0.0163)	(0.0297)	(0.0184)
married	0.0111	0.274	-0.320**
	(0.151)	(0.214)	(0.142)
exp	0.104***	0.0910*	0.140***
	(0.0253)	(0.0480)	(0.0393)
exp2	-0.0125***	-0.00828*	-0.0230***
	(0.00374)	(0.00468)	(0.00790)
Region_2	-0.118**	-0.170	-0.0816
	(0.0594)	(0.120)	(0.0663)
Region_3	-0.0408	-0.114	-0.0149
	(0.0580)	(0.114)	(0.0628)
Region_4	-0.0858	-0.0666	-0.0730
	(0.0615)	(0.134)	(0.0655)
2_year	0.0932	-0.000674	0.128
	(0.0853)	(0.121)	(0.137)
4_year	0.191**	0.226*	0.177
	(0.0835)	(0.114)	(0.137)
VOCA	0.115	0.0393	0.223
	(0.0901)	(0.111)	(0.167)
VOCA*2_year	-0.161	-0.102	-0.218
	(0.104)	(0.143)	(0.179)

VOCA*4_year	-0.201	-0.195	-0.287
	(0.158)	(0.287)	(0.221)
regularjob	0.128**	0.135	0.127*
	(0.0545)	(0.0921)	(0.0680)
firmsize	0.195***	0.201***	0.223***
	(0.0442)	(0.0714)	(0.0566)
Construction	-0.0351	0.0430	-0.137
	(0.101)	(0.137)	(0.159)
Services	-0.0576	-0.0848	-0.0670
	(0.0419)	(0.0780)	(0.0538)
Constant	4.957***	5.159***	4.921***
	(0.130)	(0.164)	(0.194)
Observations	331	109	222
R-squared	0.201	0.269	0.209

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5-5, shows the results for employment and wage using the Conditional Expectation Correction Method (CECM), in which considering with unobserved heterogeniety shows have more statistically significant and much different from the probit model for employment and the OLS estimation for employment and wage effect with the same dependent and independent variables above.

First, the results of CECM estimates in employment with individual characteristics shows similar results with simple regression of the probit model; males have a positive relationship with employment and there is no statistically significance, job seeking period definitely has a negative effect on employment and is the statistically significant. Marital status has positive effect for males, but it is not statistically significant and has a negative effect female, statistically significant at the 1% level. The region effect of employment in the capital benchmark shows almost a negative relationship for both male and female and it is not statistically significant. Moreover, with respect to education effect of employment, the analysis shows slightly different results from the probit model above. In terms of high school level, vocational secondary education and 2-year university graduates, there is a negative probability of employment in the female group and is also not statistically significant. Other groups are all consistent with the previous probit model estimation.

Second, the results of the CECM estimation in wage with individual characteristics also show similar results with the OLS regression, the wage effect is higher in the male group than female group at the statistically significant level of 1%, but the magnitude of coefficient is higher than in the simple OLS regression. No statistically significant job seeking period has a stronger negative effect than the results above. The job seeking period relationship with wage has lightly and negatively changed, marital status effect is almost same, working experience effect of statistical significance is excluded, and its magnitude of coefficient is greater in comparison with the OLS model estimation. Additionally, the region effect is the same with OLS estimates in a negative relationship, but the power of statistically significant level is larger.

Furthermore, the results of educational effect show that the 3 categorical education

variables have quite similar relationship with before, only the difference is 2-year university graduates of male group get a positive relationship and 4-year university graduates' magnitude of coefficient decreases. In contrast, interestingly, for the high school level of education, the vocational high school has more advantage in wage by about 19.4% than general high school at the statistically significant level of 10% and overall coefficient of magnitudes is also bigger than the OLS estimation. Likewise, for employed status, company scale and industry characteristics' results are also almost similar with the OLS estimation as well.

Table 5-5: CECM estimated by employed and wage in Labor Market Outcomes

VARIABLES	CECM employed			CECM wage		
	ALL	MALE	FEMALE	ALL	MALE	FEMALE
male	0.0194			0.144***		
	(0.0394)			(0.0462)		
mushoku_year	-0.0585***	-0.0524**	-0.0657***	-0.00306	0.0102	-0.00489
	(0.0153)	(0.0213)	(0.0199)	(0.0165)	(0.0326)	(0.0195)
married	-0.371***	0.129	-0.521***	0.00504	0.260	-0.327**
	(0.0918)	(0.119)	(0.100)	(0.168)	(0.261)	(0.156)
exp				0.109***	0.0956	0.150***
				(0.0320)	(0.0653)	(0.0416)
exp2				-0.0135**	-0.00883	-0.0249***
				(0.00635)	(0.0136)	(0.00937)
Region_2	-0.0407	0.105	-0.174**	-0.162***	-0.217*	-0.131*
	(0.0644)	(0.0939)	(0.0729)	(0.0617)	(0.131)	(0.0699)
Region_3	0.0314	0.127	-0.0700	-0.0436	-0.130	-0.0174
	(0.0623)	(0.0975)	(0.0726)	(0.0576)	(0.116)	(0.0650)
Region_4	-0.0163	-0.0170	-0.0972	-0.109*	-0.0895	-0.0984
	(0.0645)	(0.110)	(0.0694)	(0.0646)	(0.137)	(0.0685)
2_year	0.0703	0.132	-0.0495	0.0958	0.0187	0.116
	(0.0638)	(0.0937)	(0.0754)	(0.0890)	(0.127)	(0.145)
4_year	-0.00680	-0.0764	-0.0773	0.163*	0.205*	0.137
	(0.0622)	(0.0968)	(0.0717)	(0.0874)	(0.116)	(0.147)
VOCA	0.0630	0.181	-0.0756	0.194**	0.106	0.302
	(0.0823)	(0.120)	(0.103)	(0.0948)	(0.138)	(0.191)
VOCA*2_year	-0.133	-0.137	-0.0519	-0.163	-0.114	-0.205
	(0.0978)	(0.139)	(0.134)	(0.108)	(0.156)	(0.196)
VOCA*4_year	-0.0189	-0.0291	0.0717	-0.175	-0.153	-0.256

	(0.117)	(0.281)	(0.134)	(0.164)	(0.291)	(0.237)
regularjob				0.111**	0.116	0.106
				(0.0547)	(0.0953)	(0.0728)
firmsize				0.188***	0.201**	0.213***
				(0.0442)	(0.0878)	(0.0560)
Construction				-0.0374	0.0484	-0.140
				(0.103)	(0.155)	(0.160)
Services				-0.0599	-0.0952	-0.0621
				(0.0439)	(0.0894)	(0.0513)
millsp1	-0.00890	-0.0437*	0.00427	-0.0131	-0.00210	-0.0185
	(0.0139)	(0.0237)	(0.0161)	(0.0134)	(0.0301)	(0.0141)
millsp2	0.0115	-0.00577	0.0158	-0.0295*	-0.0456	-0.0238
	(0.0165)	(0.0296)	(0.0192)	(0.0172)	(0.0432)	(0.0183)
Constant	0.778***	0.379***	1.088***	4.763***	4.975***	4.725***
	(0.0979)	(0.135)	(0.114)	(0.152)	(0.212)	(0.224)
Observations	594	211	383	331	109	222
R-squared	0.077	0.101	0.140	0.228	0.290	0.242

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5.4 Labor Market Outcomes (Quality)

This section identifies labor market outcomes in employed status and work-place as a quality aspect is given in Tables 5-6 to 5-8 first stage (probit model) and second stage (CECM model) of estimation. The estimates of labor market outcomes, employed status and work-place scale as quality aspects employed the probit model for both dependent variables, employed status and work-place which represents as mentioned, above that the dummy variable for employed status has only two categories: an individual with regular job status has value one, ipso facto an individual with non-regular-job status has a value zero, for work-place scale; a company in large scale with more than 300 hundred employees gets a vale one, otherwise zero.

First, the results of employed status are given in Table 5-6. With respect to the individual characteristics, no statistically significant gender effect for male is more likely to be a regular employee, the job seeking period and marital status has a negative correlation with the probability of being a regular employee. The former is statistically significant except the female group and the latter is not statistically significant. Working experience has more probability to be a regular job status, especially in the male group at 1% of the statistically significant level. Unexpectedly, the region effect, especially region 2 is found in the male group, so far, this result has not seen in other labor market outcomes, but is not statistically significant.

Second, the general but not statistically significant education effect has a positive probability in 2-year and 4-year university graduates, as well as the female group, just only the male group has no educational effect in higher education. In terms of vocational education background for each level of education, the high school level has a negative effect in the male group at a statistically significant level, but the positive effect in the female group is not statistically significant level; 2-year university level has the opposite result and it is not statistically significant, and 4-year university level also has the opposite result, and it is not statistically significant.

Lastly, interestingly with regard to the firm size has no relationship with having a regular-job status, even though it is not statistically significant and the industry effect also has

no correlation with regular-job at no statistically significant level.

Table 5-6: Probit Model estimated by Job Status in Labor Market Outcomes

VARIABLES	Probit Model Regular-job					
	ALL	AME	MALE	AME	FEMALE	AME
male	0.0787	0.0195				
	(0.171)	(0.0425)				
mushoku_year	-0.113**	-0.0280**	-0.147*	-0.0323*	-0.0985	-0.0241
	(0.0541)	(0.0133)	(0.0846)	(0.0178)	(0.0786)	(0.0191)
married	-0.391	-0.0967	-0.884	-0.194	0.0650	0.0159
	(0.447)	(0.111)	(0.585)	(0.128)	(0.717)	(0.175)
exp	0.363***	0.0900***	0.716***	0.157***	0.0911	0.0223
	(0.119)	(0.0289)	(0.227)	(0.0484)	(0.174)	(0.0423)
exp2	-0.0461***	-0.0114***	-0.0930***	-0.0204***	0.0225	0.00549
	(0.0178)	(0.00432)	(0.0257)	(0.00528)	(0.0359)	(0.00882)
Region_2	0.0661	0.0156	0.387	0.0906	-0.0993	-0.0211
	(0.247)	(0.0589)	(0.430)	(0.103)	(0.339)	(0.0707)
Region_3	-0.0694	-0.0174	0.536	0.119	-0.340	-0.0809
	(0.234)	(0.0581)	(0.427)	(0.0980)	(0.321)	(0.0707)
Region_4	-0.0749	-0.0188	0.0819	0.0211	-0.221	-0.0497
	(0.244)	(0.0607)	(0.427)	(0.110)	(0.334)	(0.0720)
2_year	0.0809	0.0200	-0.236	-0.0517	0.514	0.125
	(0.275)	(0.0681)	(0.429)	(0.0935)	(0.385)	(0.0939)
4_year	0.292	0.0724	-0.291	-0.0638	0.791**	0.193**
	(0.267)	(0.0661)	(0.419)	(0.0911)	(0.366)	(0.0884)
VOCA	-0.182	-0.0451	-1.044**	-0.229**	0.324	0.0790
	(0.330)	(0.0816)	(0.472)	(0.101)	(0.534)	(0.130)

VOCA*2_year	0.370	0.0916	1.012	0.222	-0.128	-0.0312
	(0.423)	(0.104)	(0.659)	(0.140)	(0.641)	(0.157)
VOCA*4_year	-0.181	-0.0448	0.0850	0.0186	-0.546	-0.133
	(0.491)	(0.122)	(0.978)	(0.214)	(0.662)	(0.161)
regularjob						
firmsize	-0.00697	-0.00173	-0.0626	-0.0137	-0.0480	-0.0117
	(0.187)	(0.0462)	(0.391)	(0.0857)	(0.222)	(0.0540)
Construction	-0.353	-0.0873	-0.710	-0.155	-0.185	-0.0451
	(0.438)	(0.108)	(0.566)	(0.122)	(0.687)	(0.168)
Services	-0.269	-0.0666	-0.812**	-0.178**	0.0478	0.0117
	(0.200)	(0.0494)	(0.334)	(0.0710)	(0.240)	(0.0584)
Constant	0.816**		1.364***		0.383	
	(0.378)		(0.513)		(0.495)	
Observations	412		141		271	
R-squared						

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5-7 shows the probit model results of firm-size effect, which means a dummy variable; a company of large scale with more than 300 hundred employees has a value one, otherwise zero. This is for firm-size effect analysis in the first-stages which did not consider yet about unobserved heterogeneity. The dependent variables were employed similarly with the employed status analysis.

First, regarding to the individual characteristics, the job seeking period from the beginning to the end of obtaining the first job after graduation between general and vocational education background did not have much effect on working for a large company, but has not statistically significant. However, it has a slightly negative effect for the male group. A married person has a positive correlation to work for the large company, and it is statistically significant

at the 10% level, especially for the female group. However, if a male has married status, there is no probability of working for a large company; it could consider about the data sample with unbalanced number of data sample for gender between male and female. As mentioned in subsection 4.5, Korean men have an obligation perform the military service starting at over 20 years old. This situation leads to the result above, and it could also affect other results as well. Working experience has a relatively strong relationship with working for a large company, especially for the male group, and it is statistically significant at the 5% level. For the regions, 1 (Seoul, capital of Korea) to 4 (the place where farthest away from the capital), regions 2 and 3 have a positive relationship with working for a large company except for region 3 for the female group, but is not statistically significant. Region 4 has a negative effect on working for a large company for all, and it is slightly and statistically significant. However, note that the regional dummy variables are not a current region where the observations live now, it is a previous living place when they were in high school.

Second, with respect to education effect, having a degree in 2-year university and 4-year university with a vocational high school background, and 2-year university regardless of high school background have a negative correlation with working for a large company, just only 4-year university graduates have a positive relationship with working for a large company. In contrast, interestingly, the 4-year university graduates for female group have a negative effect and 4-year university with a vocational high school background for the female group has a positive effect on working for a large company. However, it is not statistically significant.

Third, for regular-job status, there is no possibility of working for a large company and with respect to industry effect, construction and service sectors also have no possibility of working for a large company. However, it is not statistically significant.

Table 5-7: Probit Model estimated by Firm-size in Labor Market Outcomes

VARIABLES	Probit Model Firm-size					
	ALL	AME	MALE	AME	FEMALE	AME
male	-0.178	-0.0461				
	(0.176)	(0.0455)				
mushoku_year	0.0287	0.00742	-0.0444	-0.00976	0.0597	0.0159
	(0.0579)	(0.0150)	(0.119)	(0.0259)	(0.0719)	(0.0191)
married	0.0208	0.00537			0.991*	0.264*
	(0.451)	(0.117)			(0.553)	(0.144)
exp	0.173	0.0446	0.556**	0.122***	-0.0466	-0.0124
	(0.115)	(0.0297)	(0.218)	(0.0461)	(0.166)	(0.0442)
exp2	-0.0121	-0.00312	-0.0502**	-0.0110**	0.0221	0.00589
	(0.0173)	(0.00448)	(0.0236)	(0.00512)	(0.0319)	(0.00850)
Region_2	0.0754	0.0215	0.0624	0.0123	0.152	0.0488
	(0.236)	(0.0666)	(0.431)	(0.0835)	(0.289)	(0.0913)
Region_3	0.0477	0.0135	0.482	0.113	-0.137	-0.0403
	(0.230)	(0.0646)	(0.448)	(0.0968)	(0.282)	(0.0847)
Region_4	-0.481*	-0.109*	-0.0729	-0.0134	-0.639**	-0.155*
	(0.266)	(0.0629)	(0.535)	(0.0991)	(0.317)	(0.0822)
2_year	-0.168	-0.0435	-0.0538	-0.0118	-0.329	-0.0878
	(0.285)	(0.0737)	(0.446)	(0.0978)	(0.398)	(0.106)
4_year	0.229	0.0591	0.607	0.133	-0.0530	-0.0141
	(0.273)	(0.0705)	(0.396)	(0.0883)	(0.383)	(0.102)
VOCA	-0.0166	-0.00430	0.317	0.0696	-0.486	-0.130
	(0.352)	(0.0909)	(0.507)	(0.112)	(0.564)	(0.150)
VOCA*2_year	-0.384	-0.0993	-0.456	-0.100	-0.300	-0.0799
	(0.452)	(0.117)	(0.635)	(0.139)	(0.750)	(0.199)

VOCA*4_year	-0.0417	-0.0108			0.554	0.147
	(0.508)	(0.131)			(0.694)	(0.184)
regularjob	-0.0216	-0.00559	-0.0578	-0.0127	-0.0501	-0.0133
	(0.190)	(0.0491)	(0.384)	(0.0844)	(0.234)	(0.0623)
Construction	-0.0388		-0.275		0.182	
	(0.402)		(0.600)		(0.563)	
Services	-0.344*		-0.242		-0.323	
	(0.180)		(0.321)		(0.228)	
Constant	-0.655*		-1.531***		-0.204	
	(0.383)		(0.553)		(0.489)	
Observations	412		133		271	
R-squared						

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5-8. show the results for employment status as a regular job or non-regular job and firm-size using the Conditional Expectation Correction Method (CECM) considering with endogeneity shows have more statistically significant and much different from the probit model for the estimation with the same dependent and independent variables above.

First, the results of CECM estimates in employment status as a regular job or non-regular job with individual characteristics also show similar results with probit model regression, the regular-job effect is higher in male group than female group but it is not statistically significant. No statistically significant job seeking period has a negative effect both male and female. marital status effect is almost same, working experience has a positive effect of statistically significant is only for male group, female group also has a positive relationship between working experience and regular job, but it is not statistically significant. Additionally, the region effect is the same with probit model estimates is lightly different in a negative relationship, and it is statistically no significant.

Besides, the results of educational effect show the 3 categorical education variables has quite similar between probit model and CECM estimation. Similar to the results of probit model, women have a benefit from higher education for being regular employed, while men are apposite. In addition, the statistical significance of the possibility of regular-job employment disappears by receiving a 4-year university education in female group. No statistically significant of vocational high school graduates are negative relationship with regular-job in male group and its positive relationship in female group. The possibility of getting a regular job is negative relationship with 2-year university graduates in female group, and the male group is positive when they obtain a job after vocational high school graduation. In terms of 4-year university after vocational high school graduation, there is no relationship with obtaining regular job in both male and female group and is no statistically significant. The service industry has no correlation with regular employment and is not statistically significant.

Second, the results of CECM estimation in firm size with individual characteristics individual characteristics shows similar results with simple regression based on probit model, interestingly, males group have a negative relationship with in working for a large company and no statistically significant, this opposite result only has firm-size outcomes among four outcomes that this study focused on employed status whether he / she currently has a job or not, wage, employment status as a regular job or non-regular, firm-size whether the company has employees more than 300 people. The job seeking period definitely have a different effect between males and females. Moreover, marital status has different effects between female, between males and females and male has a statistically significant negative correlation in working for a large company. The region effect, just only for region 4 has strongly negative effect for female group and it is statistically significant level of 5%.

Moreover, with respect to education effect of firm-size analysis show slightly different with probit model above. In terms of higher education level comparison category is the high school graduates, 2-year university graduates have a negative probability of working for a large company for both male and female group are same with probit model analysis and it is also not

statistically significant. The result for 4-year university graduates is same with probit model estimation above. However, high school level is lightly different with the result of probit mode estimation, vocational secondary education in male has a positive effect on working for big-sized company at the 5% level of statistically significant. Higher education background with vocational high school has a positive effect only for female group unlike the results in probit model estimation and is not statistically significant. No statistically significant of regular job status and Service industry also does not have an effect on working for a large company.

Table 5-8: CECM estimated by Frim-size and Job Status in Labor Market Outcomes

VARIABLES	CECM Firm-size			CECM Regular-job		
	ALL	MALE	FEMALE	ALL	MALE	FEMALE
male	-0.0478			0.0156		
	(0.0420)			(0.0433)		
mushoku_year	0.00774	-0.0153	0.0222	-0.0341*	-0.0451	-0.0269
	(0.0179)	(0.0230)	(0.0276)	(0.0198)	(0.0318)	(0.0271)
married	0.0440	-0.259**	0.310	-0.0913	-0.208	0.0388
	(0.117)	(0.116)	(0.206)	(0.158)	(0.217)	(0.226)
exp	0.0510	0.135*	-0.00221	0.0935**	0.137**	0.0403
	(0.0324)	(0.0819)	(0.0492)	(0.0367)	(0.0632)	(0.0439)
exp2	-0.00445	-0.0129	0.00371	-0.0128*	-0.0197	-0.000123
	(0.00626)	(0.0198)	(0.0103)	(0.00753)	(0.0147)	(0.00804)
Region_2	-0.00418	-0.0482	0.0290	-0.0127	0.0659	-0.0514
	(0.0701)	(0.0934)	(0.0945)	(0.0676)	(0.119)	(0.0860)
Region_3	0.0497	0.142	-0.00984	-0.0105	0.0744	-0.0610
	(0.0663)	(0.0997)	(0.0900)	(0.0643)	(0.121)	(0.0828)
Region_4	-0.134**	-0.0689	-0.167**	-0.0305	0.0268	-0.0627
	(0.0629)	(0.103)	(0.0793)	(0.0652)	(0.126)	(0.0820)
2_year	-0.0584	-0.0204	-0.105	0.0185	-0.0348	0.133
	(0.0688)	(0.0808)	(0.108)	(0.0792)	(0.104)	(0.137)
4_year	0.0181	0.0716	-0.0459	0.0521	-0.0639	0.191
	(0.0758)	(0.104)	(0.112)	(0.0733)	(0.0988)	(0.132)
VOCA	0.0929	0.225*	-0.0555	-0.00171	-0.213	0.156
	(0.0960)	(0.131)	(0.161)	(0.114)	(0.140)	(0.192)
VOCA*2_year	-0.0621	-0.111	0.00602	0.0979	0.222	-0.0219
	(0.109)	(0.134)	(0.174)	(0.119)	(0.162)	(0.198)

VOCA*4_year	-0.00121	-0.226	0.148	-0.0241	-0.0588	-0.132
	(0.146)	(0.147)	(0.213)	(0.155)	(0.369)	(0.215)
Regular-job	-0.0191	-0.0226	-0.0325			
	(0.0497)	(0.0750)	(0.0681)			
Firm-size				-0.0184	-0.0256	-0.0292
				(0.0488)	(0.0896)	(0.0600)
Construction	-0.00607	-0.0824	0.0633	-0.0943	-0.153	-0.0503
	(0.114)	(0.166)	(0.218)	(0.126)	(0.179)	(0.222)
Services	-0.102**	-0.0898	-0.0944	-0.0671	-0.151**	0.0173
	(0.0515)	(0.0680)	(0.0809)	(0.0467)	(0.0686)	(0.0631)
millsp1	-0.0465***	-0.0559**	-0.0379*	-0.0143	0.0171	-0.0309*
	(0.0153)	(0.0264)	(0.0200)	(0.0152)	(0.0284)	(0.0181)
millsp2	0.0169	-0.00127	0.0204	-0.00997	-0.0445	0.00865
	(0.0198)	(0.0369)	(0.0224)	(0.0166)	(0.0300)	(0.0192)
Constant	0.0560	-0.246	0.245	0.659***	0.794***	0.493***
	(0.122)	(0.159)	(0.169)	(0.127)	(0.177)	(0.184)
Observations	412	141	271	412	141	271
R-squared	0.089	0.188	0.102	0.067	0.190	0.067

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CHAPTER 6:

DISCUSSION AND CONCLUSION

6.1 Discussion

This subsection interprets the implications of the results in chapter 5 following each research question, with respect to every hypothesis based on the literature review in chapter 3 and the Korean context reviewed in chapter 2. In terms of interpreting the results referred in the second stage model analysis, which eliminated unobserved heterogeneity in labor market outcomes. This section also clarifies understanding of mismatch to understand mismatch in Korea between all research questions and hypotheses found on existing studies.

6.1.1 High School Choice

The research question 1-1 asks what are the determinants of the high school choice (General HS vs Vocational HS) in the student's ability and student's family backgrounds in Korea? To answer this question, the study tests Hypothesis 1-1, namely, Students who have low performance and parents with less education and lower income levels in the middle-school are more likely to go to vocational high school than general high school. What the study finds in regards to the relationship between students' background factors and their probabilities of high school enrollment among education types are in line with the many previous studies in Korea, such as Kang et al (2000), Kang & Kim (2002), Yim (2011), Ok et al (2013). According to previous studies have confirmed the negative function of vocational high school and its factors of enrollment. For instance, vocational high school in Korea loses its original purpose and function as a vocational education institute; disable to send students to labor market immediately after graduation, and the students in enrollment are academically underachieved and not motivated to learn vocational education and training for the future job. These evidence

shows why vocational high school enrollment rate is decreasing. In addition, student with parents of high income and educational attainment are more likely to enter general high schools than vocational high schools, and they are more likely to go to 4-year universities instead of entering the labor market after high school graduation. In addition, the students who entered the 2-year university due to their low academic achievement are more likely to enter the 4-year university after 2-year university graduation than the students who decided to build the career first for employment (Byun & Kim, 2011; Lee, 2011; Oh, 2012; Kim, 2013).

According to the estimation results in section 5.1, higher teacher assessment has a negative effect to attend vocational high school even though the lowest teacher assessment is becoming stronger not to enter vocational high school. Interestingly, if the teacher assessment is greater than 4, the results show a negative association in attending vocational high school for the female group is stronger than the male group, and the 74 students who had the highest score in the male group did not enter vocational high school (disappeared in the sample), means no probability to enter vocational high school for the students who have highest score in middle school. The family background variables of high father's education and father's income are found to have a statistically negative effect on the probability of sending their children to vocational high school. Father's better education level affects the female group more than the male group, and father's better income affects the male group more than the female group in nonattendance of vocational high school.

In short, Hypothesis 1-1 is confirmed through its analysis results for research question 1-1, and it was mostly consistent with previous studies in Korea. However, a new result in this study finds that not only does great school achievement affect absence of vocational high school, but it also finds that even though students do not have a good score in teacher assessment, such as middle level, they are unlikely to enter vocational high school more than 50 percent. The results might be due to vocational high school having unfavorable social recognition, such as students being academically underachieving and having low social status with family background. And into the bargain, in consideration of the 74 students have the

highest score of teacher assessment disappearing in the sample, the choice of vocational education, somehow the vocational high school is totally ignored by the group of academically excellent students due to focusing on entering prestigious university. It seems that the academically excellent students in Korea do not think about vocational high school as a learning institution to learn cognitive skills as well as non-cognitive skills which could make social harmony for being a lifelong. For the father education and income, differently affect those in male and female group. Regarding the influence of the father income to male group students, it might be considered that boys are more unconditionally and socially supported by their parents spending a high amount of private tutoring for education investment than girls, which is a traditional social perception in Korea from a long time ago. However, when the father education is higher than average, they also focus on the girl's education, not pursuing attending vocational high school. It seems educated fathers do not follow the social perception of educational support to the boys rather than girls.

The policy of vocational high school education has been focused on improving its quality and repairing internal systems. As this study results show, the policy of vocational high school education needs to regard a certain way to ameliorate vocational education as a key to reducing the labor shortage in small and medium sized enterprises. For instance, it is urgent to focus on and care about changing more people's perception of vocational high school and how to deal with vocational high school students who are mostly disadvantaged, likewise, academically underachieving students from socially low stratum families in financially and educationally. While, this study does not focus on the relationship between the cost of private tutoring and vocational high school enrollment, but the results show it is very strongly and negatively correlated with vocational high school enrollment. As this study result shows, if the number of enrollment rate is increased by eradicating unfavorable perception of vocational high school, the persistent problem of private tutoring cost can also be resolved.

6.1.2 University Choice

In the past, the education of Koreans was accompanied by dramatic economic growth and explosive educational demand, resulting in remarkable educational expansion. Therefore, it has been found the inequality as well as social stratum through education difference between general and vocational education in high school level, 2-year and 4-year university in higher education level (Jang, 2000; Bang & Kim, 2003; 2013; Park, 2004). With regard to this Korean situation, research question 1-2 is very important to investigate the relationship between the higher education and labor market outcomes to connect with research question 3 of this study. It is able to recognize whether higher education is really necessary for all or not as Korean people enthusiastically need.

Research question 1-2 asks: what are the determinants of the university choice between 2-year university and 4-year university in the student's ability and student's family backgrounds? Following research question 1-2 answered by hypothesis 1-2 shows that students who have low performance and parents with less education and lower income levels in high-school are more unlikely to participate in higher education.

As reviewed in section 3.4, some previous studies mainly highlight the schooling decision in higher education with family background, and school achievement. Vocational high school students are more likely go to 2-year university than 4-year university, and if students enter 4-year university from vocational high school, they are more likely to have higher school achievement in middle school and privileged family background. Furthermore, students, who have a certain motivation to learn skills linked to their targeted occupation and enter vocational high school, are more unlikely to make a schooling decision to enter higher education than students who are not motivated or any target for future occupation (Chae, 2009; Im & Jeoung, 2010; Park, et. al, 2010; Byun & Kim, 2012; Kim, 2013). These findings are relatively consistent with this study findings, but there are some implications corresponding to the Korean education situation.

The estimation result about the relationship in schooling decision of higher education

with the school performance and family background show that highest teacher assessment or at least more than level 4 has a strongly positive effect on the probability of enrolling in 4-year university. Yet, the significance of the positive association between teacher assessment over level 4, and 4-year university enrollment is stronger in the female group. Educational performance has been shown to be the most important factor for all students in making the decision to continue to higher education in Korea. This study also finds a strong relationship between good academic performance and the schooling decision of higher education. In terms of father's low education, no statistical significance of the trend of the higher education enrollments is negative, but not for the female group. Only the male group is affected negatively by father's low education when they decide to pursue higher education in 2-year university at the statistically significant of 10% level. Father's high income has a slightly positive effect only for entering 4-year university not for 2-year university. Moreover, the region of residence effect is not significant for pursuing higher education.

Unexpectedly, the privileged family background has not strongly affected to enter 4-year university and the school performance has a better effect, which is quite different from previous studies. This study finds that the most important thing for entering 4-year university is better academic performance. Even though there is no overall statistical significance of region effect, some parts of regions had a positive effect on the probability of pursuing higher education. Based on this result, it seemed the fervent social perception of higher education robustly drives to decide of pursuing higher education; the physical conditions still could not match the fervent social perception of higher education. This result also shows how strongly bound social perception of higher education are in Korea.

To sum up, with respect to better situations in school achievement and family background, this study finds better situations have relatively positive effect on attending general high school and higher education, especially 4-year university. However, family background is slightly correlated with higher education, or it is statistically not significant. These findings support the notion that family background does not significantly influence

pursuing higher education. This finding indicates that the higher education choice is not solely influenced by school achievement or family background. It can be considered to come from social beliefs such as credentialism (Kim,1997), in which economic development requires educated people who have credentials at a high education level in order to gain decent socioeconomic status. For the pursuing higher education in male and female group, the female group has more probability than the male group on enrollment rate of higher education. It is able to be interpreted that the girls have stronger academical ability and more efficient in education investment than boys in Korea.

The noticeable policy implication about higher education from an individual and social perception, it is need to replace an individual and social perception of higher education due to this study finding which the higher education did not have the guarantee in employment and its quality. For instance, in the individual aspect, the higher education generally has to be worked with especially for someone really need a diploma of 4-year university or further to work in the professional field. As well as in the social aspect including demand side of labor market, such as company needs to evaluate applicants based on their real ability which is required in the working field, not to evaluate with highest levels of diploma for hiring an employee. It might be helpful to link to improve vocational high school enrollment rate and it might be able to reduce labor shortage in small and medium sized enterprises as a key of fostering at the same time.

6.1.3 Labor Market Outcomes

This subsector is the most important part of this study. It investigates the relationship between every education path and labor market outcomes, especially for the education pathway background with vocational education.

There are not many studies analyzing the labor market outcomes of vocational high school graduates in Korea, and studies on the labor market outcomes of vocational high school graduates after entering 2-year or 4-year university are even more rare. There are a number of

studies that have analyzed the wage effect of vocational high school graduates (Chung, 2009; Park, et al., 2010; Choi, 2018). However, these research findings are different with same topic among them. In the most recent studies of Park (2010) and Choi (2018), Park (2010) found that vocational high school graduates have more effect on wage than general high school graduates, and the longer the work experience is, the higher the wage rate of vocational high school graduates than general high school graduates. Choi (2018) has slightly different findings from Park (2010), and denotes that vocational high school graduates have employment premium in the short term, and as their age increases, the employment premium decreases, respectively. For the male group, vocational high school graduates have wage premium compared to general high school graduates, but there was no significant difference as their age increased. As well as, when the selection bias was corrected, the wage advantage of the vocational high school graduate disappeared.

Related to the labor market outcomes on each level of education, research question 2-1 asks how the labor market outcomes differ depending on each education pathway in terms of employment. Its answer is found through hypothesis 2-1: that Obtaining higher of levels education as a 2-year university or vocational secondary education can increase likelihood of employment after graduation rather than other education pathway.

The results presented in subsection 5.3 as well as all research findings in labor market outcomes are based on the CECM estimation, which considered unobserved heterogeneity. The results do not show a statistically significant relationship between education levels nor education pathway or labor market outcomes in terms of employed status. In addition, the results do not show a statistically significant relationship between overall individual characteristics or employment either. In a general sense, longer job seeking period and marital status in female group are strongly not linked to employed status. Unexpectedly, the female group has a negative relationship with vocational high school, 2-year university in employed status in contrast to previous studies in Korea (see subsection 3.4).

When vocational high school graduates have more education in 2-year or 4-year

university, it does not have an effect on employed status even though more than about 70% of vocational high school students are going to university in Korea. And even the female group had negative effect with it. It may be possible to assume that although, vocational high school graduate could enter 2-year or 4-year university, they could not enter prestigious university based on beginning of this study findings have shown that the school achievement strongly effects on the probability of attending higher education, especially 4-year university and vocational education students did not have advantage in school achievement. Accordingly, students with vocational high school background have a high learning motivation is relatively higher to receive higher education than entering labor market after graduation. Thus, they are highly motivated to obtain a desirable job after graduating the higher education. This resulted in overeducation and a job mismatch between job seekers who complete higher education and small and medium sized enterprises.

Interestingly, the female group with marital status has a negative relationship with employed-status. Since, this study's data include same aged samples, all people are 25 years old in the final wave, and despite Korea having a high rate of double-income families, the female group with marital status has a negative relationship with employed-status. This may imply that young woman with marital status are having a career break in early stage.

In the other words, in this context, it is necessary to quickly recognize that the relationship between the labor market and tertiary education is no longer a positive relationship to obtain a desirable job. It is politically necessary to notice for matching with suitable education in labor market needs as well as spreading this awareness about the gap between social perceptions of higher education and what is happening in real labor market. As mentioned before, in this situation as well, the most important way to instigate changing the persistent social perceptions about higher education is for policy-makers to address on this first and the next stage, such as education quality and its structures. Furthermore, it might be a key solution to reducing the labor shortage and resolving the women's career break in the early stage from this research finding.

Research question 2-2 asks how the Labor market outcomes differ depending on each education pathway in terms of wages. Related to this research question, the study tests hypothesis 2-2: namely, Obtaining the highest of levels education can lead to greater opportunities for wages, on the contrary, fewer opportunities to find employment. What this study found in regards to the relationships between education and wage are in consistence with the previous studies in Korea such as Chea (2004) and Nam (2005). The study findings in more education is correlation with more earning wage are consistent with this study findings. More specifically, Chea (2004) found that the vocational high school graduates have more advantage in wage than general high school graduates at the first work place but it is not constant in their current job. Against this finding Nam (2005) denotes vocational high school graduates haven't advantage in wage than general high school graduates. Both researchers consistently found vocational secondary education haven't found great outcomes in labor market of Korea.

This study main result of the labor market outcome in wage in subsection 5.3 confirmed that is the increase in the effect of higher education on the labor market outcome in wage among 3 education levels, high school, 2-year university and 4-year university, respectively.

More specifically, first, in terms of individual characteristics, the male group has a positive relationship with wage effect in contrast to female group, that the average male log wage is higher than the average female log wage by about 14%. For the job seeking period after finishing latest education has different effect between male and female as positively correlate with male group and negatively correlate with female group. It may interpret the male group has a military service obligation, thus, males relatively need more time for obtaining a job than females group. Marital status has a negative effect for female, this finding might be explained by a part of Korean women's career break. It is possible to think of a case of woman's career break in which marital status declines wages at the same age of people despite working experience have already controlled and was a positive effect on wages. All region variable consistently have a negative relationship with obtaining higher salary, the desirable job may be concentrated and placed in Seoul which is same situation with prestigious universities in Korea.

Secondly, with regard to effect of educational background, expectedly, getting more education has more opportunity having better salary as mentioned. Only regarding high school level between vocational and general education, the wage effect is higher in vocational high school graduates. This finding is most important finding which is not consistent in literatures. Vocational high school background and higher education in 2-year or 4-year university has a negative effect on wage compare to general high school graduates. This result suggests that the job career strategy of having a desirable job for vocational high school graduates, to have a job first and accumulating the working experience will be helpful to have a secure and stable job.

In addition, expectedly, quality aspects of labor market outcomes, employment status as a variable with regular job track and large company has a positive effect on wage. This results can explain why young people want to work for limited a number of large sized company even though they do not have proper qualification in prestigious university.

6.1.4 Labor Market Outcomes (Quality aspects)

This part is a quite important part in terms of a different view of labor market outcomes from the education investment that was not considered in the previous research. For this reason, these findings cannot be supported by the literature. In Korea, there is a high possibility of unstable job situations in non-regular jobs and small sized companies that normally cannot provide worker's welfare service to their employees. Thus, it is meaningful to consider this part because job quality varies greatly depending on regular or non-regular employment and the size of company in Korea.

The research question 3-1 asks how the Labor market outcomes differ depending on each education pathway in terms of job quality aspect in employment status as regular or non-regular employment. Related to this research question, the study tests hypothesis 3-1: namely, obtaining higher of levels education, particularly, the general education track, such as 4-year university based on general high school can lead to greater opportunity for job status in regular

employment compared to pursing less education. Hypothesis 3-1 could not confirm the results for research question 3-1. Unexpectedly, the pursuing more education or a background with vocational high school did not lead to employment in regular job status.

Although it is not statistically significant, marital status has a negative effect on the male group, as men have an obligation to perform military service in Korea. For married men, they might does not want to spend a lot of time searching for a decent job in regular employment, lead to them becoming temporary workers, especially for less educated persons. However, it may also imagine that the workers with higher education will need more time to settle in the large company. As a whole analysis, regular employment was a negative relationship with region 2~4. However, when women and men were analyzed separately, the result is opposite between male and female, the male group has a positive effect on obtaining a regular job in a region far away from the capital, but the female group result is opposite. It might mean that women have a disadvantage in regular employment not in the Seoul area.

In terms of education effect on regular or non-regular employment, the male group does not have any significant with pursuing more higher education than secondary education in obtaining regular employment, and the result of the female group is different. However, it is quite hasty to simply interpret higher education for males does not have a positive relationship with regular employment. Since, as mentioned before, males take more time for obtaining a job with their military service obligation, and the whole data sample included observations with short term working experience (the average working experience is one or two-year both male and female), especially for the male group. Thus, with respect to data characteristics, males who graduate 2-year or 4-year university are more likely not have a job. Just only for the high school level, the vocational high school has a negative effect on male; the previous study finding that females have more probability of entering vocational high school than males might be true.

Interestingly, large company has no significant advantage in employment as a regular job, and it might be the worker in large company are not in tenure track and they might be

working as a non-regular job worker. This result suggests that the problem of irregular employment, which has been a persistent issue in Korea for a long time, is still present in large corporations.

The research question 3-2 looked at how Labor market outcomes differ depending on each education pathway in terms of job quality aspect in the workplace. Related to this research question, the study tests hypothesis 3-2, namely, that obtaining higher levels education, particularly the general education track, such as 4-year university based on general high school, can lead to greater opportunity for working in large corporations compared to pursuing less education. The Hypothesis 3-2 also could not confirm with results for research question 3-2. Unexpectedly, the more the education pursued or its background with vocational high school could not ensure being employed in a large company. However, vocational high school graduates worked at a large company. The employment status as regular job also has a negative effect on a large company. It might be explained by those who are working in a large company, especially young people, have higher probability of having non-regular job status is very highly happened in the real society of Korea.

6.2 Limitation of the Study

As many studies do, this study also encompassed the following limitations that further research should consider addressing: (1) The analysis of education effect on labor market outcomes could expose only short-term effect, (2) The analysis is getting ahead to next stage of analysis model from research question 1 toward to research question 3, the data attrition is getting serious in the restricted sample size, and (3) selection bias in labor market outcomes.

First, on account of the survey period on the data sample that started survey form 2004 when individuals aged 15 years old at attended middle school to 2014 when the same individual were 26 years old and had an working experience less than 2-years averagely. All the outcomes in results cannot determine individual's whole life outcomes. For instance, wage gap become greater over time such as 5 years or 10 years of job experience in different education levels,

which may see different rates of promotion speedily or salary increases among different industries. Secondly, the feature of an analytical model order cannot avoid data attrition over the time survey even though the data sample have added in 2004 and 2007, which do not include family background and sufficient individual information such as parental education and high school background. Furthermore, the male group loses the data samples due to the national obligation of military service when their age around 20 years old. For this reason, the final estimation of model analysis following research question 3 brought out unbalanced gender results (Table 6-1 and 6-2). Finally, due to model analysis already clarified unobserved heterogeneity in the school choice, it is technically difficult to analyze the education effects on labor market outcomes to clarify selection bias in individuals after getting a job at the same time. The analysis of the education effect of each individual labor market outcome should certainly be considered for further study.

Table 6-1: 1st Year (2004) results of survey (Unit: people, %)

Subjects pf Survey	No. of samples (people)	No. of successful samples (people)	Survey success rate (%)
3rd year students of middle school	2,000	2,000	100
3rd year students of general high school	2,000	2,000	100
3rd year students of vocational high school	2,000	2,000	100
Household (Guardian)	6,000	5,831	97.2
School administrator (Vice principal or chief of school affairs)	300	300	100
Homeroom teacher	1,121[8]	1,121	99.2

Source: Created by Author based on Korean education & employment panel (KEEP), user guide in wave 1st (2004) ~ 11th (2014)

[8] In principle, 4 homeroom teachers of 4 classes (Total of 1,200 teachers) per each school should be surveyed. But when the number of classes were smaller than 4, only teachers of between 1-3 classes were surveyed.

Table 6-2: 1st Year (2004) results of survey (Unit: people, %)

2004	Subjects pf Survey	No. of samples (people)	No. of successful samples (people)	Survey success rate (%)
3rd year middle school cohort	General high school students	3,942[9]	1,240	83.5
	Vocational high school students		442	
	Early graduates[10]		3	
	Students employed / Students not entering higher level school		11	
3rd year high school cohort	College students		981	
	Students employed / Students not entering higher level school		616	

Source: Created by Author based on Korean education & employment panel (KEEP), user guide in wave 1st (2004) ~ 11th (2014)

[9] Number of effective samples, excluding 2,058 students who are not eligible for the survey (dropouts 168, Army 1,742, Overseas 87, Runaway 38, etc.)

[10] For the case of college students who graduated early in 2007 among third grade students of middle school in 2004.

6.3 Conclusion

Most developed countries are concerned about the general education studies and policy agenda. Many policy analysts continue to engage in discourse on general and vocational education.

As the world enters a full-fledged low-growth era, concerns remain over the unemployment rate for young people. Young people who have job also experience job mismatches in various forms, from high frequency of job changes to unemployment and vice versa. For instance, there is a general tendency that university graduates tend to secure irregular jobs than regular jobs, and a majority of them has difficulty in entering labor market in developed countries. Accordingly, many policy analysts continue inquiring about the significance of policy favoring a high enrollment rate on higher education instead of vocational education. A strategical way to address these problems is to strengthen vocational education, thereby facilitating a smooth school-to-work transition and reducing the gap of mismatch between the school and the labor market (CEDEFOP, 2012; 2013).

These similar situations have been illustrated in Korea for a long time; the problem of youth unemployment is so serious that it draws attention to the national and also personal level. In particular, the unemployment problems of university graduates have become a more serious social problem based on the fact that the vast majority of young people enter college without any learning motivation, which is called over education. It has brought about the main problem of the job-mismatch between job seeker who complete higher education and small and medium sized enterprises (Jung, 2017; Ministry of Employment and Labor, 2016). More specifically, the average employment rate of university graduates by 2014 was only 64.5% (Ministry of Education, 2015), while the youth unemployment rate remained at a high level of 11.6% as of March 2018.

To solve these problems in Korea, the government has introduced a policy to revitalize secondary vocational education in 2009 (Ministry of Education, Science and Technology, 2010). The Ministry of Education, Science and Technology (MEST) has been promoting the reform of the vocational education system for making excellent quality and management in

vocational high school. Because vocational education has long been disputed that the content of vocational education is functioned as a useless skill. Moreover, the ability of vocational high school students that they have low educational ambition, such as labeling vocational high school students as dull and unmotivated, and the relatively higher maintenance cost of vocational education than general education. The Korean government has endeavored to overcome this disgraceful label for vocational high school students (Sung, 2010), by preventing excessive college enrollment, and revitalizing the role of vocational secondary education as a career path. It is to make a vocational secondary education that has an ambitious to be able to explore future careers and jobs by themselves after their graduation.

Specifically, Meister school was established in 2010 as a type of vocational high school leading to a career from the new policy about vocational education. The number of Meister schools is few compared to the majority of typical vocational high school; Students in Meister school are required to have great academic performance during middle school for entrance and are achieving impressive performance in the labor market after graduation.

Although the government has endeavored to remove the stigmatized labels vocational high school, which has just changed its name to specialized high school, these labels persist and students are still entering vocational high school without autonomous motivation (Kim & Sohn, 2011). The enrollment rate of vocational high school is also not enormously increasing, and the disgraceful impression about vocational high school has not been highly decreasing.

Against this background, this study sets out to explore the following research questions: (1) What are the factors which affect an individual's schooling decisions about high school and university in Korea? and (2) How do the labor market outcomes correlate with each education path as well as all level of education in terms of employment and wage? and (3) How do the labor market outcomes correlate with each education path as well as all levels of education in terms of job quality aspects? The purpose of this study was to investigate the effects of an individual's school choice by high school level and university level on labor outcomes (wages employment, quality aspects of employment status such as regular job and working for the

large company). More specifically, it was the investigation into the impact of different type of high school choices on tertiary education decisions, and the effect of every level of education as well as every conceivable education pathway on labor market outcomes.

This study is significant because it makes an academic contribution in the following respects. This study particularly evaluates possible education pathways in school choice between secondary and higher education regarding vocational education links to labor market outcomes in Korea. There are many studies which have identified school choice in secondary and tertiary level regarding vocational education in comparison with general education with respect to labor market outcomes. However, it is not enough to analyze vocational education's outcomes without taking into consideration the various education pathways, which is not only for the final education degree without concerning the education pathway and includes high school background with a high enrollment rate of post-secondary education in Korea.

Secondly, the study of school choice has to deal with careful data analysis in an individual's unobserved heterogeneity, such as different individual outcomes through education possibly being correlated with motivation, ability (IQ or EQ) and so on.

A growing number of studies have accounted for the influence of school choice based on family background. However, the results were not consistent and definitely there is a lack of studies for school choice regarding unobserved heterogeneity such as motivation from parental financial and social status, which can be denoted in an empirical study using large-scale data in Korea. These results are found to be more significant in males than females to pursue higher education and entering a better university. However, most studies could not eliminate the unobserved heterogeneity properly for, particularly, the decision of receiving higher education.

Third, most of the studies have been dedicated to analyze the labor market outcome in the rate of returns to education as it correlates to wage. However, the wage differences cannot deeply explain their job quality or stability in Korea due to large numbers of existing employees with contract jobs and without a welfare system. Moreover, most of the studies in Korea determined the rate of returns to vocational education have been unconcerned about the

unobserved variable that is affecting heterogeneity. This study takes a more in-depth look at the correlation of labor market outcomes and education by analyzing basic factors beyond income so that the study includes quality factors such as job status (regular or non-regular) and work place (large company or not) variables as well as unobserved variables implicated in heterogeneity.

With regards to the first research question, this study put forward the following hypotheses: (1-1) Students who have low performance and parents with less education and lower income levels in middle-school are more likely to go to vocational high school than general high school; (1-2) Students who have low performance and parents with less education and lower income levels in high-school are more unlikely to participate in higher education.

The other hypotheses related to the second research question were as follows: (2-1) Obtaining higher levels of education at 2-year university or vocational secondary education can increase the likelihood of employment after graduation more than other education pathways; (2-2) Obtaining the highest levels of education can lead to greater opportunities for wages, on the contrary, fewer opportunities to find employment.

For research question 3, the study hypotheses were as follows: (3-1) Obtaining higher levels of education, particularly, the general education track, such as 4-year university based on general high school can lead to greater opportunity for a regular job status compare to fewer taking education; (3-2) Obtaining higher of levels education, particularly general education track, such as 4-year university based on general high school can lead to greater opportunity for working in a large corporation compared to pursuing less education.

This study applies a probit model to analyze the determinants of disparate high school enrollment. In addition, determinants of tertiary education choice between 2-year and 4-year university is investigated by applying an MNL model. To examine the impact of every level of education as well as every conceivable education pathway on labor market outcomes, the OLS and probit model are utilized combining a CECM technique. The study relies on the nationally representative panel education and employment survey tracing data, which were collected

through the KRIVET from 2004 to 2014. This study treats the dataset as a pooled cross-section with the sample in 2004 / 2007 / 2014.

The estimation results regarding the determinants of high school choice basically show that higher teacher assessments have a negative effect on enrolling in vocational high school even though the lowest teacher assessment show a stronger relationship not to enroll in vocational high school. The family background variables, as high father's education and father's income, are found to have a statistically negative effect on the probability of sending their children to vocational high school. Father's better education level affect the female group more than male group, and father's better income affects the male group more than female group in nonenrolment in vocational high school. Regarding the influence of the father income to male group students, it might be considered that boys are more unconditionally and socially supported by their parents spending a high amount of private tutoring for education investment than girls, which is a traditional social perception in Korea from a long time ago. However, when the father education is higher than average, they also focus on the girl's education, not pursuing attending vocational high school. It seems educated fathers do not follow the social perception of educational support to the boys rather than girls.

Interestingly, this study found that the 74 students who had the highest score in the male group did not enter vocational high school (disappeared in the sample), means no probability to enter vocational high school for the students who have highest score in middle school. It seems that the choice of vocational education is totally ignored by the group of academically excellent students due to focusing on entering prestigious university.

The estimation results on the determinants of higher education choice between 2-year and 4-year university shows privileged family background not only strongly affects the decision to enter 4-year university, but school performance is also more likely to give effect of such a decision. This observation is different from previous studies. This study found that the most important thing for entering 4-year university is better academic performance. Even though there is no statistical significance for region effect, some part of regions had a positive

effect on the probability of pursuing higher education. The female group has a strongly higher probability of pursuing higher education with teacher assessment 4 and 5 rather than male groups. It can be interpreted that the girls' academical ability is stronger and more efficient than boys with respect to education investment. Regarding the social perception of education in Korea, it seemed the fervent social perception of higher education robustly drives the decision of pursuing higher education, the financial conditions is not only catch up the fervent social perception of higher education. This result also shows how strongly the blinded social perception of higher education has settled into Korea.

The estimation results on the impact of every education level and education pathway on labor market outcomes (wages, employment, quality aspects of employment status such as regular job and working for the large company) show that even if a student attends the highest level of education possible, it does not necessarily lead to easier access to employment, or better employment status (e.g. regular job and working for large company). However, it does have an effect to receive better wage. There is no big gap in labor market outcomes when this study compares between vocational high school graduates, and 2-year university graduates and 2-year university graduates are worse than vocational high school graduates in terms of wage amount and the likelihood to work for large companies. In the pathway where vocational high school graduates continue to obtain more education in 2-year or 4-year university, it does not have effect on labor market outcomes in terms of wage, employment and quality aspects of employment status such as regular job and working for large companies. It is important to note that more than 70% of vocational high school students are going to university in Korea. In addition, this study reveals that vocational high school graduates, in comparison with general high school graduates, do have advantages on wage and the likelihood to work for big-sized companies, whereas this advantage could not be found at 2-year and 4-year university graduates' outcomes.

In Korea, even after the introduction of the revitalization of secondary vocational education in 2009, the government still maintains its relatively strong priority on vocational

education development under the argument that it has better linkage to the labor market. While there are a wide range of concerns about vocational high school, however, the Korean government has more concentrated on the supply side of aspect on their commitment to vocational high such as to improve the quality of education, teacher's qualifications, curricular and so on, only in the supply side. Despite these efforts by government vocational high school management, the enrollment rate is not enormously increasing and the disgraceful impression about vocational high school has not been highly decreasing.

In this circumstance including public financing, The Korean government efforts and concerns might not be included by accurately respecting demand side of vocational education, such as the students' needs, to make attractive school for improving high enrollment rate in the vocational high school and for linking to labor market easily after graduation right away. Additionally, the Korean government should continuously make efforts and commitment to develop the vocational high school sector, focusing on the demand side, particularly, students who are academically underachieving and have the family background in the relatively lower group. From an administrative perspective, the Korean government has established 50 specialized vocational high schools, so-called Meister school. Meister schools are becoming popular among students and parents as proven by its high enrollment rate. Its outcomes as a school-to-work transition have been highly evaluated by scholars as well as students and families who have directly experienced its outcomes after graduation. However, the record show that Meister school are merely accounted for a shy 50 schools nationwide. This is despite the fact that Meister school policy was able to succeed due to its perfect financial support for admission and education. In addition, more than 400 typical vocational schools have been struggling to change the negative social recognition. In short, this policy was made only considering the education provider and could not benefit much from the perspective of student recipients.

The study confirms that the score is one the main factors behind choice and decision towards vocational high school. However, even students with low grades also have a negative

cognition toward applying to vocational school, hence this can be attributed to the negative perception of vocational school itself. In this situation, the urgent policy for improving vocational school is by putting priority to change the negative social perception of this type of school itself. In addition, as mentioned above, the government and vocational high schools should cooperate with the view and consideration towards the students, who are recipients of education. In this respect, this study offers some broad ideas.

First, by taking into consideration that students enroll to vocational school are commonly academically underachiever, teachers and school management must provide a curriculum tailored to the student's level. As their scholastic year increases, it is necessary to assess regularly whether the process is being done properly or not.

Secondly, unlike general high schools, in vocational high school there are many subject activities and several qualifications required in relation to their chosen fields vis-à-vis their future job. As a result, it is costly to take many subject activities and preparing each qualification. In some studies, it is assumed that the burden of those additional fee may lead to disruption of learning process and quality as most of the students in vocational school are from disadvantaged group due to their family background. With regards to this situation, the government and vocational schools have to conduct a financial assessment of the additional tuition fees for students and identify the desirable environment where students can concentrate on every subject and acquired qualifications, which are needed for their career.

Finally, there is a necessity for specific follow-up management of the graduates' checking in their labor market performance. Despite the purpose of vocational education is to provide a greater chance of being employed and get absorbed into labor market, there is no sufficient information and little efforts to collate the graduates experience in labor market. A conduct of alumni tracer study and collection of success stories in labor market, may enhance enrollment rate of vocational school. Therefore, to improve vocational high school graduates' labor market outcomes and its enrollment rate, it is vital to eliminate negative perceptions of vocational school. In addition, evaluation and management of academically underachieving

students based on careful time series data with specific information current students and graduates are critical.

Regarding the school choice of higher education, with respect to better family / student situations in school achievement and family background, this study finds better situations have relatively positive effect on attending general high school and higher education, especially 4-year university. However, family background is slightly correlated with higher education or it is statistically no significant. These findings support the notion that the family background is not significantly influencing decision to enroll in higher education. This finding indicates that higher education choice is not solely influenced by family background. It can be considered to come from the social beliefs such as the credentialism (Kim,1997), in which the economic development requires educated people who have credentials from higher education institution in order to a gain decent socioeconomic status.

Interestingly, one of the key findings of this study in labor market outcomes (wages, employment, quality aspects of employment status such as regular job and working for the large company) shows vocational high school graduates earn higher wage than general high school graduates and there is a significant probability of working for large companies for graduates of vocational high school students rather than any education level and pathway. Meanwhile, 4-year university graduates only have higher wage effect than the other education level and pathway, however no effect on other labor market outcomes. In addition, for vocational high school graduates who further enroll in 2-year or 4-year university, there is no effect on every labor market outcome.

In the other words, in the context of Korea, it is necessary to quickly recognize that the relationship between the tertiary education and labor market is no longer a positive relationship to obtain a desirable job. It is politically unavoidable to notice for matching with suitable education in labor market needs as well as spreading this awareness about the gap between social perception of higher education and happening in real labor market. As mentioned before, in this situation, the most important thing is to change the social perception about higher

education and the policy-maker need to prioritize this effort first and then subsequently improve other aspects, such as education quality or its structures.

In conclusion, it would appear that the overall results, the working experience has a greatly and significantly positive effect on every labor market outcomes and vocational high school graduates have a significantly effect on wage and employment in large company. Based on these results, the strategy of having a desirable job for vocational high school graduates, who are in disadvantaged group with regards to their school achievement and family background, is by prioritizing job acquirement first and, then accumulating work that subsequently will help to secure a desirable job. More generally, vocational education, especially at the high school level is still important for government policy to succeed in reducing the problem of employees' shortage in the small and medium size enterprises as well as for the students who are in disadvantaged group with regards to their school achievement and family background.

With respect to the government policy, it needs to keep balance in supporting for vocational education link to the labor market outcomes in terms of its efficiency It is also inevitable to promote quality and stability in labor market for vocational high school graduates based on appropriate internal and external structure in society. Since the results of this study also show that employees who had a vocational education do not seem to be able to secure and stable job on this has a negative effect to regular job.

REFERENCE

Ahn, J. W. & Lee, B. W. (2013). The Relation Analysis between Working Life Satisfaction and On-The-Job Training Factors of Employees from the Specialized High School. *The Korean Technology Education Association,* Vol. 13, No. 1, pp. 93-110. (In Korean, with English abstract).

Ahn, J. W. & Lee, B. W. (2015). The Relation Analysis between Factors Related with Job and Turnover Possibility and First Working Life satisfaction of Paid Workers from the Vocational High School. *The Korean Technology Education Association,* Vol. 15, No. 2, pp. 113-129. (In Korean, with English abstract).

Ahn, S. (2011). Relationship between the Sample Quantiles and Sample Quantile Ranks. *Communications for Statical Applications and Method*, Vol. 8, No. 6, pp. 707-716.

Ahn, S. Y. & Lee, K. S. (2009). The Factors Associated with Youths' Career Decision Making at the Secondary Education Level and Its Effect. *Journal of Future Oriented Youth Society*, Vol. 6, No. 4, pp. 81-99. (In Korean, with English abstract).

Alexander, L. & Pallas M. (1983). Private Schools and Public Policy: New Evidence on Cognitive Achievement in Public and Private Schools. *Sociology of Education*, Vol. 56, No. 4, pp. 170–182.

An, J. H. & Bae, S. A. (2013). Investigation on the change of national curriculum and college admission system. *The Journal of Curriculum Studies,* Vol. 31, No. 3, pp. 95-120. (In Korean, with English abstract).

Appleton, S. & Balihuta, A. (1996). Education and agricultural productivity: evidence from Uganda. *Working Paper No. WPS/96–5* (Oxford, Centre for the Study of African Economies, Oxford University)

Appleton, S. (2000) Education and health at the household level in sub-Saharan Africa. *Working Paper No. 33* (Cambridge, MA, Harvard University Center for International Development)

Arriagada, A. & Ziderman, A. (1992). Vocational Secondary Schooling, Occupational Choice, and Earnings in Brazil, *Washington, DC: World Bank.* Population and Human Resources Department WPS 1037,

Arum, R. & Shavit, Y. (1995). Secondary Vocational Education and the Transition from Schoolto Work. Sociology of Education, Vol. 68, No. 3, pp. 187-204.

Ashenfelter, O & Rouse, CE. (1998). Income, schooling, and ability: evidence from a new sample of twins. *Quarterly Journal of Economics*, Vol.113. pp. 253–284.

Ashenfelter, O. & Krueger, A. (1994) Estimates of the economic return to schooling from a new sample of twins. *The American Economic Review,* Vol. 84, No. 5, pp. 1157-1174.

Aslam, M. (2007). Rates of return to education by gender in Pakistan. *University of Oxford, GPRG Working paper*, GPRG-WPS-064.

Atchoarena, D. & Esquieu, P. (2002). Private Technical and Vocational Education in sub-Saharan Africa: Provision Patterns and Policy Issues. *Paris: UNESCO/ International Institute for Educational Planning.*

Avdelkarim, A. (1996). Technical and Vocational Education & Training in the Philippines Experience and views of Trainees, *Institute of social studies*, No.23.

Bagheri, F. & Kara, O. (2005). Rate of Return on Education and Sample Selection Bias. *Atlantic Economic Journal Vol.* 33, pp. 359–360.

Becker, G. & Chiswick B. (1966). Education and the Distribution of Earnings. *The American Economic Review*, Vol. 56, No. 1/2, pp. 358-369.

Becker, G. (1964). Human capital, *Columbia University Press*

Becker, R. & Hecken, A. (2009). Higher Education or Vocational Training? *Acta Sociologica*, Vol. 52, No. 1, pp. 25-45.

Behrman, J. & Rosenzweig, R. (1999). 'Ability' bias in schooling returns and twins: a test and new estimates. *Economics of Education Review*, Vol. 18, No.2. pp. 159–167.

Bennell, P. (1996). General versus Vocational Secondary Education in Developing Countries: A Review of the Rates of Return Evidence, *Journal of Development Studies*, Vol. 33, No. 2, pp.

230–247.

Bennell, P. (1996). Rates of return to education: does the conventional pattern prevail in sub-Saharan Africa? *World Development*, Vol.24, No.1. pp. 183–19.

Bennell, P. & Segerstrom, J. (1998). Vocational Education and Training in Developing Countries: Has the World Bank got it Right? *International Journal of Educational Development*, Vol.18, No. 4, pp. 271 – 287.

Bishop, J. & Mane, F. (2004). The impacts of career-technical education on high school labor market success, *Economics of Education Review*, Vol. 23, pp. 381–402

Bishop, R. (1996). Addressing issues of self-determination and legitimation in Kaupapa Maori research. *Research perspectives in Maori education*. pp. 143-160.

Blaug, M. (1971). Summary of the Rate of Return to Investment in Education in Thailand: A Report to the National Education Council on the Third Educational Development Plan. *Bangkok: Ford Foundation.*

Blundell, R. & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models, *Journal of Econometrics*, Vol. 87 No. 1, pp. 115-143.

Brooks, R. (2003). Young People's Higher Education Choices: The Role of Family and Friends. *British Journal of Sociology of Education,* Vol. 24, No. 3, pp. 283-297.

Byun, S. Y. & Kim, K. K. (2011). Determinants of College Attendance among Vocational High School Graduates. *The 7th Academic Competition of Korea Research Institute for Vocational Education & Training (KRIVET)*. (In Korean, with English abstract).

Cappellari, L. & Jenkins, S. (2003). Multivariate probit regression using simulated maximum likelihood. *The Stata Journal*, 3, 278-294.

Card, D. (2001). Estimating the return to schooling: Progress on some persistent econometric problems. *Econometrica,* Vol. 69, pp. 1127–1160.

CEDEFOP. (2012). From Education to Working Life: The Labor Market Outcomes of vocational education and training. *Thessaloniki: Cedefop.*

CEDEFOP. (2013). Labor Market Outcomes of Vocational Education in Europe: Evidence from the European Union Labour Force Survey. *Thessaloniki: Cedefop.*

Chae, C. K. & Chung, J. H. (2009). Pre-Employment Vocational Education and Training in Korea, *World Bank, Working Paper No. 0921*.

Chae, C. K. & Chung, J. H. (2009). Pre-Employment Vocational Education and Training in Korea. *The World Bank, Social Protection and Labor*, *Washington D.C.*

Chang, S. S. (2000). Inequality of Educational Opportunity in Korea - The Effects of Family Background on Educational Attainment. *Korean Journal of Sociology,* Vol. 34, pp. 671-708. (In Korean, with English abstract).

Chea, C. K. (2003). Short-term Labor Market Outcomes of Vocational Highschool Graduates. *Korea research Institute for Vocational Education & Training (KRIVET),* Working paper 3-1. (In Korean, with English abstract).

Chea, C. K. (2004). Short-term Labor Market Outcomes of Vocational Highschool Graduates. *The Journal of Vocational Education Research*, Vol. 23, No. 2, pp. 59-74. (In Korean, with English abstract).

Chea, C. K. (2006). Career Decision of Vocational Highschool Graduates. *The 2nd Academic Competition of Korea research Institute for Vocational Education & Training (KRIVET).* (In Korean, with English abstract).

Cho, B. K. (2003). The actual situation of college life of vocational high school graduates. *Master Thesis: Sungkyunkwan University*. (In Korean).

Cho, Y. et., al. (2011). An analysis of Vocational Highschool's Career Path. *Ministry of Education*. (In Korean).

Cho, Y. J. & Bang, S. J. (2011). The analysis of college admission gab by income group. *The 8th Academic Competition of Korea Research Institute for Vocational Education & Training (KRIVET).* (In Korean, with English abstract).

Choi, D. S. (2008). Higher Education Decision of Vocational Highschool Graduates. *The 4th Academic Competition of Korea research Institute for Vocational Education & Training*

(KRIVET). (In Korean, with English abstract).

Choi, G. N. (2001). The Issue of vocational education policy and challenge of development in South Korea]. *Science & Technology Policy*, Vol. 132, No.11-6. (In Korean).

Choi, S. J. (2015). A Study on Types of Career Patterns of College Graduates in Korea: Focused on 60's Generation. *Journal of Agricultural Education and Human Resource Development,* Vol. 47, No. 1, pp. 27-48. (In Korean, with English abstract).

Choi, S. J. (2018). Employment Advantage and Wage Dispersion: Vocational High School and College Graduates in Korea. *Journal of Agricultural Education and Human Resource Development,* Vol. 50, No. 1, pp. 73-95. (In Korean, with English abstract).

Choi, S. J. & Kim, S. N. (2010). A Study on Types of Career Patterns of Youth: Comparison Between General and Vocational Highschool Student. *The 7th Academic Competition of Korea research Institute for Vocational Education & Training (KRIVET).* (In Korean, with English abstract).

Choi, Y. H, Hwang, S. Y. Kim, Y. S. (2011). Truth and Falsity in 80 Percent of University Enrollment Rate. *Issue & Analysis,* Vol.8, pp. 1-25. (In Korean).

Christian, K. (2011). Lessons for Developing Countries from Experience with Technical and Vocational Education and Training. *IGC Working paper.* F-39011-SLE-1

Chu, H. J. (2012). Individual and College Effects on New Graduates. *Korean Journal of Educational Administration,* Vol. 30, No. 1, pp. 603-626. (In Korean, with English abstract).

Chung, Y. (1990). Educated Misemployment: Earnings Effects of Employment in Unmatched Fields of Work. *Economics of Education Review*, Vol. 1, No. 4, pp. 331–342.

Chung, Y. P. (1995). Returns to vocational education in developing nations. In M. Carnoy (Ed.), *International encyclopaedia of economics of education, Oxford: Pergamon*, pp. 175–181.

Coleman, G., Kalish, I., Konigsburg, D. & Navarro, G (2014). Competitiveness: Catching the next wave The Philippines, *Deloitte.*

Cuddeback, G., Wilson, E., Orme, J. & Combs-Orme, T. (2004). Detecting and Statistically Correcting Sample Selection Bias. *Journal of Social Service Research*, Vol. 30, No. 3

David, N. & Daniel, S. (2011). The Value of Vocational Education: High School Type and Labor Market Outcomes in Indonesia, *Policy Research Working Paper 5035.*

Dearden, L. et., al. (2002). The Returns to Academic and Vocational Qualification in Britain. *Bulletin of Economic Research*, Vol. 54, No. 3, pp. 249-278.

DeVoretz, D. (1969). Alternative Planning Models for Philippine Educational Investment. *The Philippine Economic Journal*, Vol. 7, No. 2, pp. 99–116.

Dougherty, S. (1990). Unit Costs and Economies of Scale in Vocational and Technical Education: Evidence from the People's Republic of China. *Economics of Education Review*, Vol. 9, No. 4, pp. 389-394.

Duraisamy, P. (2002). Changes in returns to education in India, 1983–94: By gender, age cohort and location. *Economics of Education Review*, Vol. 21, pp. 609–622.

Dustmann, C. (2004). Parental background, secondary school track choice, and wages. *Oxford Economic Papers*, Vol. 56, pp. 209-230.

Eichhorst, W. et., al. (2015). A Road Map to Vocational Education and Training in Industrialized Countries, *ILR Review*, Vol. 68, No. 2, pp. 314-337.

El-Hamidi, F. (2006). General or Vocational? Evidence on School Choice, Returns, and "Sheep Skin" Effects from Egypt 1998. *University of Phoenix, Monroville, USA. Working Paper 0406.*

Eric, A., Ludger, H. & Zhang, L. (2011). General Education, Vocational Education, and Labor-Market Outcomes over the Life-Cycle*. Leibniz Information Centre for Economics, Conference Paper*, No. B09-V2.

Erikson, R. & Goldthorpe, J. (1992) The constant flux: A study of class mobility in industrial societies. *Oxford University Press, USA.*

Fafchamps, M. & So¨derbom, M. (2006). Wages and labor management in African manufacturing. *Journal of Human Resources, Spring*, Vol. 41, No. 2, pp. 346–379.

Fafchamps, M., So¨derbom, M., & Benhassine, N. (2006). Job sorting in African labor markets. *CSAE Working Paper* 2006-02.

Fersterer, J., Pischke, S., & Winter, R. (2008). Returns to Apprenticeship Training in Austria: Evidence from Failed Firms. *Scandinavian Journal of Economics*, Vol. 110, No. 4, pp. 733–753.

Fuller, W. (1976). More Evidence Supporting the Demise of Pre-employment Vocational Trade Training: A Case Study from a Factory in India. *Comparative Education Review*, Vol. 20, No. 1, pp. 30–41.

Gerardo, P. (2009). Labor Policies and Philippine Companies: Analysis of Survey Opinions, *Philippine Journal of Development*, No. 67, 2nd Semester 2009 Vol. XXXVI, No. 2.

Godius, K. & Francis, T. (2008). The Returns to Vocational Training and Academic Education: Evidence from Tanzania. *World Development*, Vol. 36, No. 11, pp. 2223-2242

Goldin, C. (2001). The Human-capital Century and American Leadership: *Virtues of the Past. The Journal of Economic History*, Vol. 61, No. 2, pp. 263-292.

Grosso, J. & Shea, J. (1979). Vocational Education and Training: Impact on Youth, *Berkeley, Calif.: Carnegie Council on Policy Studies.*

Hall, C. (2016). Does more general education reduce the risk of future unemployment? Evidence from an expansion of vocational upper secondary education. *Economics of Education Review 52*, pp. 251-271.

Ham, J. K. (1998). Historical Research on the Changes of Curriculum in Korea. *Seoul: Kyoyukkwahaksa.* (In Korean).

Hampf, F. & Woessmann, L. (2017). Vocational vs. General Education and Employment over the Life Cycle: New Evidence from PIAAC. *CESifo Economic Studies*, pp. 255-269

Hanushek, E. (2015). Time in education: introduction. *The Economic Journal*, Vol. 125, No. 588, F394-F396.

Hanushek, E. (2013). Economic Growth in Developing Countries: The Role of Human Capital, *Economics of Education Review,* Vol. 37, pp. 204-212.

Hanushek, E. et., al. (2015) General Education, Vocational Education, and Labor-Market Outcomes over the Lifecycle. *The Journal of Human Resources*, Vol. 52, No. 1.

Harmon, C. & Walker, I. (1995). Estimates of the economic return to schooling for the United Kingdom. *American Economic Review*, Vol. 85, No. 5, pp. 1278–1286.

Harmon, C. & Walker, I. (2000). The returns to the quantity and quality of education: evidence for men in England and Wales. *Economica* Vol. 67, No. 265, pp. 19-35.

Harmon, C. &Walker, I. (1999). The marginal and average returns to schooling in the UK. *European Economic Review*, Vol. 43: pp. 879–887.

Hausman, J. & McFadden, D. (1984). Specification Tests for the Multinomial Logit Model. *Econometrica, 52*(5), 1219-1240.

Haveman, R. & Wolfe, L. (1984). Schooling and economic well-being: The role of nonmarket effects. *Journal of human Resources*, pp. 377-407.

Heckman, J. (1976). A Life-Cycle Model of Earnings, Learning, and Consumption. *Journal of Political Economy*, Vol. 84, No. 4, pp. S11-S44

Heckman, J. (1976). The Common Structure of Statistical Models of Truncation, Sample Selection and Limited Dependent Variables and a Simple Estimator for Such Models. *The National Bureau of Economic Research*, Vol.5, No.4, pp. 475-492.

Heckman, J. (1979). Sample Selection Bias as a Specification Error. *Econometrica*, Vol. 47, Issue 1, pp. 153-162.

Heckman, J. & Klenow, P. (1997). Human Capital Policy. *University of Chicago.*

Hollenbeck, K. (1993). Postsecondary education as triage: returns to academic and technical programs. *Economics of Education Review*, pp. 213–232.

Horowitz, A. & Schenzler, C. (1999). Returns to General, Technical and Vocational Education in Developing Countries: Recent Evidence from Suriname. *Education Economics*, Vol. 7, No. 1, pp. 5-20.

Hotchkiss, L. (1993). Effect of Training, Occupation, and Training-Occupation Match on Wage. *Journal of Human Resources,* Vol. 28, No.3, pp. 482-496.

Hotchkiss. L. et., al. (1993). The relation of mothers′ controlling vocalizations to children′ s intrinsic motivation. *Journal of experimental child psychology*, Vol. 55, No. 2, pp. 151-162.

Howland, L. et., al. (2012) Meaningful learning with technology (4th ed.). *Pearson*.

Hyens, B. (1974). Social Selection and Stratification Within Schools, *American Journal of Sociology* Vol.79, No.6, pp. 1434-1451.

Infosys. (2016). Amplifying Human Potential - Education and Skills for the Fourth Industrial Revolution. *Infosys.*

Jang, M. H., Ok, J. P., Choi, D. S., Yoon, I. K., Na, S. I., & Park, J. W. (2011). 2011 Research for the Revision Direction of Specialized Subjects Curriculum by Area of Specialized and Meister High School: Point on Agriculture and Biotechnology, Fishery and Maritime Transportation, Vocational Home Economics Education Subject Area. *Sejong: Korea Research Institute for Vocational Education & Training (KRIVET).* (In Korean).

Joshua, D. (2003). Comparing the payoff to vocational and academic credentials in Thailand over time, *International Journal of Educational Development*, Vol. 23, pp. 607–625.

Kahyarara, G. & Teal, F. (2007). The Returns to Vocational Training and Academic Education: Evidence from Tanzania. *World Development*, Vol. 36, No. 11, pp. 2223–2242.

Kang, K. J., & Kim, J. W. (2002). The current status and tasks of the vocational and technicaleducation system for developing key competencies. *Korean Educational Development Institute.*Research Report 2002-19. (In Korean).

Kang, S. & Bishop, J. (1989). Vocational and Academic Education in High School: Complements or Substitutes? *Economics of Education Review,* Vol. 8, No. 2. pp. 133-148.

Kang, S. H. (2013). The Employment Determinants and Labor Market Attachment Possibility of Vocational High School Graduates. *Quarterly Journal of Labor Policy*, Vol. 13, No. 3, pp. 91-123. (In Korean, with English abstract).

Kang, Y. H. et., al. (2000). Future policy measures to improve vocational high school education in Korea. *Korea Research Institute for Vocational Education and Training*. Research Report 99-38. (In Korean).

Kawaguchi, D. (2009). Application of Mincerian wage function to Japanese labor market. *Tokyo: Research Institute of Economy, Trade & Industry, IAA.*

Kim, A. K. & Shin, D. J. (2007). School to Work Transition and Employment Status of High School Graduate Youths. *Korea Labor Institute,* Vol.13*,* No. 2, pp. 125-147. (In Korean, with English abstract).

Kim, B. H. (1997). Development and Two-dimensional Classification of Career Decision and Career Preparation Behavior of College Students. *Ph. D. Dissertation: Seoul National University*. (In Korean).

Kim, C. H. (2002). Main Points at Issue in Curriculum and Establishment of Educational View for Vocational High School. *The Journal of Curriculum Studies*, Vol. 20, No.3, pp. 211-241. (In Korean, with English abstract).

Kim, H. M. (2002). The Study on the School Life of Junior College Students Entered through the Admission Test of Same Majors. *Journal of Agricultural Education and Human Resource Development*, Vol. 35, No. 2, pp. 83-99. (In Korean, with English abstract).

Kim, K. H. (2014). An Analysis of High School Graduates' Job Performance: Focusing on the Comparison of Specialized High School and Meister High School. *Employment Panel Conference*. (In Korean).

Kim, K. K. & Byun, S. Y. (2006). Determinants of children's educational transition in Korea. *Korean Journal of Sociology of Education*, Vol. 16, No. 4, pp. 1-27. (In Korean, with English abstract).

Kim, K. K., & Byun, S. Y. (2005). The Impact of Family Background on Children's Educational Transition. *The 2nd Academic Competition of Korea Research Institute for Vocational Education & Training (KRIVET).* (In Korean, with English abstract).

Kim, K. N. (2010). Longitudinal Study of Student Recognition of the Effectiveness of Private tutoring in Mathematics Compared to Classroom Instruction and Self-study. *Korean Journal of Educational Research*, Vol. 48, No. 4, pp. 135-166. (In Korean, with English abstract).

Kim, K. N. (2012). The Effects of Sectors on Student Academic Achievement: Causal Analysis using Social Experiment. *Korean Journal of Sociology of Education*, Vol. 22, No. 2, pp. 1-29. (In Korean, with English abstract).

Kim, S. B. et., al. (2013). Status and Development Process of Vocational Highschool in Korea. *The Business Education Journal*, Vol. 22, No. 1-2, pp. 13-34. (In Korean).

Kim, S. H. (2015). The Vocational High School Graduates' Career Choices and Job Achievements. *The Journal of Education Studies,* Vol. 46, No. 1, pp. 93-115. (In Korean, with English abstract).

Kim, S. N. (2013). A Study on the Relationship between Education and Subject Mismatch and Labor Market Outcomes of Workers Graduated from Vocational High School. *The Journal of Vocational Education Research*, Vol. 32, No. 4, pp. 93-111. (In Korean, with English abstract).

Kim, S. N. (2013). A Study on the Relationship between Education and Subject Mismatch and Labor Market Outcomes of Workers graduated from Vocational High School. *The Journal of Vocational Education Research*, Vol. 32, No. 4, pp. 93-111. (In Korean, with English abstract).

Kim, S. S. & Ryu, B. R. (2008). Analysis on the Effect of Student's Backgrounds, Effort, and School Experience on Entering Highschool. *Korean Journal of Sociology of Education*, Vol. 18, No. 2, pp. 31-51. (In Korean, with English abstract).

Kim, Y. H. (2014). Private Education. *Social Media OhmyNews.* Retrieved July 30, 2018, from http://blog.ohmynews.com/chamstory/popup/print?id=521715

Kim, Y. H. & Kim, B. K. (1999). Education and Social Class Movement in Korean Industrialization Period. *Korean Journal of Education,* Vol. 37, No.1, pp. 155-172. (In Korean, with English abstract).

Kim, Y. S. (2009). Wage Determinants in the Korean Labor Market. *Korean Journal of Industrial Relations*, 19(2), 1-25. (In Korean, with English abstract).

Kim, Y. S. (2017). Enhancing Korea's Work Competency: Focusing on Problem-Solving Skills. *KDI Policy Forum, Sejong: Korea Development Institute (KDI).* No. 265. (In Korean, with English abstract).

Kim, Y. S. & Son, J. H. (2012). An Analysis of Career Trends on Vocational Highschool Students. *Korea research Institute for Vocational Education & Training (KRIVET).* Vol. 15, No. 1, pp. 51-75. (In Korean).

Kingdon, G. (1996). The quality and efficiency of private and public education: a case-study of urban India. *Oxford bulletin of Economics and Statistics*, 58, 57-81.

Kingdon, G. & Unni, J. (2001). Education and women's labour market outcomes in India. *Education Economics*, 9, 173–194.

Kleiber, J. (2014). Industry-academe linkages in the Philippines: Embedding foreign investors, capturing institutions? *Geoforum*, Vol. 59, pp. 109–118.

Krueger, D. & Kumar, B. (2004a). Skill-specific rather than General Education: A Reason for US-Europe Growth Differences? *Journal of Economic Growth*, Vol, 9, pp. 167-207.

Krueger, D. & Kumar, B. (2004b). US-Europe Differences in Technology-driven Growth: Quantifying the Role of Education. *Journal of Economic Growth*, Vol, 51, pp. 161-190.

Kuczera, M. & Field, S. (2010). Learning for Jobs OECD Reviews of Vocational Education and Training: Options for China, *OECD 2010.*

Kuh, D., Ben-Shlomo, Y., Lynch, J., Hallqvist, J., & Power, C. (2003). Life course epidemiology. *J Epidemiol Community Health*, 57, 778-783.

Lechner, M. (2000). An Evaluation of Public-Sector-Sponsored Continuous Vocational Training Programs in East Germany. *The Journal of human Resources*, Vol. 35, No. 2, pp. 347-375.

Lee, I. A. (1993). A Study on the Changes of Science Education in Elementary School. *Suwon: The University of Suwon.* (In Korean).

Lee, J. H. & Jyung, C.Y. (2010). Variables Associated with Employment Barriers of Specialized Vocational High School Students. *Journal of Agricultural Education and Human Resource Development,* Vol. 42, No. 1, pp. 25-47. (In Korean, with English abstract).

Lee, J. H., Jung, H., & Hong, S. C. (2014). Is Korea Number One in Human Capital Accumulation? Education Bubble Formation and Its Labor Market Evidence. *KDI School of Public Policy and Management,* Sejong: *Korea Development Institute (KDI)*, Vol. 46. (In Korean).

Lee, J. S. & Jyung H. J. (2004). Direction of restructuring vocational high school for curriculum reform. *Korea research Institute for Vocational Education & Training (KRIVET).* (In Korean).

Lee, J. Y. (2014). Vocational Education and Training in Korea: Achieving the Enhancement of National Competitiveness. *Korea Research Institute for Vocational Education & Training (KRIVET).*

Lee, S. C., & Eom, M. Y. (2014). An Analysis on the Employment Characteristics and School Factors Affecting Employment at Specialized Vocational Schools]. *The Journal of Korean Education*, Vol. 41, No.3, pp. 89-117. (In Korean, with English abstract).

Lee, S. J. (2011). A Study on its Effect and Participation's Decision for Career Education of Youth. *Journal of Education & Culture*, Vol. 17, No. 2, pp. 385-408. (In Korean, with English abstract).

Lee, S. S. (2001). A Study on the College Academic Achievement of Vocational High School Graduates. *Master Thesis: Hongik University*. (In Korean).

Lee, Y. S. (2017). The industry 4.0 and future of vocational education. *THE HRD REVIEW ed., Vol. 20. Sejong: Korea Research Institute for Vocational Education and Training (KRIVET).* (In Korean).

Liu, C. (2013). How Are Secondary Vocational Schools in China Measuring up to Government Benchmarks? *China & World Economy*, Vol. 21, No. 3, pp. 98–120.

Lockheed, M. et., al. (1991). Improving Primary Education in Developing Countries. *New York, NY: Oxford University Press for World Bank.*

Lorraine, D. et., al. (2002). The effect of school quality on educational attainment and wages. *Review of Economics and Statistics*, Vol. 84, No. 1, pp. 1-20.

Lourdesamy, I. (1972). "'Vocational Education in Malaysia: A Case Study in Development Administration'". *University of Pittsburgh. Ph.D. dissertation,*

Malamud, O. & Pop-Eleches, C. (2010). General Education versus Vocational Training: Evidence from an Economy in Transition. *The Review of Economics and Statistics,* Vol. 92, No. 2, pp. 43-60.

Malgwi, A. et., al. (2005). Influences on Students' Choice of College Major. *Journal of Education for Business*, Vol. 80, No. 5, pp. 275-282.

Mardolis, D. & Simonnet, V. (2002). Technical / Professional versus general education, Labor Market Networks and Labor Market Outcomes. *International Journal of Manpower*, Vol. 23, No. 5, pp. 471-492.

Margolis, D. & Simonnet, V. (2002). Technical/professional versus general education, labor market networks and labor market outcomes*", International Journal of Manpower*, Vol. 23 No.5, pp. 471-492.

Meer, J. (2007). Evidence on the returns to secondary vocational education. *Economics of Education Review*, Vol. 26, pp.559–573.

Meyer, R. (1982). Job Training in the School. *Job Training for Youth, Columbus: The National Center for Research in Vocational Education, Ohio State University.*

Middleton, J. et., al. (1993). Skills for Productivity: Vocational Education and Training in Developing Countries. New York, NY: Oxford University Press.

Miller, P. & Martin, N. (1995). What do twins studies reveal about the economic returns to education? A comparison of Australian and U.S. findings. *American Economic Review*, Vol. 85, No. 3, pp. 586–599.

Mincer, J. (1974). Schooling, Experience, and Earnings. *Columbia University Press*, Summary and Agenda, No. 2. pp. 128 – 144. *National Bureau of Economic, New York*

Moenjak, T. & Worswick C. (2003). Vocational education in Thailand: a study of choice and returns. *Economics of Education Review*, Vol. 22, No. 1, pp. 99-107.

Myck, M. & Vignoles, A. (2002). The Returns to Academic and Vocational Qualifications in Britain. *Centre for the Economics of Education London School of Economics and Political Science Houghton Street London.*

Nam, K. K. (2005). Is the Education for 'Forgotten Half' Successful? *Economy and Society*, No. 70. (In Korean, with English abstract).

Nam, K. K. (2005). Wage Effect of Vocational High School Education. *KOREA DEVELOPMENT ECONOMICS ASSOCIATION*, Vol. 11, No. 1, pp. 143-169. (In Korean, with English abstract).

Neuman, S. & Ziderman, A. (1989). Vocational Secondary Schools *can* be more Cost-effective than Academic Schools: the case of Israel, Comparative Education, Vol. 25, No. 2, pp. 151-163.

Neuman, S. & Ziderman, A. (1991). Vocational Schooling, Occupational Matching, and Labor Market Earnings in Israel. *The Journal of Human Resources*, Vol. 26, No. 2. pp. 256-281.

Neuman, S. & Ziderman, A. (1999). Vocational Education in Israel: Wage Effects of the VocEd-Occupation Match. *The Journal of Human Resources*,Vol. 34, No. 2, pp. 407-420.

Neuman, S. & Ziderman, A. (2003). Can vocational education improve the wages of minorities and disadvantaged groups: The case of Israel. *Economics of Education Review*, Vol. 22, pp. 421–432.

Newhouse, D. & Suryadarma, D. (2011). The Value of Vocational Education: High School Type and Labor Market Outcomes in Indonesia, *THE WORLD BANK ECONOMIC REVIEW*, Vol. 25, No. 2, pp. 296–322.

Malamud, O. & Pop-Eleches, C. (2010). School tracking and access to higher education among disadvantaged groups, *Journal of Public Economies*. Vol. 95, No.11-12, pp. 1538-1549.

Oh, H. S. et., al. (2010). The Comparative Study on Career Decision Level of Highschool Students. *The Journal of Vocational Education Research*, Vol. 29, No. 2, pp. 245-265. (In Korean, with English abstract).

Oh, S. Y. (2012). A Study on Vocational High School Students' Perspective on Their Career Decision Making: Focusing on Seoul Area. *The Journal of Vocational Education Research*, Vol. 31, No. 3, pp. 135-151. (In Korean, with English abstract).

Ok, J. P. et., al. (2012). Directions for educational renovation of Specialized high school. Research Report 12-19. *Korea Research Institute for Vocational Education and Training.* (In Korean).

Ordovensky, F. (1995). Effects of Institutional Attributes on Enrollment Choice: Implications for Postsecondary Vocational Education. *Economics of Education Review,* Vol. 14, No. 4, pp. 335-350.

Origo, F. & Pagani, L. (2009). Flexicurity and job satisfaction in Europe: The importance of perceived and actual job stability for well-being at work. *Labour Economics*, Vol. 16, pp.547-555.

Oshio, T., Sano, S. & Kobayashi, M. (2010). Child Poverty as a Determinant of Life Outcomes: Evidence from Nationwide Surveys in Japan. *Institute of Economic Research PIE/CIS Discussion Paper*; No. 452.

Oxtoby, R. (1977). Vocational Education and Development Planning: Emerging Issues in the Commonwealth Caribbean'. *Comparative Education*, Vol. 13, No. 3, pp. 223–43.

Pack, H. (2002). Africa's declining productivity: Evidence from Tanzania. *Mimeo, University of Pennsylvania.*

Pack, H. (2002). Africa's declining productivity: Evidence from Tanzania. *Mimeo, University of Pennsylvania.*

Palmer, P. (2014). Technical and vocational skills and post-2015: Avoiding another vague skills goal? *International Journal of Educational Development,* Vol. 39, pp. 32–39.

Park, D. Y. (2016). Developing Middle-Skilled Worker and Apprenticeship Program. The HRD Review, Vol. 19, No. 4, pp. 66-77. (In Korean).

Park, H. J. (2004). Educational expansion and inequality in Korea. Research in Sociology of Education, Vol.14, pp.33-58. (In Korean, with English abstract).

Park, J. C., Lee, S. Y., & Lee, C. H. (2011). The Effect of Corporate Social Responsibility on Corporate Image: Large versus Small and Medium Sized Company. *The Korean Journal of Advertising,* Vol. 22, No. 4. (In Korean, with English abstract).

Park, J. M., Park, H. J. & Lee, K. M. (2013). An Inquiry into Social Change and Curriculum Transition in Korea: Based on North's New Institutional Theory. *The journal of system and economy,* Vo. 7, No. 3, pp. 97-124. (In Korean, with English abstract).

Phang, H. N. & Kim, K. H. (2003). Trends and Differentials in Educational Stratification in Korea. *Korean Journal of Sociology*, Vol. 37, No. 4, pp. 31-65. (In Korean, with English abstract).

Phang, H. N., & Kim, K. H. (2002) Opportunity and Inequality: Educational Stratification in Korea. *Korean Journal of Sociology* Vol. 34, No. 4, pp. 193-222. (In Korean, with English abstract).

Pimpa, N. & Suwannapirom, S. (2008) Thai Students' Choices of Vocational education: Marketing Factors and Reference Groups. *Educ Res Policy Prac,* Vol. 7, pp. 99-107.

Pissarides, C. (2000). Human capital and growth: a synthesis report, OECD Development Centre *Technical Papers No. 168* (Paris, OECD)

Pracharopoulos, G. & Tzannatos, Z. (1992). Case Studies on Women's Employment and Pay in Latin America. *World Bank, Washington D.C.*

Psacharopoulos, G. (1973). Returns to Education: An International Comparison. *San Francisco, CA: Elsevier, Jossey-Bass.*

Psacharopoulos, G. (1985). Returns to Education: A Further International Update and Implications. *The Journal of Human Resources,* Vol. 20, No. 4, pp. 583-604.

Psacharopoulos, G. (1987). To Vocationalize or Not to Vocationalize? That is the Curriculum Question'. *International Review of Education*, Vol.33, No. 2, pp. 187–211.

Psacharopoulos, G. (1993). Returns to Investment in Education: A Global Update', *WPS, Washington, DC: World Bank*

Psacharopoulos, G. (1994). Returns to Investment in Education: A Global Update. *World Development*, Vol. 22, No. 9, pp. 1325-1343.

Psacharopoulos, G. (2006). The Value of Investment in Education: Theory, Evidence, and Policy. *Journal of Education Finance*, Vol. 32, No. 2, pp. 113-136.

Psacharopoulos, G. & Ng, Y. (1994). Earnings and Education in Latin America. Education Economics, 2(2), 187-207.

Psacharopoulos, G. & Patrinos, H. (2004). Returns to Investment in Education: A Further Update. *Education Economics*, Vol. 12, No. 2, pp. 111-134.

Rauch, J. (1993). Productivity gains from geographic concentration of human capital: evidence from the cities. *Journal of Urban Economics*, Vol. 34: pp. 380–400.

Rhee, J. S. (1985). A Study on the Transition of the Curriculum of Science in Middle Schools. *Seoul: Ewha Womans University.* (In Korean).

Rouse, C. (1999). Further estimates of the economic return to schooling from a new sample of twins. *Economics of Education Review*, Vol. 18, No. 2, pp. 149–157.

Rumberger, R. & Daymont, T. (1984). The Economic Value of Academic and Vocational Training Acquired in High School in Youth and the Labor Market: Analysis of the National Lonaitudlnal Survey (Edited by M. Borus), *Kalamazoo: Upjohn Institute for Employment Research*

Ryan, P. (2001). Is apprenticeship better? A review of the economic evidence. *Journal of Vocational Education & Training*, Vol. 50, No. 2, pp. 289-325.

Ryan, P. (2001). The School to Work Transition: A Cross-National Perspective. *Journal of Economic Literature,* Vol.39, No. 1, pp. 34-92.

Ryan, P. (2011). Apprenticeship: between theory and practice, school and workplace. *Leading House Working Paper,* No. 64.

Schnabel, U. et., al. (2002). Parental Influence on Students' Educational Choices in the United States and Germany: Different Ramifications – Same Effect? *Journal of Vocational Behavior,* Vol. 60, pp. 178-198.

Schultz, T. (1968). Returns to Education in Bogota, Colombia, Santa Monica, *CA: The Rand Corporation Memorandum RM-5645-RC/AID.*

Schwab, K. (2016). The Fourth Industrial Revolution. *Geneva, Switzerland: World Economic Forum.*

Shavit, Y. & Müller, W. (1998). From School to Work: A Comparative Study of Educational Qualifications and Occupational Destinations. *Oxford: Clarendon Press.*

Shin, D. J. & Ryu, J. Y. (2015). The Analysis of Youth Career Path. *THE HRD REVIEW*, *Sejong: Korea Research Institute for Vocational Education and Training (KRIVET)*, Vol. 18 No. 2. (In Korean).

Shin, H. K., Kim, W. Y. & Lee, J. Y. (2005). A Study of Determinants of Career Path and Its Motivation in High School Students of Korea: The role of individual, family, school. *The Korean Sociological Association*, Vol. 10, pp. 307-336. (In Korean).

So¨derbom, M., Teal, F., Wambugu, A., & Kahyarara, G. (2006). The dynamics of returns to education in Kenyan and Tanzanian manufacturing. *Oxford Bulletin of Economics and Statistics,* Vol. 68, No. 1, pp. 261–396.

Sullivan, G. (1981). Secondary School Leavers and the Labour Market in Swaziland. *International Journal of Educational Development*, Vol. 1, No. 2, pp. 20–43.

Sung, S. J. (2010). An Analysis of Relationship between School Life and Its Factors for Low and Upper Secondary School. *Ph. D. Dissertation: Chonbuk National University*. (In Korean).

Tansel, A. (1994). Wage employment, earnings and returns to schooling for men and women in Turkey. *Economics of Education Review*, Vol. 13, No. 4, pp. 305–320.

Tilak, G. (1988). Vocational Education in South Asia: Problems and Prospects. *International Review of Education*, Vol. 34, No. 2, pp. 244-257.

Torun, H. & Tumen, S. (2017). Do Vocational High School, Graduates Have Better Employment Outcomes than General High School Graduates? *IZA-Institute of Labor Economics, Discussion Paper No. 10507.*

Trost, R. & Lee F. (1984). Technical Training and Earnings: A Polychotomies Choice Model with Selectivity. *The Review of Economics and Statistics*, Vol. 66, No. 1, pp. 151–156.

Tsai, S. & Xie, Y. (2008). Individual Treatment Effects, Selection Bias, and Sorting Gain. *Population Studies Center Research Report, University of Michigan*, 08-631.

UNESCO. (1995). Establishing Partnership in Technical and Vocational Education. *Berlin: UNESCO.*

Vanfossen, B. et., al. (1987). Curriculum tracking and status maintenance. *Sociology of Education*, pp. 104-122.

Venniker, R. (2001). Social returns to education: a survey of recent literature on human capital externalities *CPB (Netherlands Bureau for Economic Policy Analysis) Report 00/1*

Wallenborn, M. (2008). Skills development for poverty reduction (SDPR): The case of Tajikistan, *International Journal of Educational Development*, Vol. 29, pp. 550–557.

Walter, M. & Shavit, Y. (1998) The Institutional Embeddedness of the Stratification Process: a Comparative Study of Qualifications and Occupations in Thirteen Countries. *Oxford 1-48 [Chapter. 1]*

Weir, S. (1999). The effects of education on farmer productivity in rural Ethiopia *Centre for the Study of African Economies Working Paper No. WPS/99–7* (Oxford, Oxford University)

Weisbrod, B. (1964) External Benefits of Education, *Princeton, NJ, Princeton University, Industrial Relations Section.*

Wijemanne, E. & Welkala, G. (1975). Sri Lanka: non-formal education for rural youth. In Education for Rural Development: Case-Studies for Planners, Edited by: Ahmed, Manzoor and Coombs, Philip H. *New York: Praeger.*

William, T. (2014). Beating the Middle-Income Trap in Southeast Asia. *The Heritage Foundation, Database Philippines: UNESCO. Special Report*, No. 156.

Wiswall, M. & Zafar, B. (2014). Determinants of College Major Choice: Identification using an Information Experiment. *The Review of Economic Studies,* Vol. 82, No. 2, pp. 791-824.

Wollschläger, N. & Guggenheim, E. (2004). A history of vocational education and training in Europe from divergence to convergence, *Vocational European Journal Training*, No. 32.

World Economic Forum. (2017). Realizing Human Potential in the fourth Industrial Revolution: An agenda for Leaders to Shape the Future of Education, Gender and Work. *WEF White Paper*.

Yim, K. H. (2011). A study on specialization improving plan and manpower raising plan of the special high-school in domestic areas. Journal of Digital Convergence, Vol. 9, No. 6, pp. 13-25. (In Korean, with English abstract).

Yu, B. J. & Kim, Y. J. (1998). 100 Years of Korean Secondary Education History in Modern Times. *Seoul: Korean History of Education.* (In Korean).

Yu, K. J., & Hong, S. K. (2011). Determinants and Complementarities of the Technological Innovation Protection Mechanisms of Korean Manufacturing Firms. *Korean Management Science Review*, Vol. 28, No. 3, pp. 31-45.

Zafar, B. (2013). College Major Choice and the Gender Gap. *Journal of Human Resources*, Vol. 48, No. 3, pp. 545-595.

Zimmermann, K. et., al. (2013). Youth Unemployment and Vocational Training. *Foundations and Trends in Microeconomics*, Vol. 9, No. 1-2, pp. 1-157.

Zymelman, M. (1976). The Economic Evaluation of Vocational Training Programs. *The World Bank*, Vol. 11, No. 122.

APPENDIX

This section introduces the data structure based on 1st (2004) and 4th (2007) year questionnaire, which this study made pooled data from the 11years panel data in 2004, 2007 and 2014. In addition, the period has added additional data to supplement data attrition.

1. 1st Year (2004) KEEP Questionnaire

1) Questionnaire for students

- Questionnaire for the students is composed of questions about school life, family life, subject, private education, academic achievement, career planning and coaching, work experience in school, self-consciousness & occupational view, and general characteristics (Gender, religion, problem behavior, living habits, anxiety, and others).
- Questionnaire for the students is divided into questionnaires for middle school students, vocational high school students, and general high school students. The general category of the survey is the same, but questions more suitable to the characteristics of the school may be added.

2) Questionnaire for household

- Unlike other household panel questionnaires that questions family relations focused on the householder, this household questionnaire is characterized by the relations with the student. That is, it extensively surveys the student's education achievement, career, and the household environment which impacts upon the career and educational environment in detail. For example, KEEP has created an unique household questionnaire that details such as the education of the guardian, birth parents status, student's book reading experience before entering the school, and his/her cultural life.

- Overall contents of the questionnaire include the household member status, student's educational environment, household's cultural life, student's guardian, guardian's economic status, revenue, and expenditures.

3) Questionnaire for school administrator and homeroom teacher

- The questionnaire for the school administrator (Vice principal or chief of school affairs) is composed of questions about characteristics expected to show the difference by school (Equalization application status, lesson status and subject by level, speciality & aptitude, class status, school's comment gathering system, student guidance situation, career coaching situation, school's psychological and physical environment) among the basic contents except the matters gained from the Statistical Yearbook of Education (Number of teachers, number of students, number of classes, etc.).
- The major purpose of the homeroom teacher questionnaire is to include the variables that can show the school's influence and to gain information on the individual student's characteristics.

<Table A-1> 1st year (2004) questionnaire contents for students (Survey structure of KEEP)

Category	Contents of questionnaire
School Life	Type of school and the reason for selecting the type of school, satisfaction with school life (psychological, physical), recognition of teacher, characteristics of friends, conversation with friends, bully victim experience, status, reason for being bullied, present condition after the experience of being a bully victim, school club activity, school representative experience, volunteer activity experience, school change experience and reason for changing the school, experience of temporary absence from school and the reason for being temporarily absent
Family Life	Satisfaction with family life, guardian, living status with guardian, reason for not living with the guardian, the place of residence, guardian evaluation, status of siblings, degree of conversation with siblings and contents of conversation with siblings, activity with family, the place where the student spends time after school, the person who is at home after school, leisure, things to do during time of leisure. scale of pocket money, method for the creation of pocket money, where the pocket money is used, degree of pocket money satisfaction, TV watching time, the amount of book reading, the amount of computer usage, place of computer usage, degree of computer use by purpose
Academic achievement	Recognition by subject (interest, achievement), private education experience status by subject, private education type, private education time, the status of the subject's help on private education, self studying time, in-school and out-of-school, contest award, certificate status, acquired qualification certification and grade of acquisition
Career Plan	Status of future occupation decision, future occupation name, degree of knowing the occupation, occupation-related role model and how it is known, the reason for desiring the occupation, whether that occupation is considered as a life-long occupation, the probability of having the occupation, reason for not deciding the future job, desired education level, career plan after graduation, reason for entering the college, desired college type, major decision status and major, degree of knowledge on major, determination status of desired college and college name, points to be considered at the major or college selection, reason for desiring the employment or self-employment, job to be done just right graduation, desired monthly average income from that job, what the student is doing for employment or self-employment, status of vocational training taken, vocational training field, completion period of vocational training, future education & training plan, desired field name, reason for not deciding the plan after graduation.
Career coachin	Aptitude identification and method, career coaching experience status and satisfaction in school, career-related activity or talk status at home, career information acquisition method, the person who largely affects the career
Working while	Working experience status, total frequency of work, type of work, working period, working duration, daily working hours, working days per week, wage, reason for work, job searching method, the thing that is felt to be most significant in the work, the reason for stopping working
Self conscious	Important thing in life, self assessment, the person who believes in or encourages the person, self satisfaction, reason for having the job, factor of job selection, success factor for the occupation
General characteristics	Gender, religion, height, weight, dating friend status, health condition, sleeping hours, breakfast status, degree of anxiety, experience and motive that the student is seriously worried about suicide, smoking status & smoking volume, drinking status and frequency of drinking, sexual intercourse experience, runaway experience and the first runaway year, reason for runaway, frequency of being late & absent, status and frequency of disciplinary punishment experience, level of punishment

Source: Created by Author based on Korean education & employment panel (KEEP), user guide in wave 1st (2004) ~ 11th (2014)

<Table A-2> 1st (2004) year questionnaire contents for households

Category	Contents of questionnaire
General status of family members	Relationship with the student, gender, age, status of living together, reason for not living together, academic background (high school type and school record, college type and its name, graduation status, overseas studying experience)
Educational environment	Talking time, degree of interests in the student, student assessment, immigration and oversea studying consideration status, alternative education consideration status, moving experience for education, number of times moved, studies helped for degree, family rules on TV and computer (using time and contents), desired education level, preparation for higher school entrance, expected level for entrance, Career planning and future occupation recognition status, concord with parents, parents' desired occupation, student's satisfaction with the school, concerns on the educational policy, comments on equalization system, parents' view of life and view of occupation
Cultural life	Computer, mobile phone, Internet and car possession status, periodic subscription status, books owned, activity frequency with the family (dining out, movie, museum visit, traveling, exercise, etc.), experience of overseas travel, experience of hospitalization of a household member & disability status, sibling's death or missing status
Guardian of student	Guardian, birth father & birth mother relation, reason and period for not living together
Economic activity status of male guardian	Present income status, employment type, number of employees in the company, monthly average income, description of job, reason for not working, work experience status, period and reason for giving up work
Competency development of male guardian	Education and training experience status, education & lecture participation status, computer use status & frequency, foreign language status
Economic activity status of female guardian	Present income status, employment type, number of employees in the company, monthly average income, description of job, reason for not working, work experience status, period and reason for giving up work
Competency development of female guardian	Education and training experience status, education & lecture participation status, computer use status & frequency, foreign language status
Economic activity status of siblings	Relation with the student, present income status, employment type, number of employees in the company, monthly average income, description of job, reason for not working, work experience status, period and reason for giving up work
Household income, Assets & liabilities	Monthly average household income, monthly average saving amount, asset scale, liability status, amount of liabilities
Household spending	Monthly average living cost, culture & living cost, private education expenses, loan status and amount for private education, type and ownership of house, purchase amount of house, deposit money for the lease of house and monthly lease, selling area and nettable area of house, number of rooms, room only for the student, owned house status except the currently dwelling house

Source: Created by Author based on Korean education & employment panel (KEEP), user guide in wave 1st (2004) ~ 11th (2014)

<Table A-3> 1st (2004) year questionnaire contents for school administrator

Category	Contents of questionnaire
General situation	Name of the school attended, school (department) name, major (department) name, graded system, day & night status, location of school, application method, type of entrance, the person and factor that affects the college selection, satisfaction with selected college, preference between the college and department at college selection, the person and factor that affects the department selection, satisfaction with selected department, attitude of lecturing, wrong behavior, studying time, college life, frequency of guiding professor interview, satisfaction with college life, tuition fee planning method, scholar receipt status, temporary absence status, restudying plan, method and time for re-entry of college, decision of college to re-enter.type of college.name of college.field of desired major, name of desired major, planning to transfer (to other college or department), planning to keep same major
Student assessment	Degree of lateness by student, degree of absence, experience of disciplinary punishment, learning ability, talent status, leadership, future plan, family's economic level, good friendship, sincere school life evaluation, in-school and out-of school awards, ranks in the school, subjects in top 10%, subjects in top 11-30%, and subjects within the top 70%e
Homeroom teacher General information	Gender, age, responsible subject, subject described in the teacher certificate, education, years of teaching experience, belonged association

Source: Created by Author based on Korean education & employment panel (KEEP), user guide in wave 1st (2004) ~ 11th (2014)

2. 4th year (2007) KEEP Questionnaire

1) Questionnaire for high school students

- Students in the third year of a general high school, vocational high school

  - ♦ General high school: Includes all the schools often known as general high schools, science high schools, foreign language high schools, autonomous private high schools, art high schools, athletics high schools, and general class of comprehensive high-schools.

  - ♦ Vocational high school: Includes specialized high schools such as culinary arts high schools and animation high schools as well as technical high schools, commercial

high schools, agricultural high schools, information high schools, and vocational class of comprehensive high schools.

2) Questionnaire for school, homeroom teachers

- Most of the third-grade students of middle school in the 1st year (2004), the base year, become 3rd year high school students by the 4th year (2007). These conform to the questionnaires for schools and homeroom teachers taken by the schools (Vice principal or chief of school affairs) and homeroom teachers.
- This questionnaire is for schools and homeroom teachers taken by the schools and homeroom teachers of third grade students of high school newly selected in the 4th year (2007).
- The 4th year's (2007) questionnaire for schools and homeroom teachers is constructed almost the same as the 1st year's (2004) surveyed questionnaire for schools and homeroom teachers, considering the connection between the newly selected samples and the survey items of the third-grade students of high school in the 1st year (2004).
- The questionnaire for the school administrator is composed of questions about characteristics that are expected to show differences by school (Equalization application status, level-based and subject-based lesson status, after school class status, school's comment gathering system, student guidance situation, career coaching situation, school's psychological and physical environment) among the basic contents except the matters gained from the Statistical Yearbook of Education (Number of teachers, number of students, number of classes, etc.).
- The major purpose of the homeroom teacher questionnaire is to include the variables that can show the school's influence and to gain information on the individual student's characteristics.

3) Questionnaire for household

Survey was conducted for the household (Guardian) of the base year, 1st year's (2004) third year students of middle school cohort (2,000) and for the household (Guardian) of newly selected third year students of high school for 4th year's (2007) relevant cohort (1,600).

- As the third-year high school students in the base year (2004) are in their adult ages, survey was not conducted for household (Guardian).

Considering the linkage between the consideration for newly selected samples and the survey items for the household of the third year students of high school in the 1st (2004) survey, the 4th (2007) survey has almost the same structure as the questionnaire contents for household (Guardian) surveyed in the 1st (2004) year.

- For the household, which CAPI -based (Laptop computer/UMPC interview survey) survey is impossible, CATI survey is conducted with the questionnaire with selected core questions.

<Table A-4> 4st year (2007) questionnaire contents for students (Survey structure of KEEP)

Category	Contents of questionnaire
School Life	Name of school, location of school, type of school (general high school), reason for selecting vocational high school, reason for selecting vocational school while attending the school, detailed major (foreign language high school, art and athletics high school, vocational high school), points to be considered at the major selection (vocational high school), double major selection.double major (vocational high school), existence of application system for general high school (general high school), entrance status of desired school (general high school), type of school (general high school), studied math, science, second foreign language, school facilities and environment, facilities utilization, class hours, specialized subject (vocational high school), special subject teacher (vocational high school), general subject teacher (vocational high school), lesson attitude, self-study after school.participation (general high school), self studying time, evaluation on the teacher, evaluation for homeroom teacher, satisfaction with school life, study method, reason for studying, evaluation on subjects, record grades, awards in and out of school, experience as a representative of student's association, experience of being bullied in class, reason, current status, transfer experience, period, reason, temporarily stopping school experience, reason, experience of absence without notice, days, experience and level of punishment
Family Life	Residence type, Satisfaction with dormitory facilities and environment, status of living with male guardian.female guardian.reason for not living together.conversation time.guardian's rearing attitude, satisfaction with family life, the place where the student spends time after school, the person who is at home after school, amount of pocket money, where the pocket money is used, how the pocket money is made, experience of runaway, period of runaway, reason of runaway
Leisure life	Leisure time, leisure activity, TV watching time, computer usage time, degree of computer usage by purpose, volume of book reading, book type, club activity & time, number of close friends, contents of talks with friends, activities with friends, and common characteristics with friends, experience of travelling overseas
Private Education	Private education status, private education experience status by subject. private education time. type, private education cost, help degree of private education, experience of overseas language study, acquired qualification certification. implementation organization . period of acquisition
Working experience in school	Working experience, total working income, the type of job that you worked at for the longest time.total period, number of working days.working hours, income payment base, unit income, reason for working, job search method, reason for giving up, total income from this job
Career Plan	◦ Future occupation decision status, desired occupation name, occupation information recognition level, occupation role model, route to know about the role model, reason for not deciding the future occupation, desired level of education, plan right after the high school ◦ For entering college : Reason for entering the college, type of entering college, selection status of desired major Name of desired major, consideration factor when selecting department, information recognition of desired major, selection status of desired college, name of desired college, consideration factors when selecting college ◦ For getting a job or starting a business : Reason for getting a job (starting a business), name of job right after high school, expected monthly average income Things done for getting a job (starting a business), vocational training status, field, completion period of vocational training Vocational training plan status & field, vocational training status through school (vocational class), field (general high school) ◦ If career path is not decided : Reason for not deciding the plan right after high school graduation
Career coaching	Aptitude recognition status.aptitude recognition channel, career coaching experience & satisfaction status, family career coaching, the place where one gets career information, the person who affects the career
Self aspect and occupational mind	Important thing in life, existence of encourager, the level of self recognition, reason for having a job, important factor in choosing a job, important success factor for successful career
General characteristics	Health condition, exercise time, sleeping time, breakfast eating status, commuting method, commuting time, study stress, dating friend status, spending time with him or her, personal concerns or anxiety, suicide anxiety experience status, motive of considering suicide, smoking status and smoking volume, drinking frequency, violent behavior experience, sexual intercourse experience, gender, religion, height, weight

Source: Created by Author based on Korean education & employment panel (KEEP), user guide in wave 1st (2004) ~ 11th (2014)

<Table A-5> 4st (2007) year questionnaire contents for households

Category	Contents of questionnaire
Household member status	Relationship of household member, gender, age, status of living together, education level, Household member disabled/dead .missing status, social capital of household
Educational environment	Conversation time, degree of student understanding, student evaluation, consideration for immigration·studying overseas, consideration for alternative education, moving experience, discipline in family (TV, computer), level of desired education, preparation status of education expenses, forecast for and accord with advancement to higher level school and job, occupational view/life view of parents, student's satisfaction with school, degree of interest in the education policy, view on life and occupation
Culture life	Computer/high-speed internet/car possession status, volume of books in possession, activities with family, experience of overseas travel
Guardian of student	Guardian information, birth father & birth mother relation, reason and period for not living together
Economic activity & self development	Economic activity status of male guardian, female guardian (position, type of work, monthly average income, number of employees, nature of work, reason for non-economic activity, prior economic activity experience and period) Economic activity status of siblings (employment type, number of employees, monthly average income, nature of work)
Household income, Household spending	Monthly average household income, savings amount, loan status for private expenses living costs, culture & living costs, private education expenses
Asset and liabilities	Asset amount, liabilities status and amount
Residential Status	type of housing/living area, room only for the student, living area

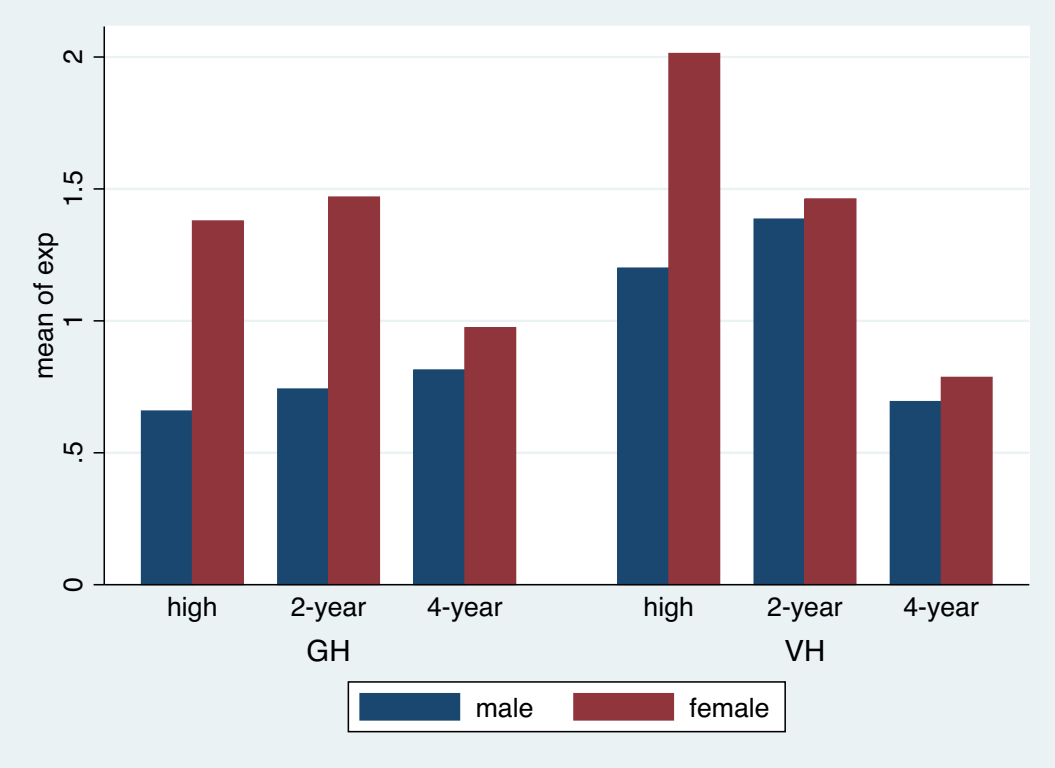
Source: Created by Author based on Korean education & employment panel (KEEP), user guide in wave 1st (2004) ~ 11th (2014)

<Table A-6> 4st (2007) year questionnaire contents for school administrator

Category	Contents of questionnaire
General situation	Equalization status, lesson status by level and name of subjects, after school status, participation status in the subject related after school, hours of lessons after school, after school lesson status in arts and athletics field, support plans for students who want employment or study in higher level school , number of school events, in-school meetings (students' association, parents' association, school steering committee, subject association, teachers' meeting), the strictness of student life guidance or regulations, obedience level of student life guidance and regulations, career coaching center status, career coaching in operation, school environment evaluation(condition of building, equipment.facilities, school surrounding environment, students' commuting conditions, study environment of the school, relations between teachers and students, economic status of parents, leadership of director, relationships between director and teachers, relationships between teachers, ability of teachers, achievement level of student), number of students entered higher level school , number of students employed, number of early graduates, number of student studied abroad, number of students dropped out, number of students taken disciplinary action, average attendance rate, number of classes, teacher & faculty members (total number of teachers, number of lecturer and short-term teachers, number of teacher's union joined), gender, age
General information	Gender, age, responsible subject, final education, method of completing lessons to become a teacher, motive of selecting teacher as a job, activity level as a homeroom teacher (homework, student counseling, student guidance), teaching experience, belonged association
Student assessment	Degree of lateness by student, degree of absence, experience of disciplinary punishment, learning ability, talent status, leadership, future, family's economic level, good friendship, sincere school life evaluation, in-school and out-of school awards, ranking in school, consulting experience with parents (study, living attitude)

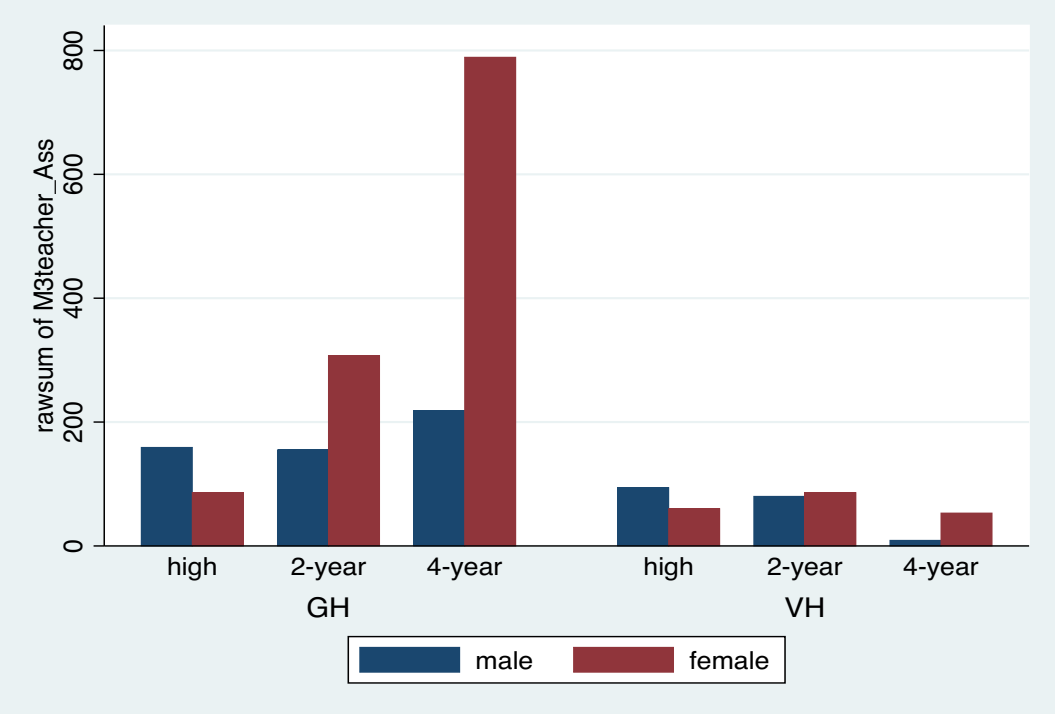
Source: Created by Author based on Korean education & employment panel (KEEP), user guide in wave 1st (2004) ~ 11th (2014)

Figure A-1: The average enrollment of higher education by high school types



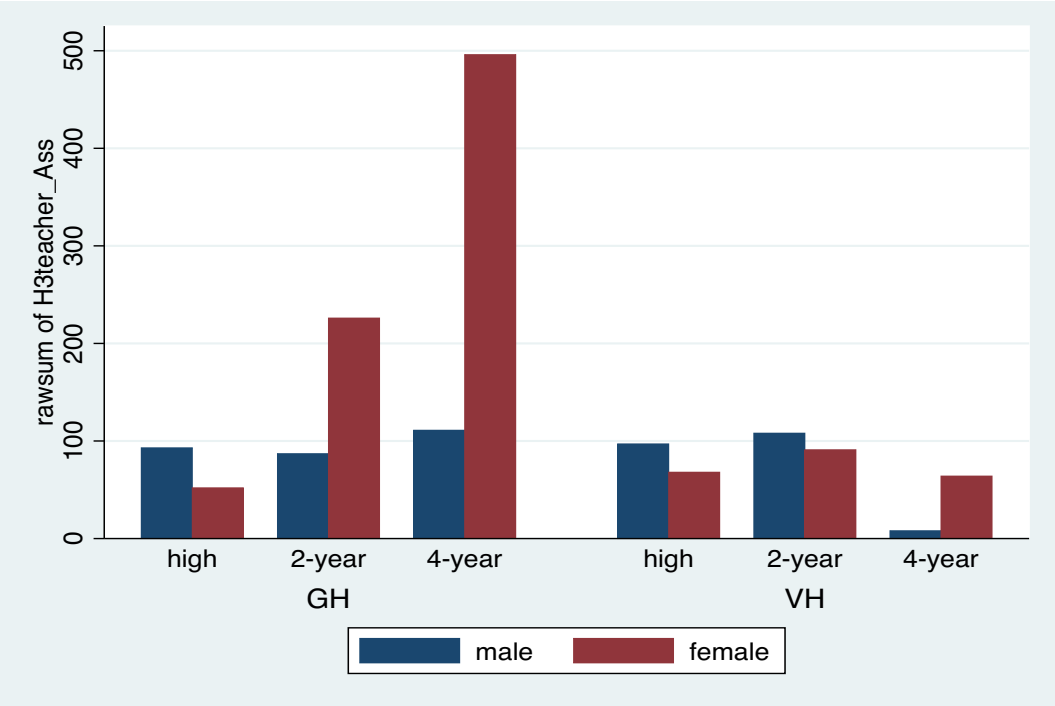
Source: Created by Author using KEEP 2004/2007/2014

Figure A-2: The average enrollment of higher education by academic achievement in middle school



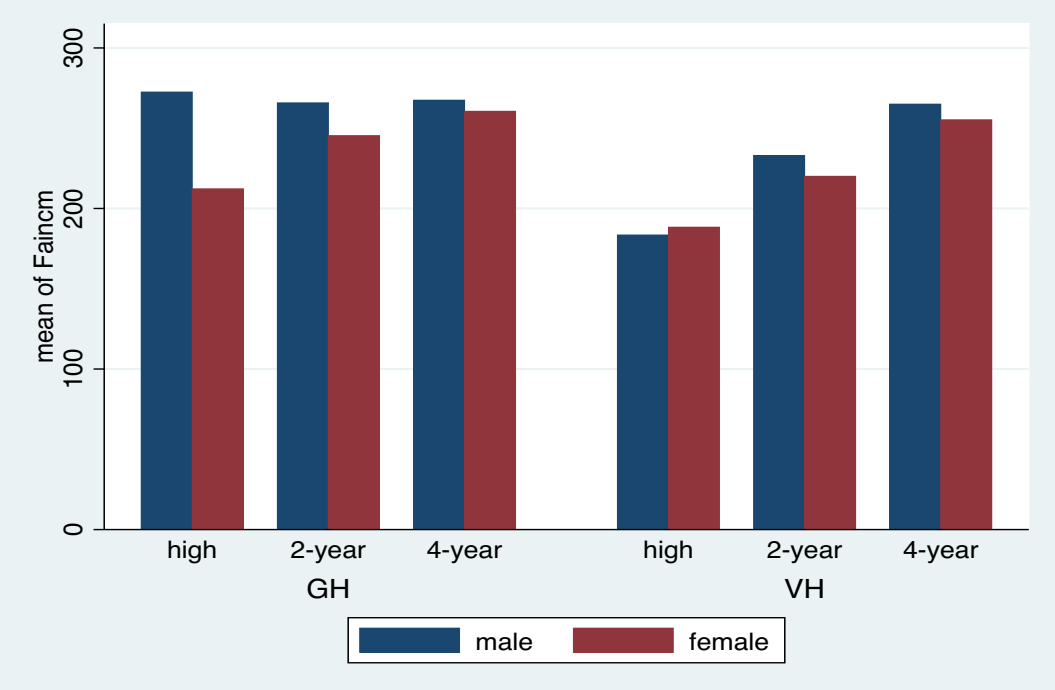
Source: Created by Author using KEEP 2004/2007/2014

Figure A-3: The average enrollment of higher education by academic achievement in high school



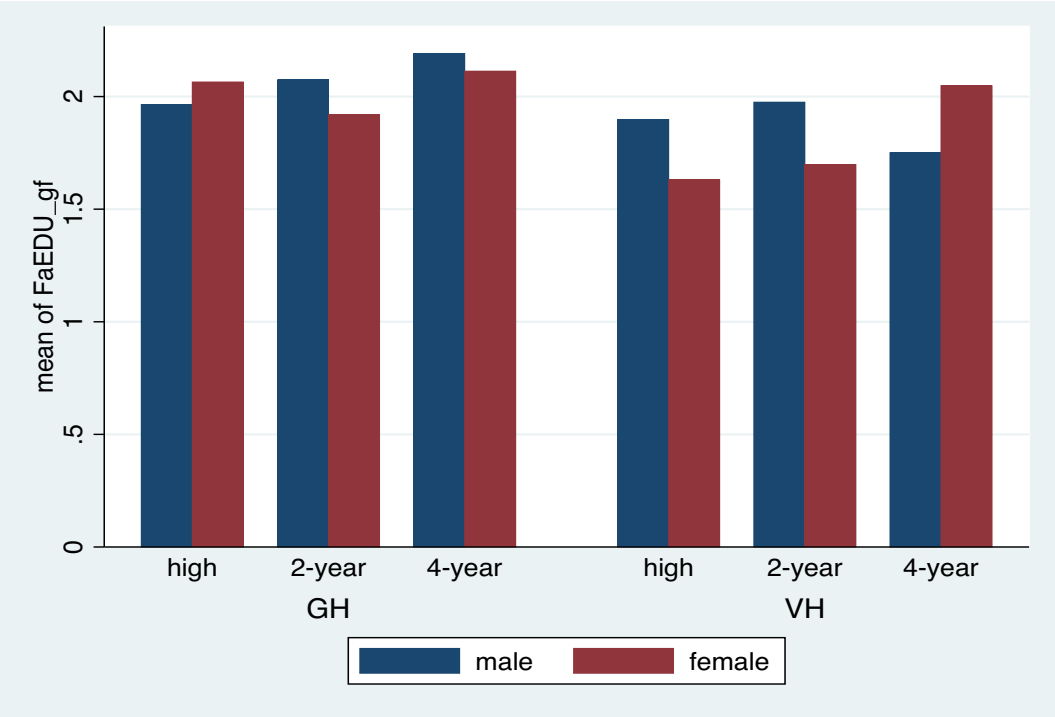
Source: Created by Author using KEEP 2004/2007/2014

Figure A-4: The average level of educations background with high school types by father's monthly income



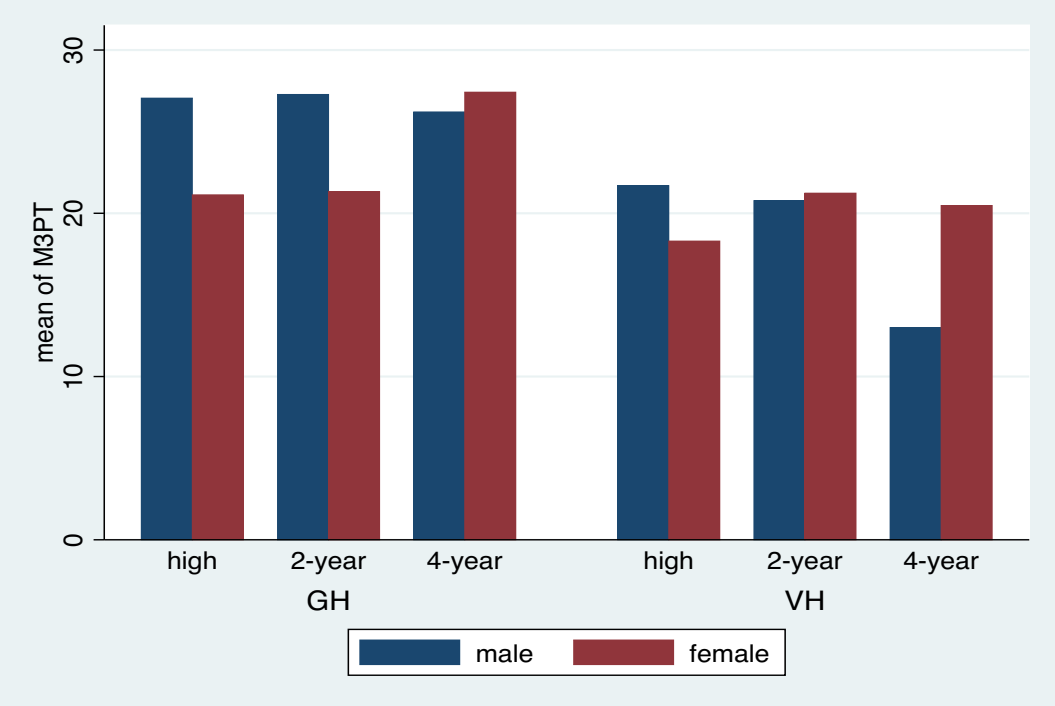
Source: Created by Author using KEEP 2004/2007/2014

Figure A-5: The average level of educations background with high school types by father's education levels



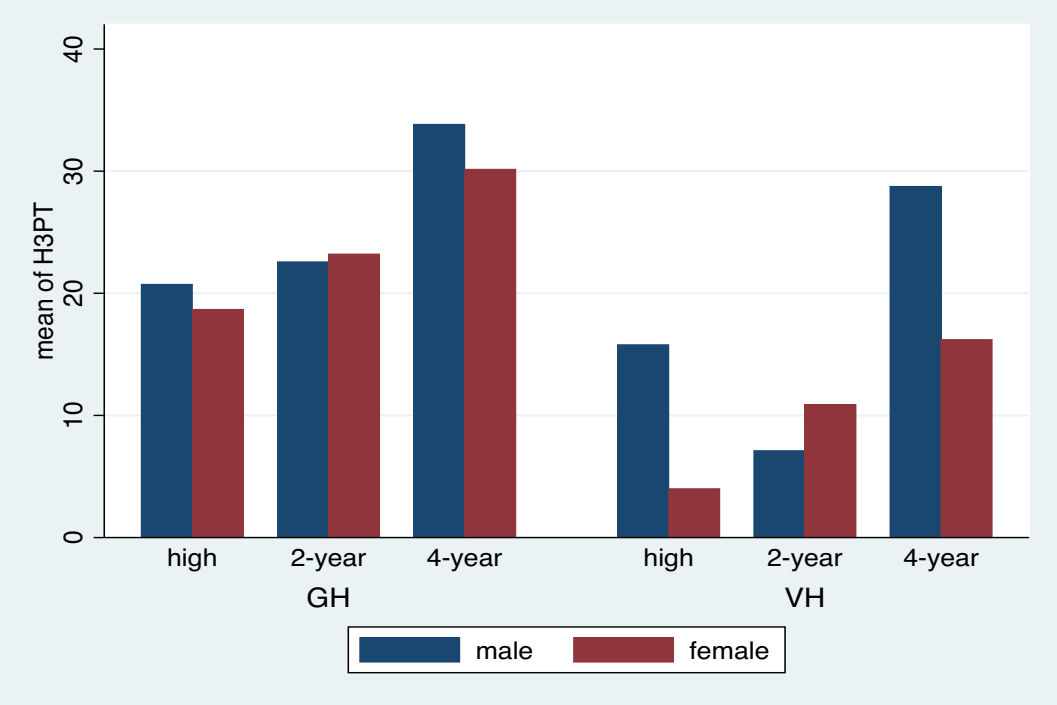
Source: Created by Author using KEEP 2004/2007/2014

Figure A-6: The average level of educations background with high school types by father's education levels



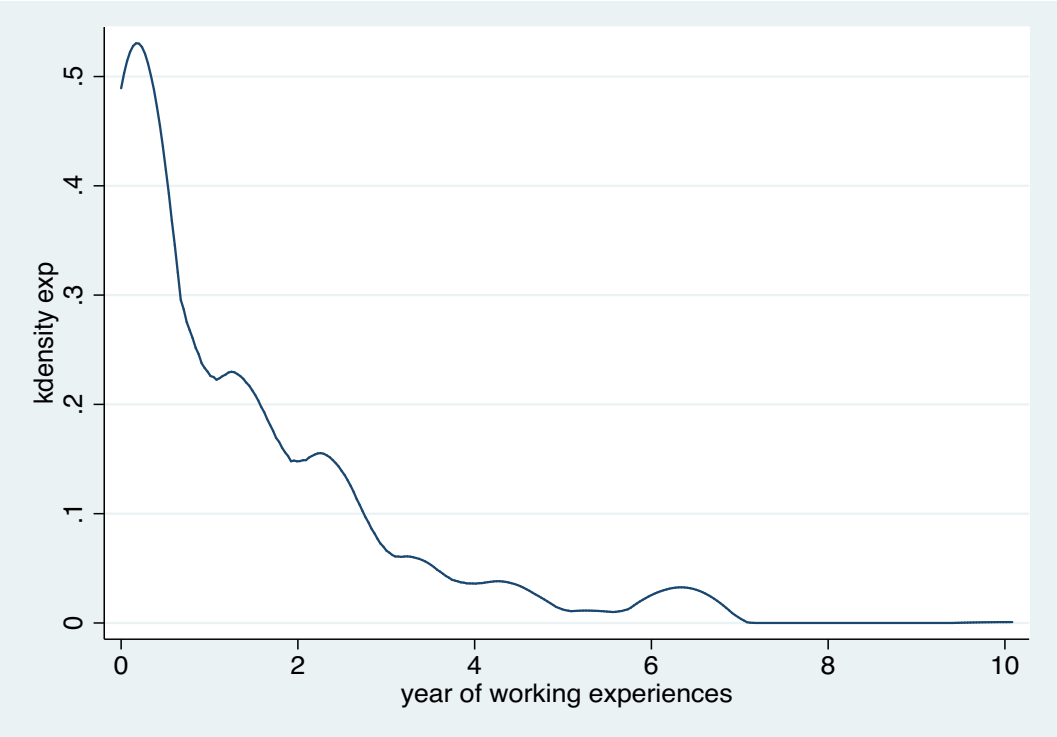
Source: Created by Author using KEEP 2004/2007/2014

Figure A-7: The average cost of private tutoring by education pathway in high school



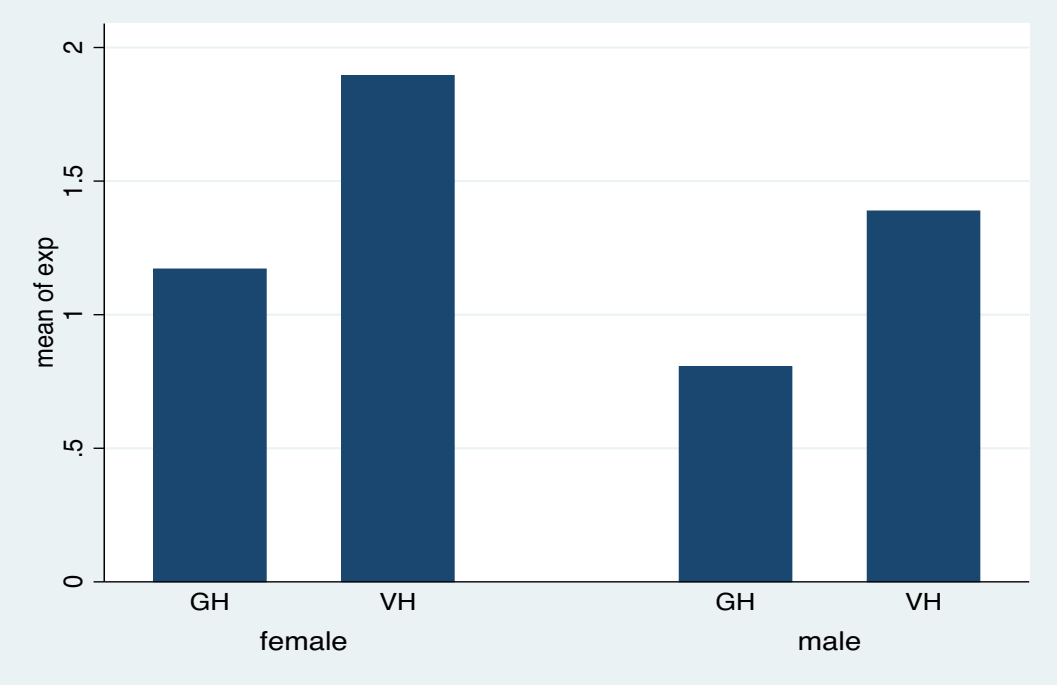
Source: Created by Author using KEEP 2004/2007/2014

Figure A-8: The year of working experiences



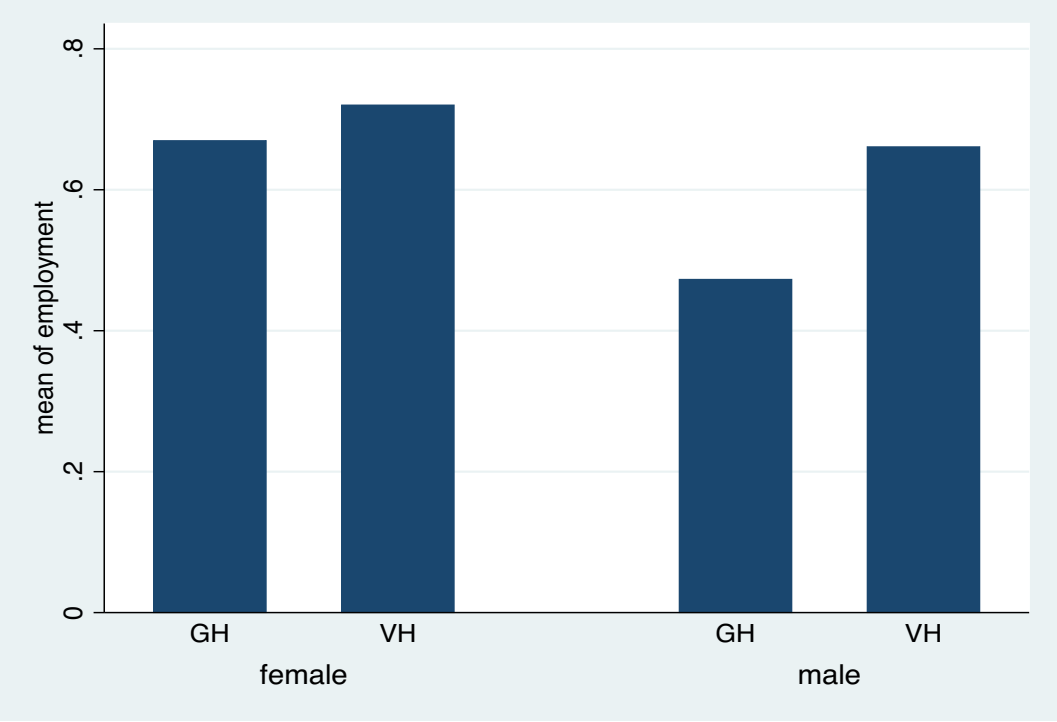
Source: Created by Author using KEEP 2004/2007/2014

Figure A-9: The working experience by high school type



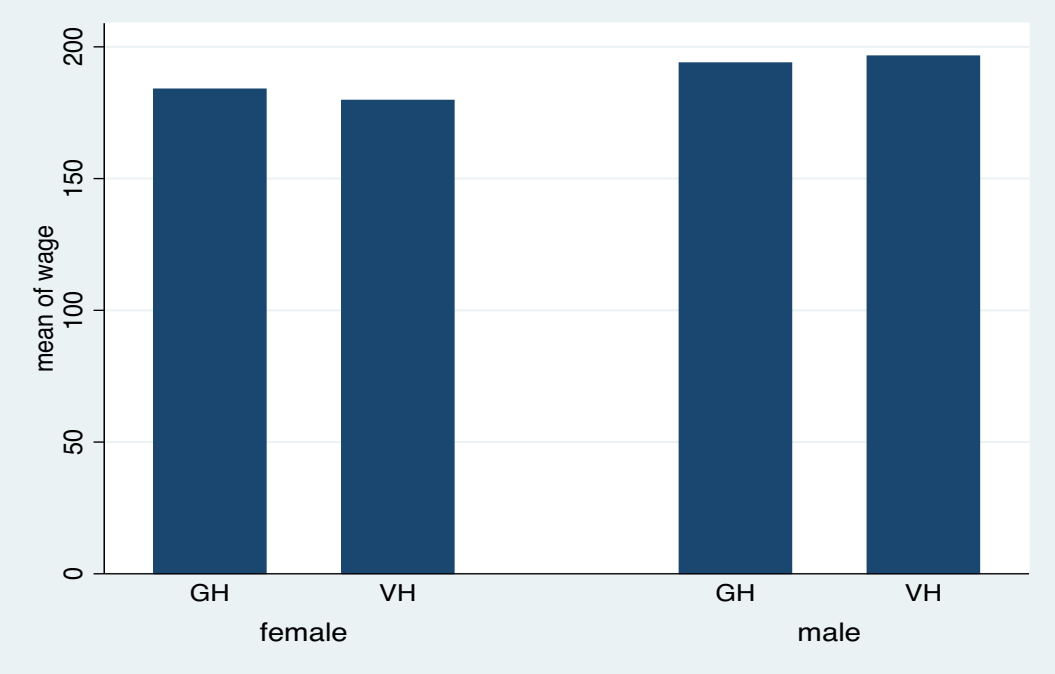
Source: Created by Author using KEEP 2004/2007/2014

Figure A-10: Employment by high school type



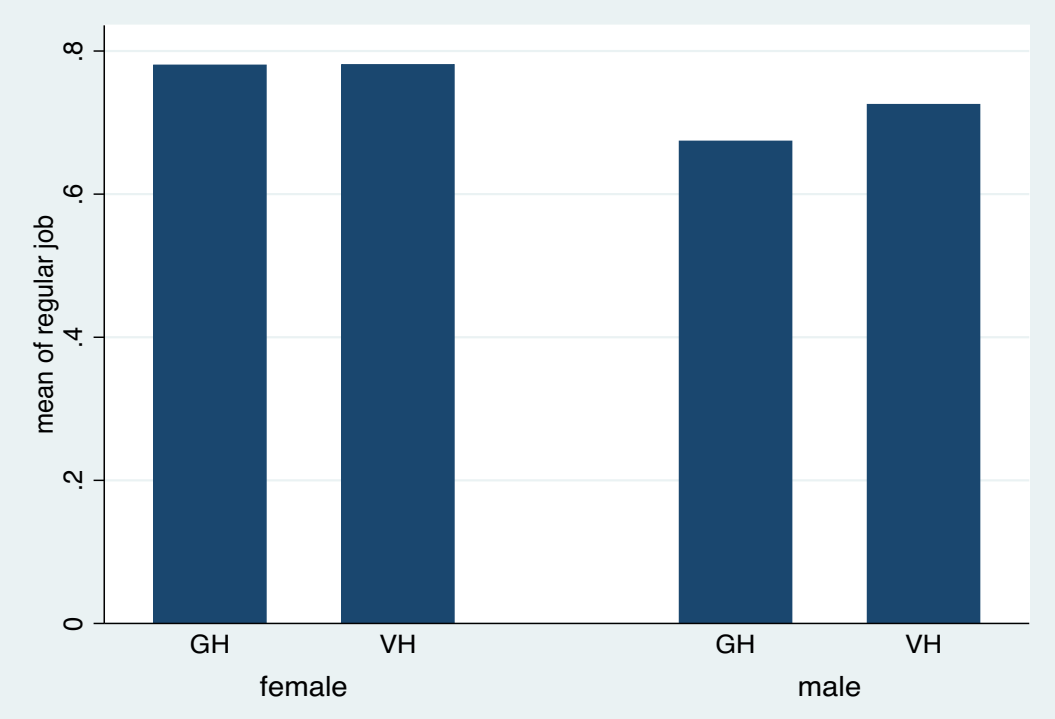
Source: Created by Author using KEEP 2004/2007/2014

Figure A-11: The wage by high school type



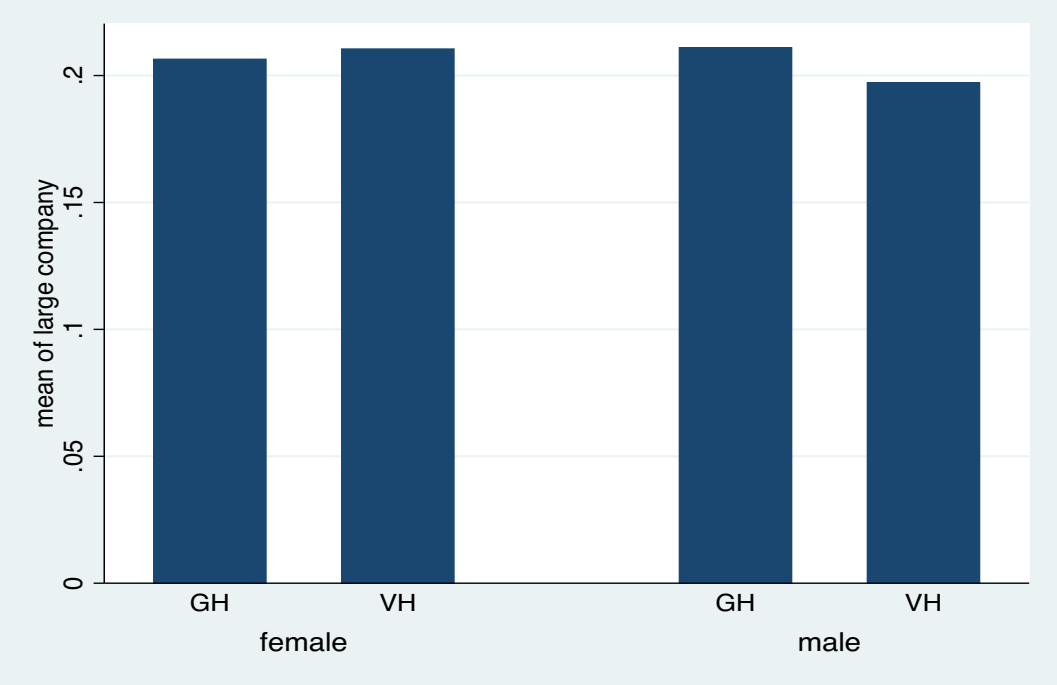
Source: Created by Author using KEEP 2004/2007/2014

Figure A-12: The employment status by high school type



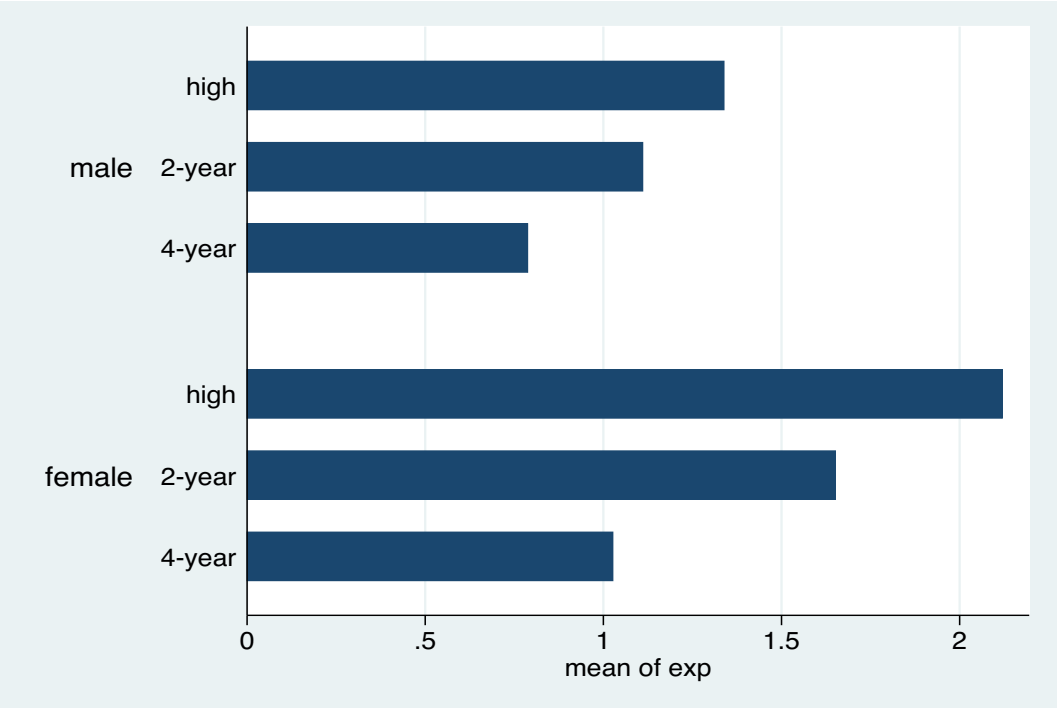
Source: Created by Author using KEEP 2004/2007/2014

Figure A-13: The working place by high school type



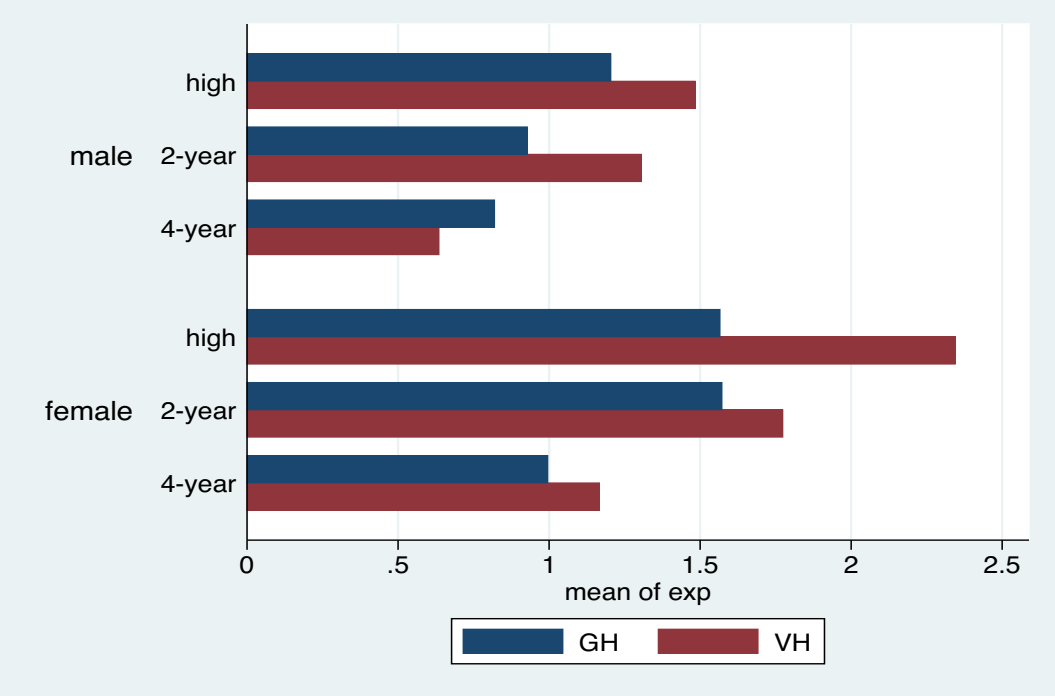
Source: Created by Author using KEEP 2004/2007/2014

Figure A-14: The working experience by level of educations and gender



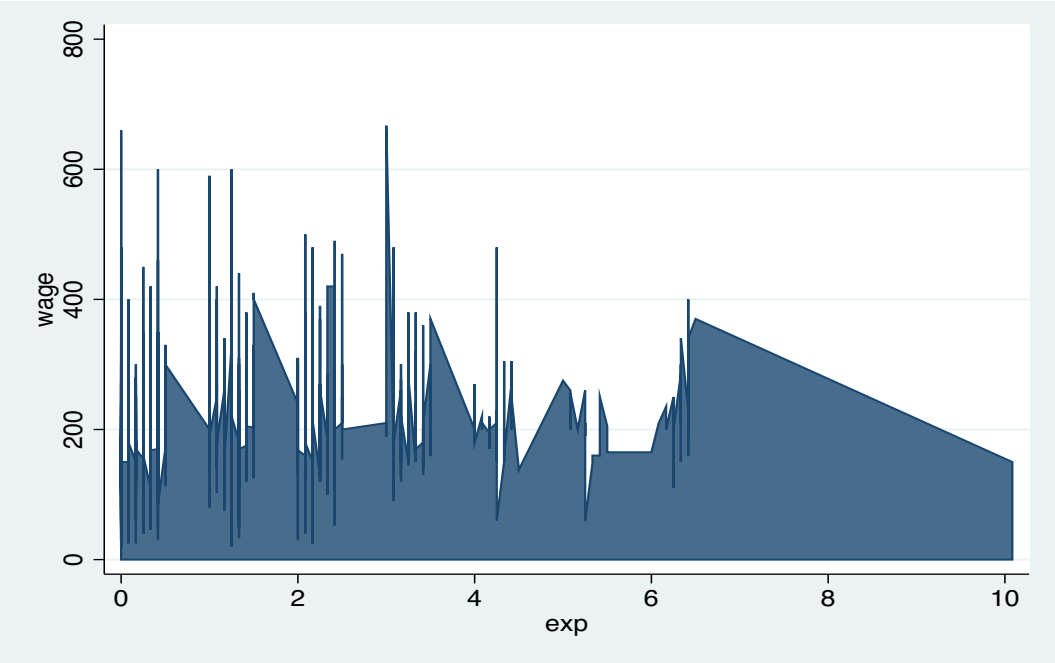
Source: Created by Author using KEEP 2004/2007/2014

Figure A-15: The working experience by education pathway and gender



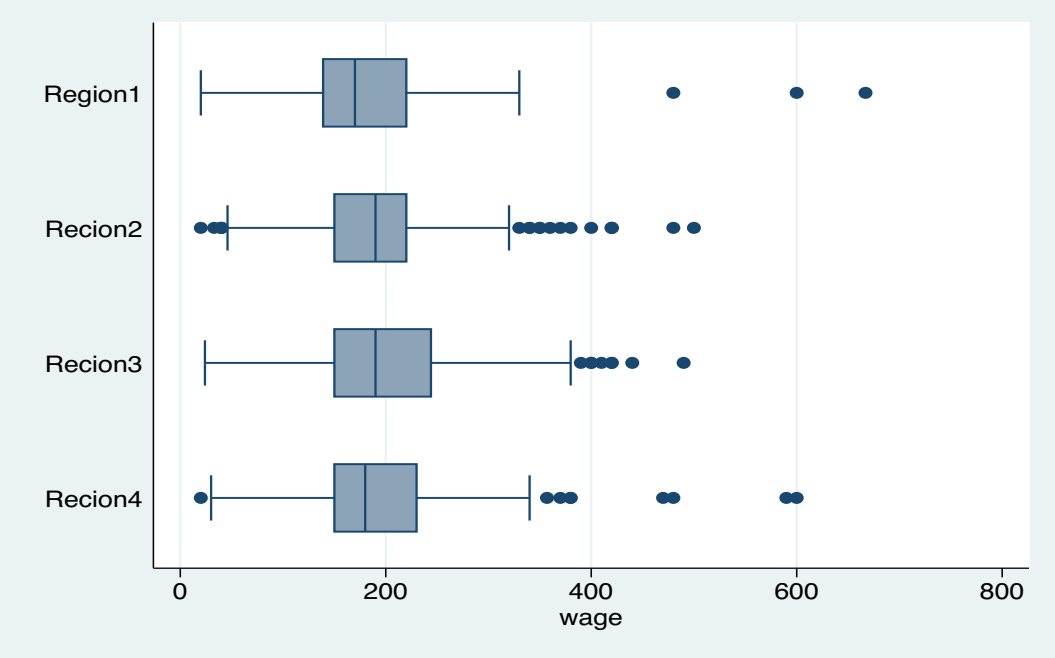
Source: Created by Author using KEEP 2004/2007/2014

Figure A-16: The wage area by working experience



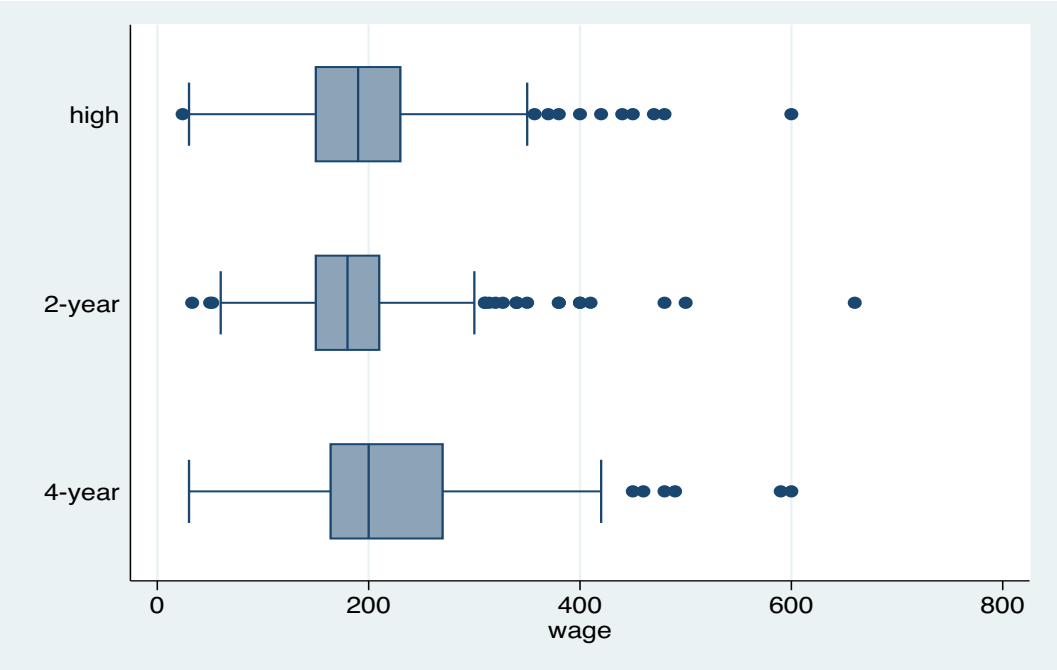
Source: Created by Author using KEEP 2004/2007/2014

Figure A-17: The wage by Region



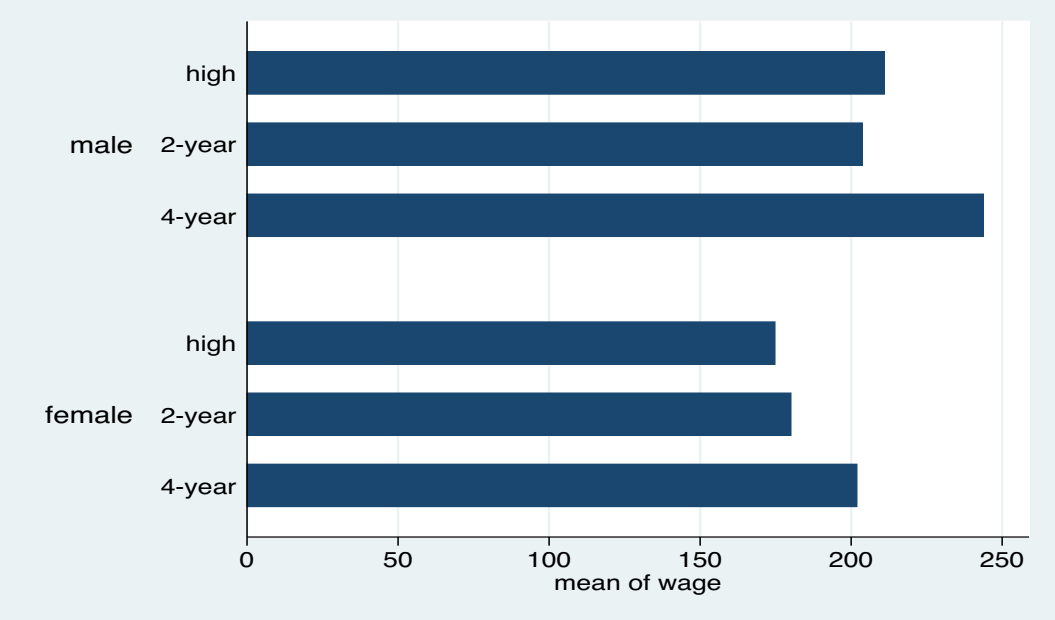
Source: Created by Author using KEEP 2004/2007/2014

Figure A-18: The wage ratio by level of educations



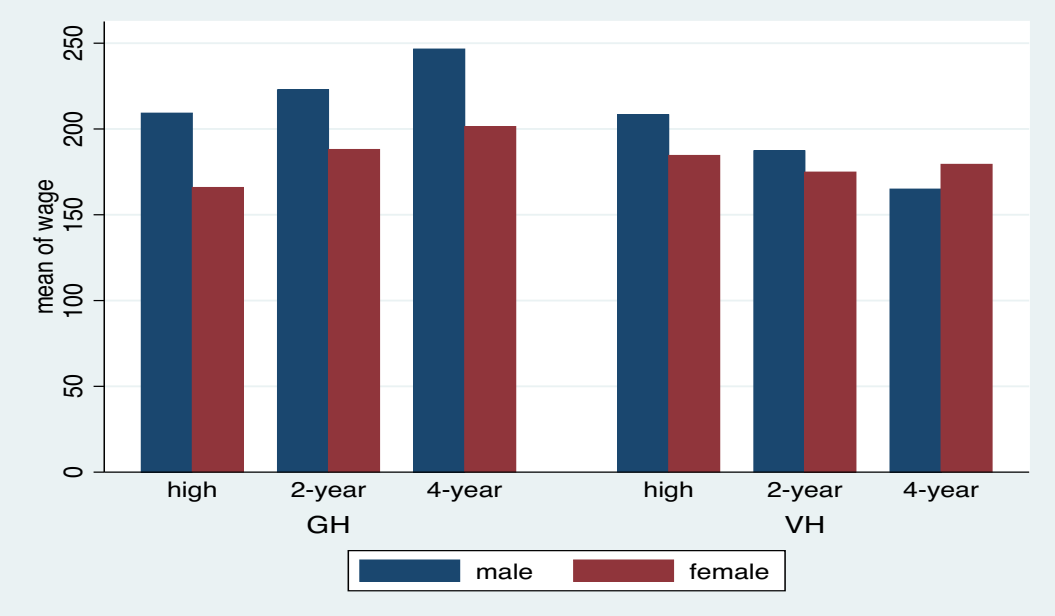
Source: Created by Author using KEEP 2004/2007/2014

Figure A-19: The wage ratio by level of educations and gender



Source: Created by Author using KEEP 2004/2007/2014

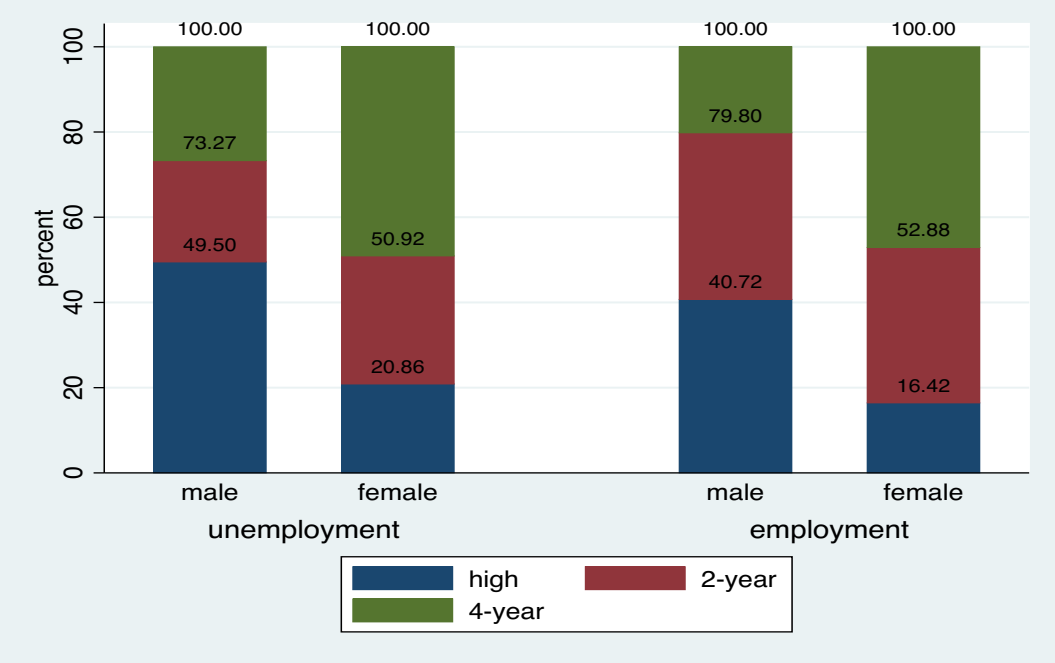
Figure A-20: The average of monthly wage by education pathway



Source: Created by Author using KEEP 2004/2007/2014

Figure A-21: The unemployment and employment ratio by level of education and gender

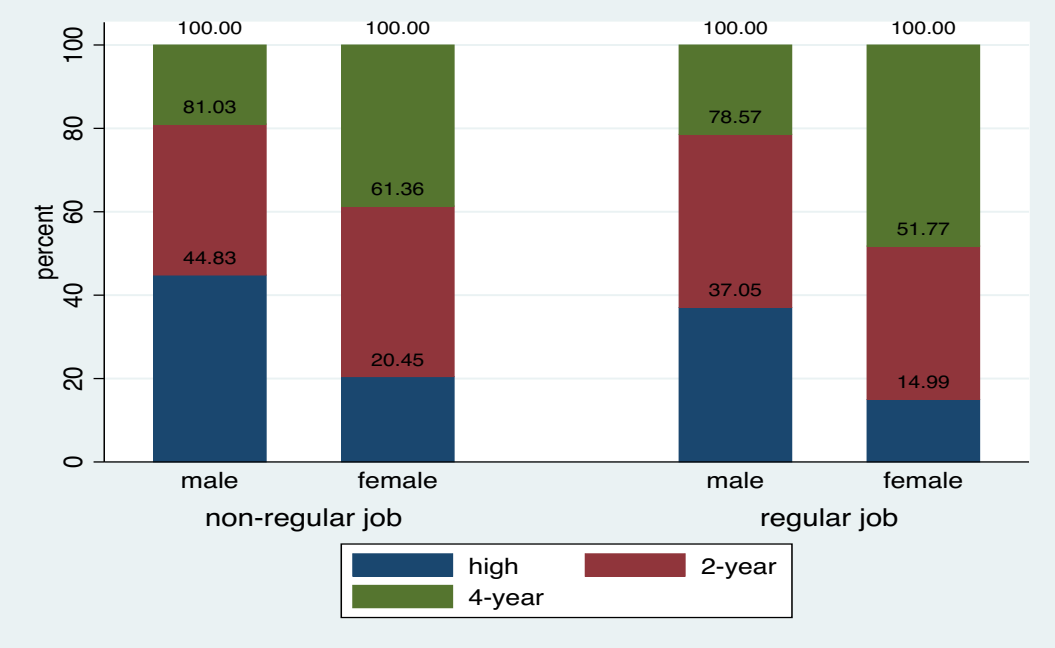
(Unit: %)



Source: Created by Author using KEEP 2004/2007/2014

Figure A-22: The employment status ratio by level of education and gender

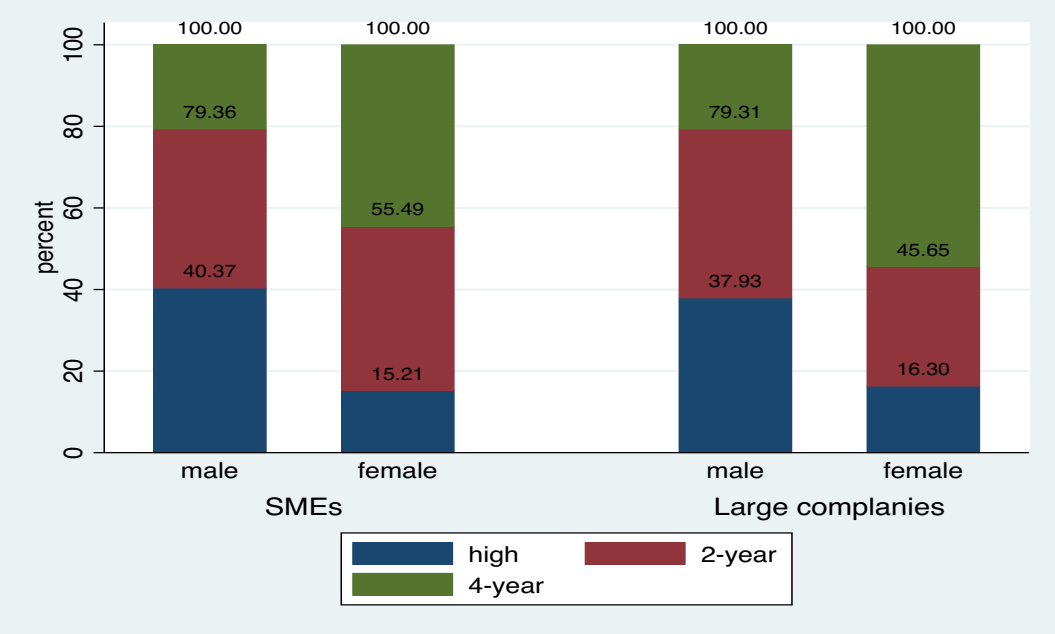
(Unit: %)



Source: Created by Author using KEEP 2004/2007/2014

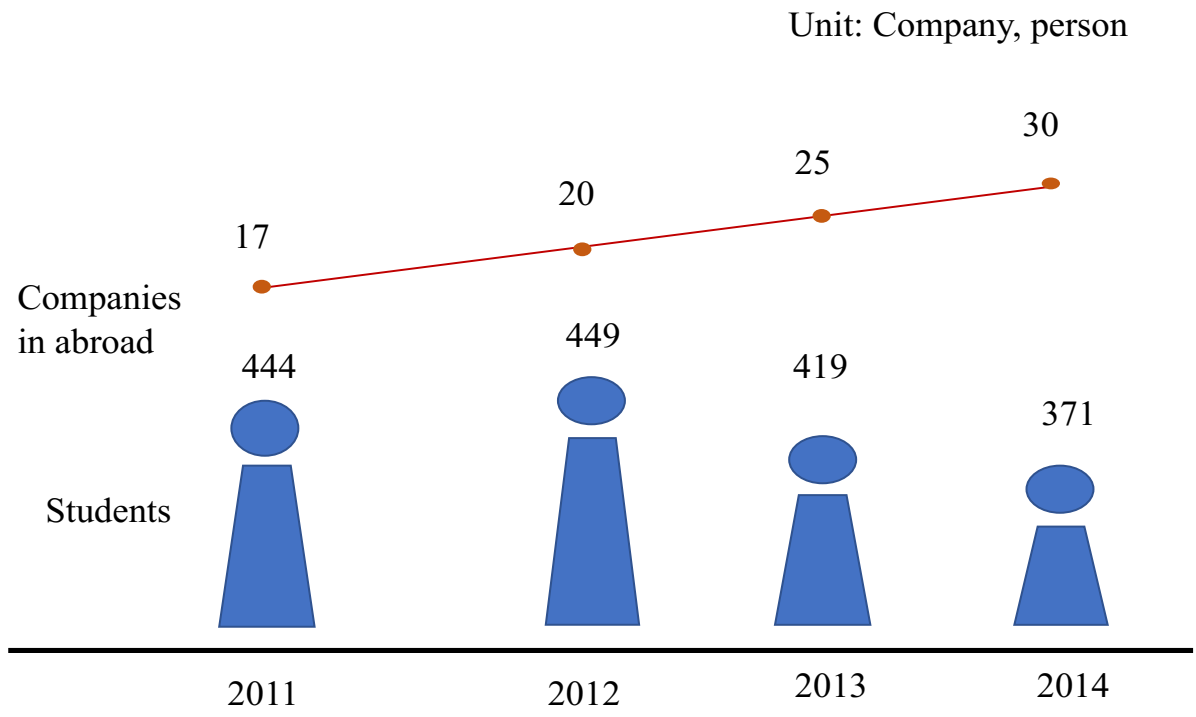
Figure A-23: The characteristics of working place by level of educations and gender

(Unit: %)



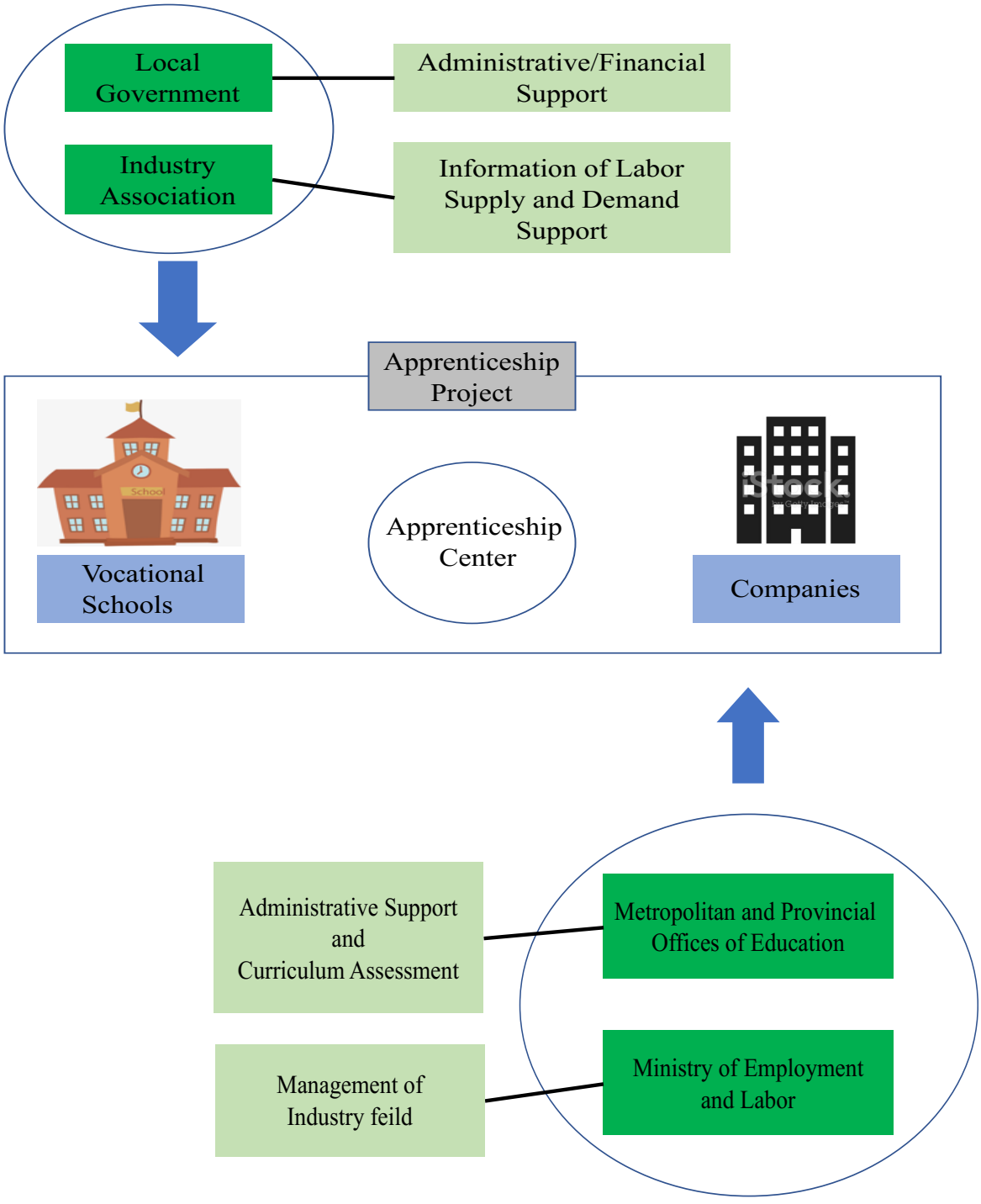
Source: Created by Author using KEEP 2004/2007/2014

Figure A-24: The participants of aboard internship program in vocational high school students



Source: Created by Author using MOE (2018)

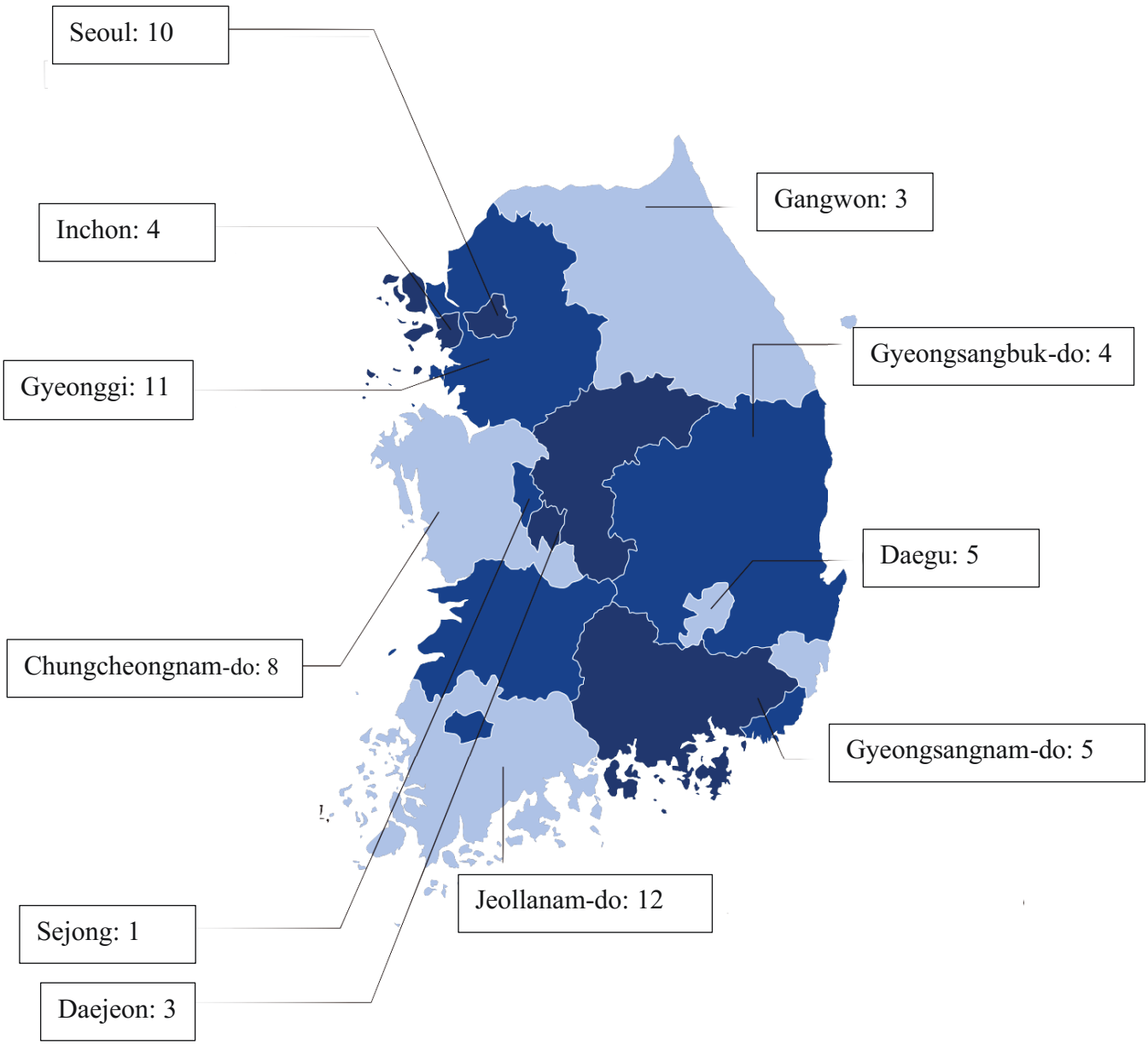
Figure A-25: The process of apprenticeship project between schools and companies



Source: Created by Author using MOE 2018

Figure A-26: The apprenticeship schools across the Korea from 2015

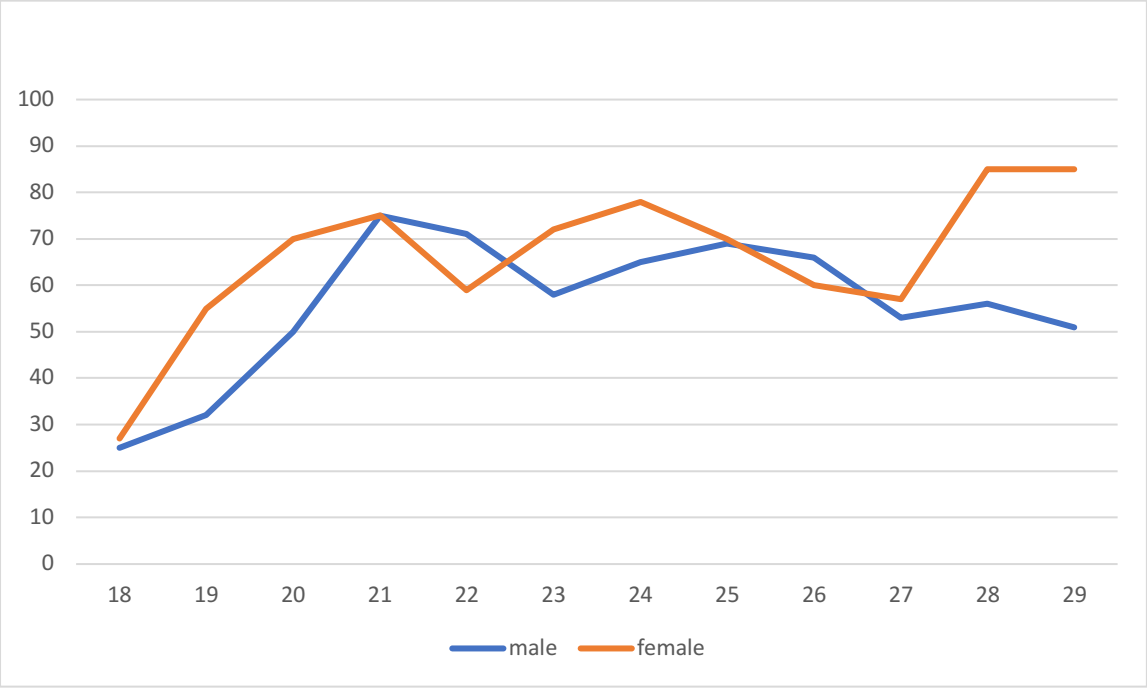
(Unit: School)



Source: Created by Author using MOE (2018)

Figure A-27: The high school graduates' employment rate by gender

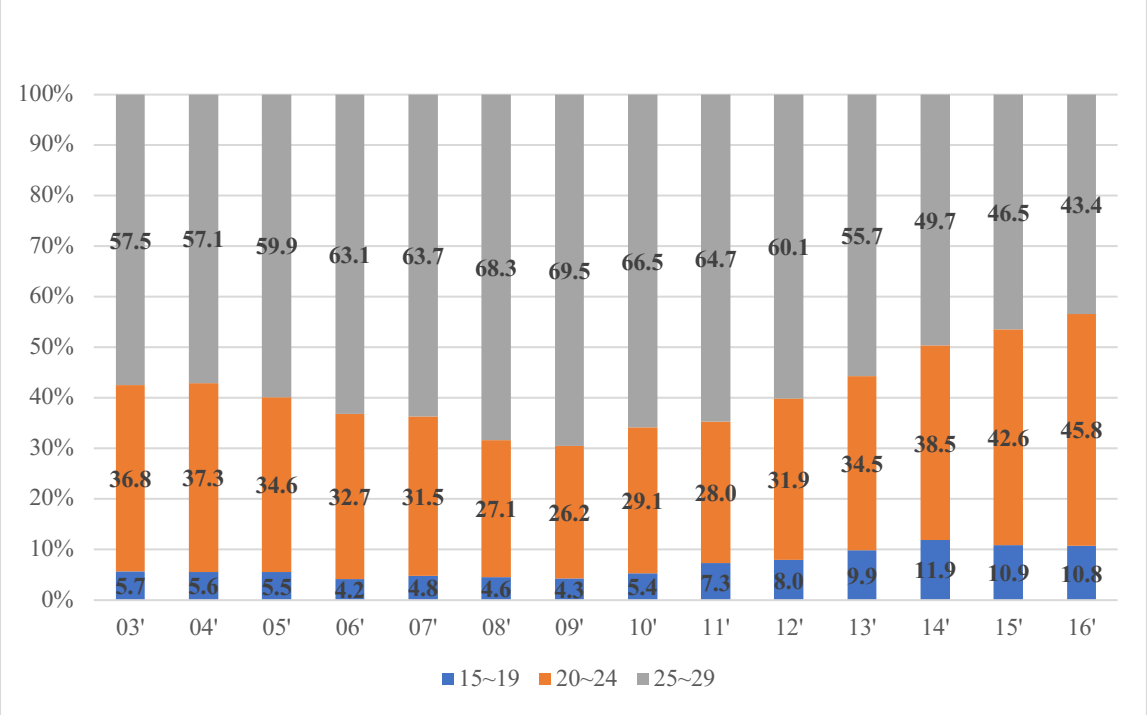
(Unit: %)



Source: Created by Author using Korean Statistical Information Service (KOSIS, 2016)

Figure A-28: The high school graduates' employment rate by age group

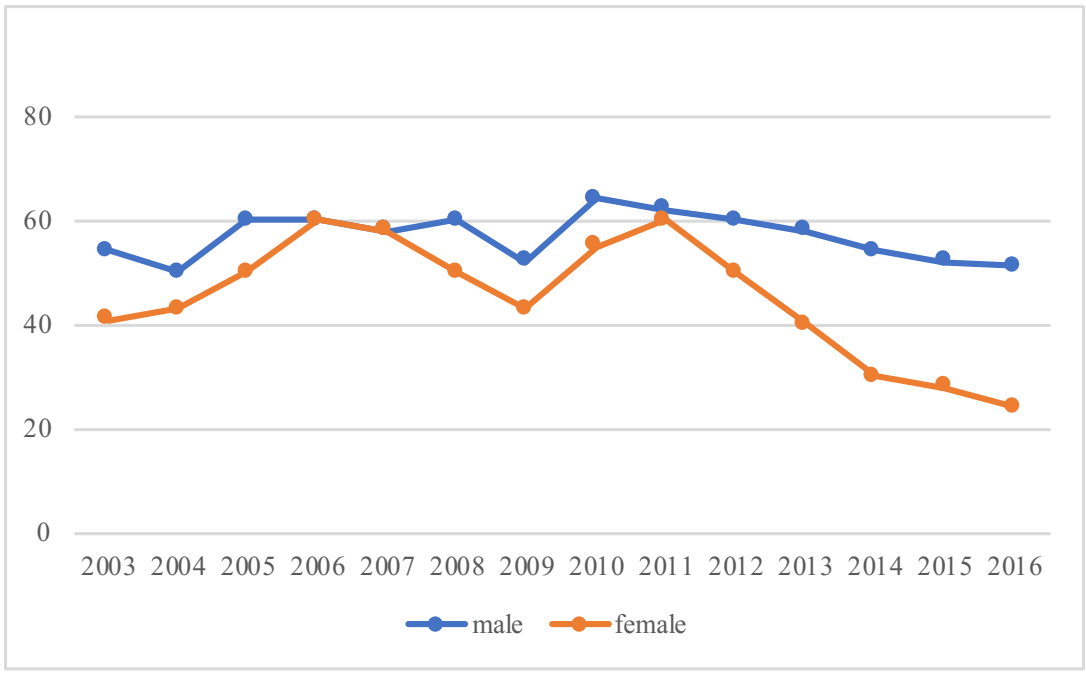
(Unit: %)



Source: Created by Author using Korean Statistical Information Service (KOSIS, 2016)

Figure A-29: The vocational high school graduates' employment rate in mining and manufacturing by age group

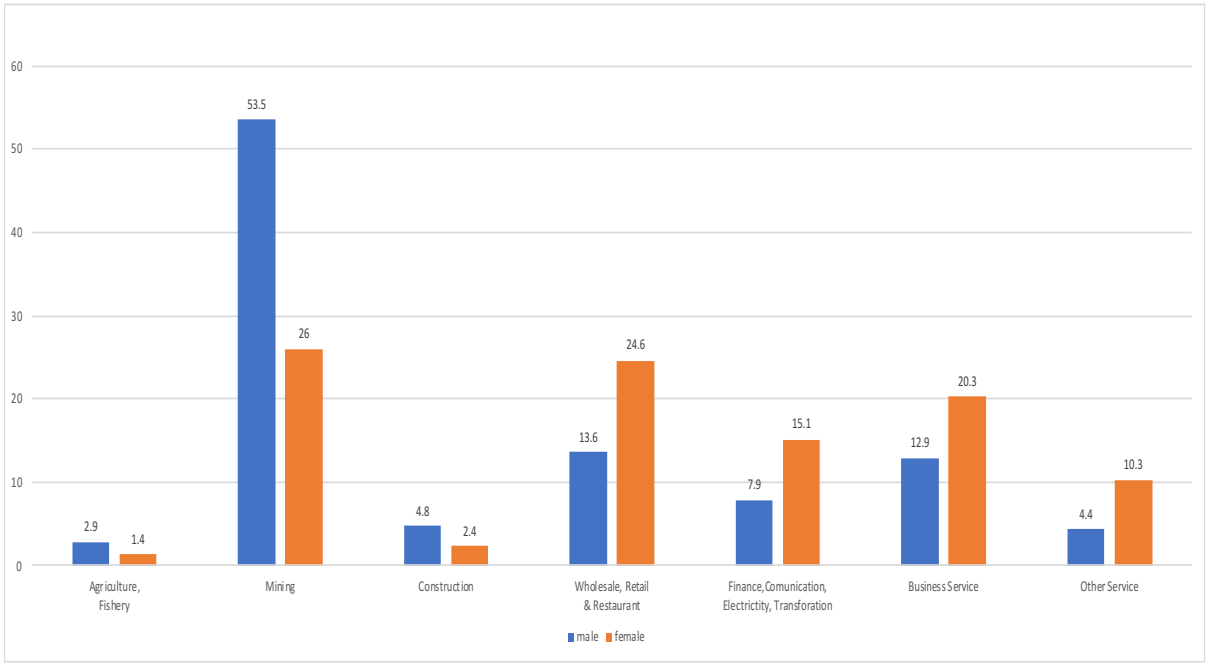
(Unit: %)



Source: Created by Author using Korean Educational Statistics Service (2016)

Figure A-30: The employment rate of high school graduates (Age. 15~24) by industry

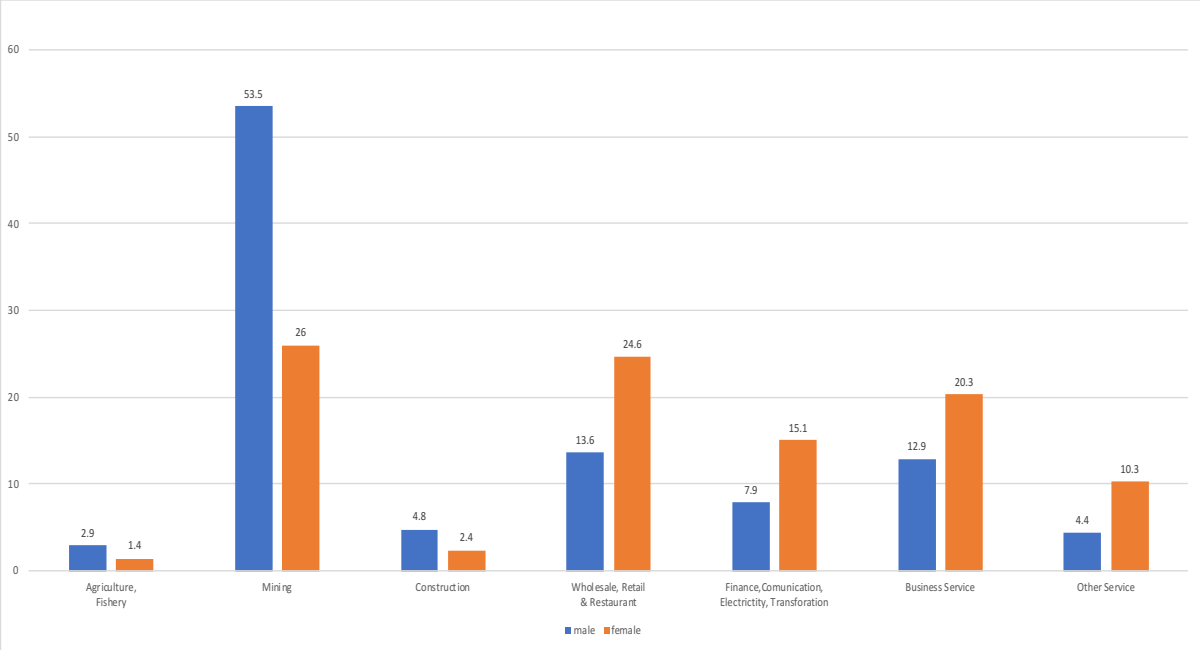
(Unit: %)



Source: Created by Author using Korean Educational Statistics Service (2016)

Figure A-31: The employment rate of high school graduates (Age. 15~24) by industry

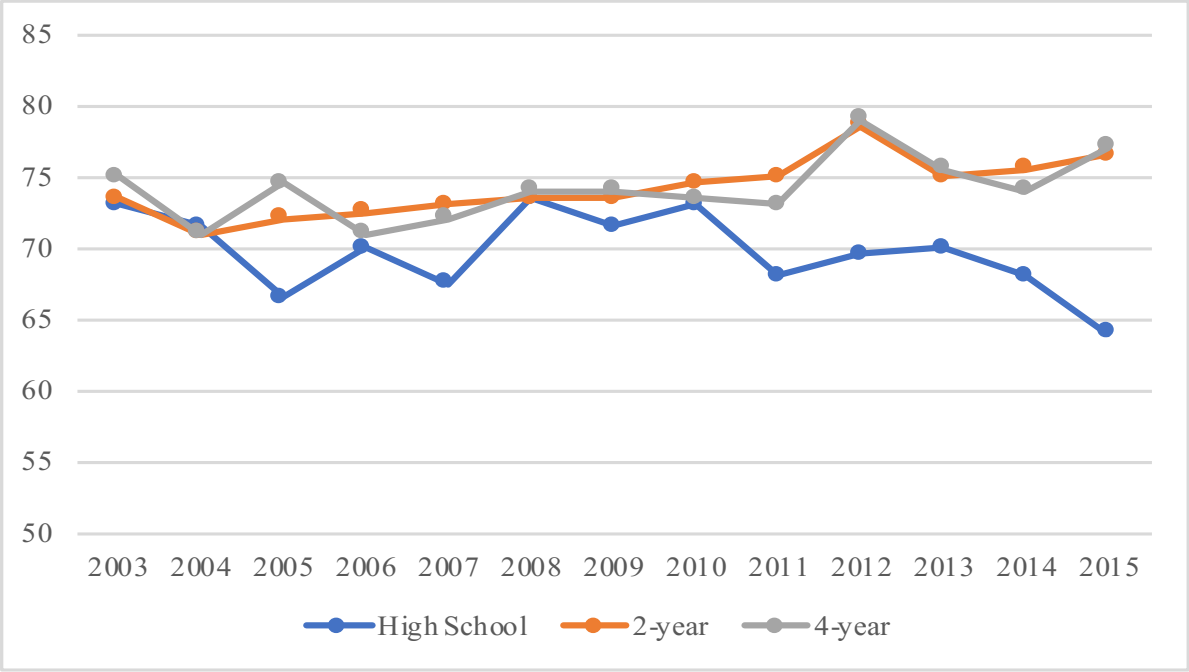
(Unit: %)



Source: Created by Author using Korean Statistical Information Service (KOSIS, 2016)

Figure A-32: The rate of regular-job workers by educational background of workers aged 15 to 29

(Unit: %)



Source: Created by Author using Korean Statistical Information Service

Figure A-33: The employment rate of high school graduates (Age. 15~24) by industry

(Unit: %)

		Professional Work	Office Work	Service Work	Sales Work	Agriculture, Fishery Work	Technical Work	Low-skiled Work	Total
male	Agriculture, Fishery	-	0.03	-	0.06	0.04	-	0.10	0.28
	Mining	-	-	-	-	-	-	-	-
	Manufacturing	4.72	4.61	-	0.11	-	7.98	4.31	49.94
	Construction	0.81	0.64	-	-	0.03	2.58	0.45	4.53
	Finance,Comunication, Electrictity, Transforation	2.01	3.32	-	0.06	0.01	0.70	0.58	7.74
	Wholesale, Retail & Restaurant	0.17	0.85	6.75	5.68	0.05	0.73	4.86	19.13
	Business Service	3.07	6.02	0.49	0.29	0.18	0.63	1.43	12.92
	Other Service	0.55	0.24	2.12	0.03	0.11	2.14	0.23	5.46
	Total	11.33	15.71	9.36	6.23	0.41	14.75	11.97	100.00
female	Agriculture, Fishery	0.05	0.16	-	-	0.05	-	-	0.26
	Mining	-	0.02	-	-	-	-	-	0.02
	Manufacturing	1.96	13.08	-	0.18	-	0.36	1.65	33.41
	Construction	-	1.07	-	-	-	-	-	1.07
	Finance,Comunication, Electrictity, Transforation	1.13	15.41	-	0.18	-	0.08	-	16.93
	Wholesale, Retail & Restaurant	0.45	7.79	2.98	8.32	-	0.50	1.31	21.34
	Business Service	3.65	14.08	1.71	0.34	0.06	-	0.72	21.20
	Other Service	0.03	1.41	4.13	0.13	-	0.05	-	5.76
	Total	7.27	53.01	8.82	9.16	0.11	1.00	3.68	100.00

Source: Created by Author using Korea Employment Information Service (KEIS, 2013)

Figure A-34: The female students' rate by vocational education major

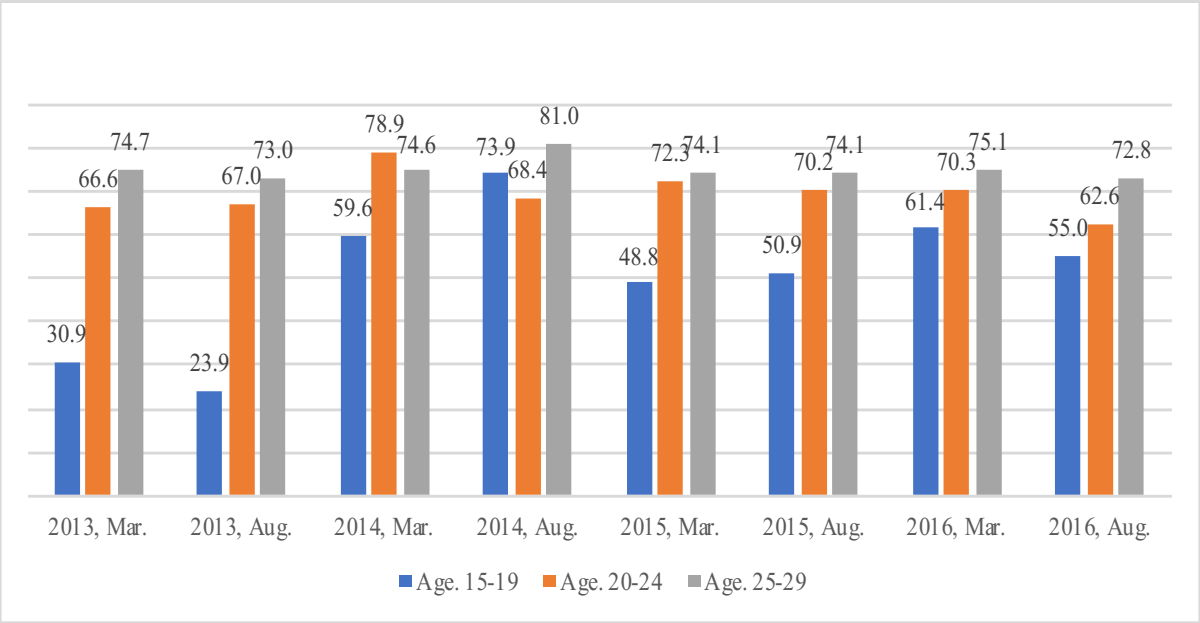
(Unit: %)

	Students			Graduates		
	all (A)	female (B)	ratio (B/A)	all (A)	female (B)	ratio (B/A)
Business, Finance	63,225	45,174	71.4	21,622	16,226	75.0
Health, Social Welfare	8,281	7,220	87.2	2,959	2,644	89.4
Desine, Culture Contents	24,571	15.049	61.2	10,743	6,637	61.8
Beauty, Tourism leisure	18,028	13,958	77.4	5,923	4,683	79.1
Cooking	8,080	4,924	60.9	2,716	1,713	63.1
Construction	16,068	1,998	12.4	5,579	775	13.9
Engine	36,144	763	2.1	11,828	312	2.6
Metarial Engineering	786	93	11.8	331	46	13.9
Chemical Industry	5,839	1,530	26.2	2,081	628	30.2
Fiber, Cloth	2,428	1,731	71.3	868	629	72.5
Electric, Electronics	32,428	2,289	7.1	10,800	898	8.3
Internet, Information	25,644	11,132	43.4	11,290	5,468	48.4
Food Engineer	4,940	2,458	49.8	1,778	914	51.4
Printing & Publication Crafts	279	212	76.0	132	107	81.8
Environment System	437	224	51.3	162	96	59.3
Agriculture, Forestry	8,167	2,602	31.9	2,981	1,094	36.7
Ship Navigation	693	4	0.6	275	4	1.5
Others	28,935	12,558	43.4	8,269	2,777	33.6
Total	284,973	108,885	43.5	100,337	45,651	45.5

Source: Created by Author using Korean Educational Development Institute (KEDI 2016)

Figure A-35: The regular-job workers of vocational high school students' rate by age group (male)

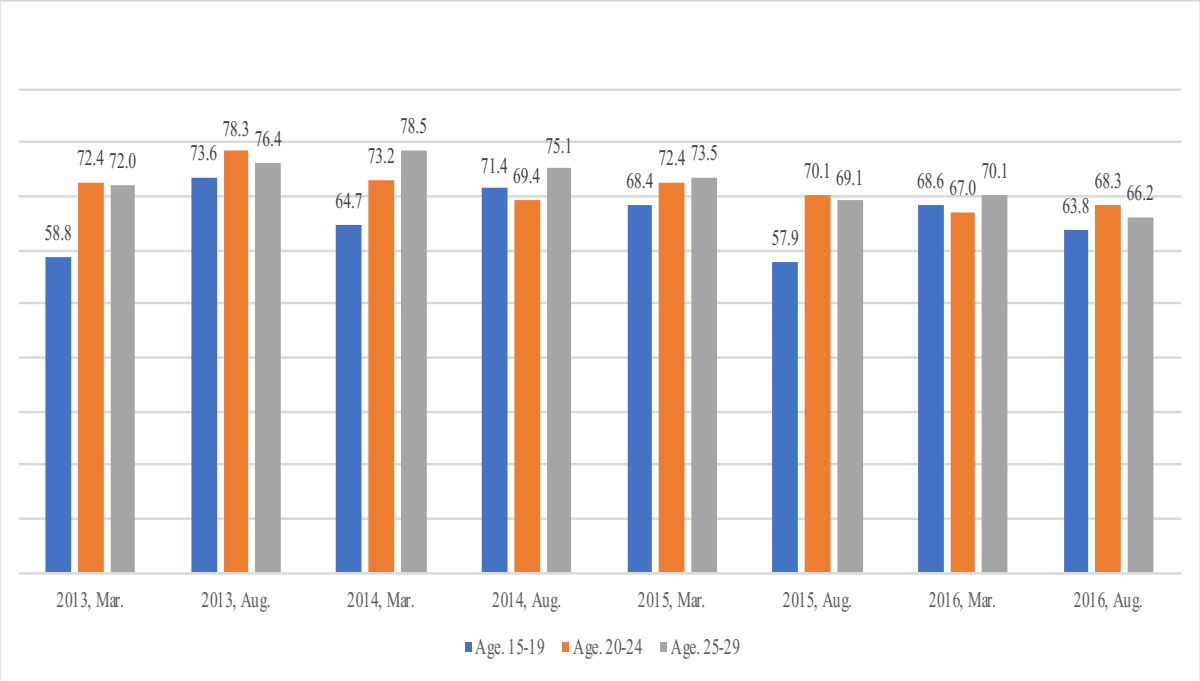
(Unit: %)



Source: Created by Author using Korean Statistical Information Service (KOSIS)

Figure A-36: The regular-job workers of vocational high school students' rate by age group (female)

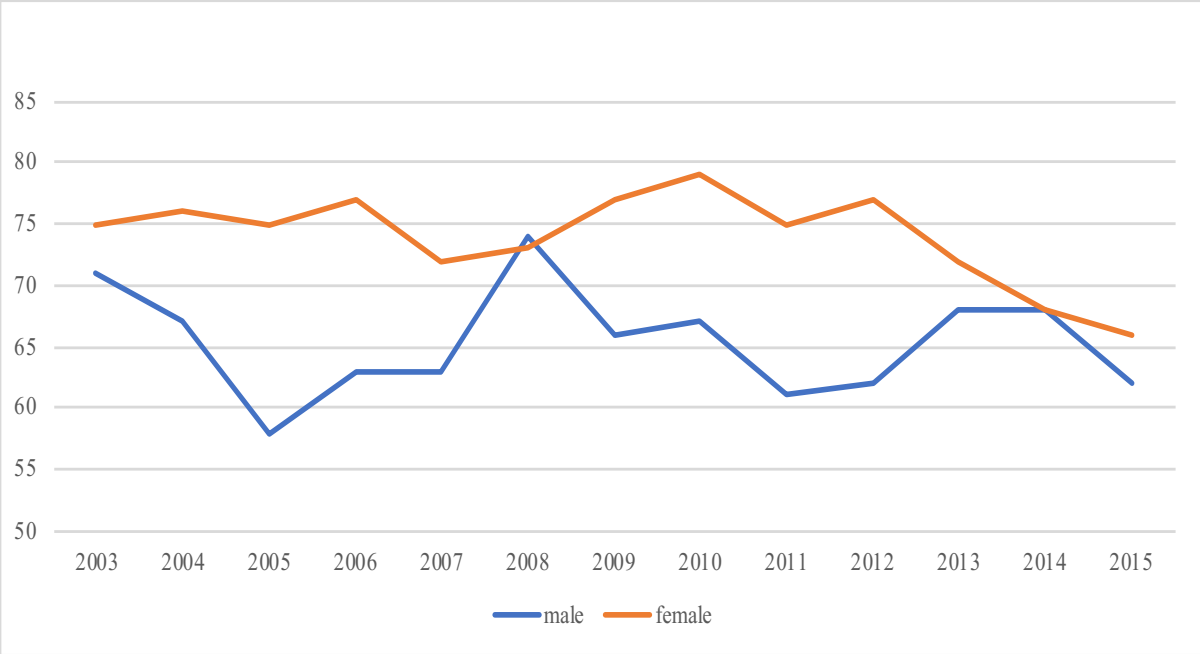
(Unit: %)



Source: Created by Author using Korean Statistical Information Service (KOSIS)

Figure A-37: The rate of regular-job workers by educational background (high school)

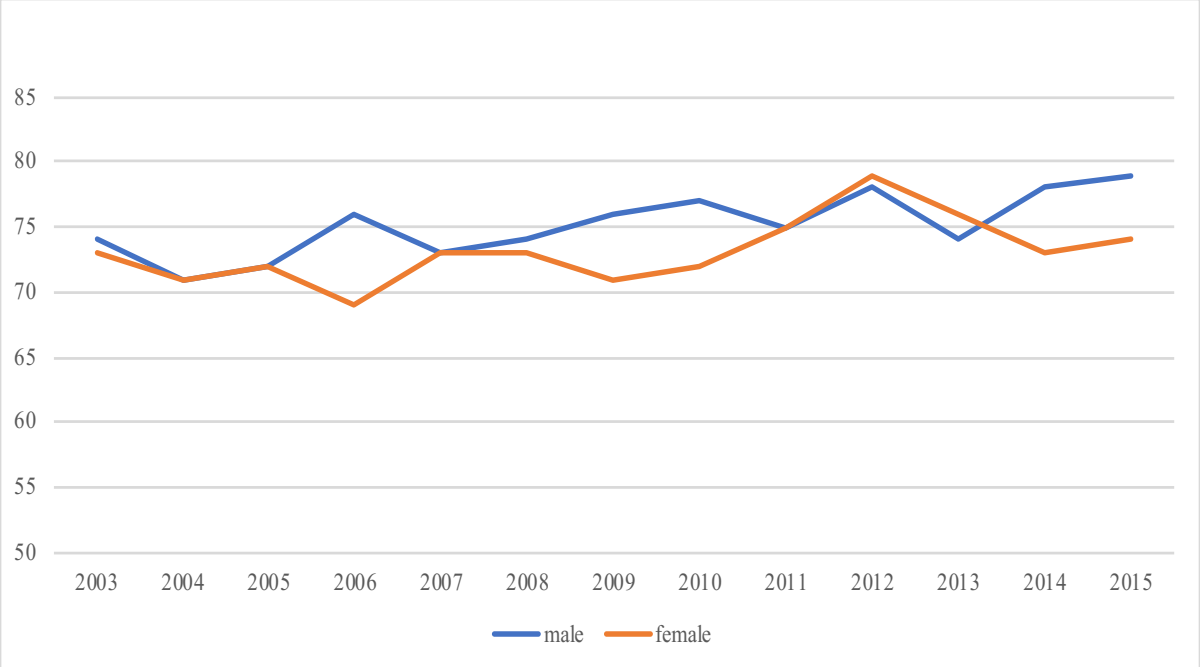
(Unit: %)



Source: Created by Author using Korean Statistical Information Service (KOSIS)

Figure A-38: The rate of regular-job workers by educational background (2-year university)

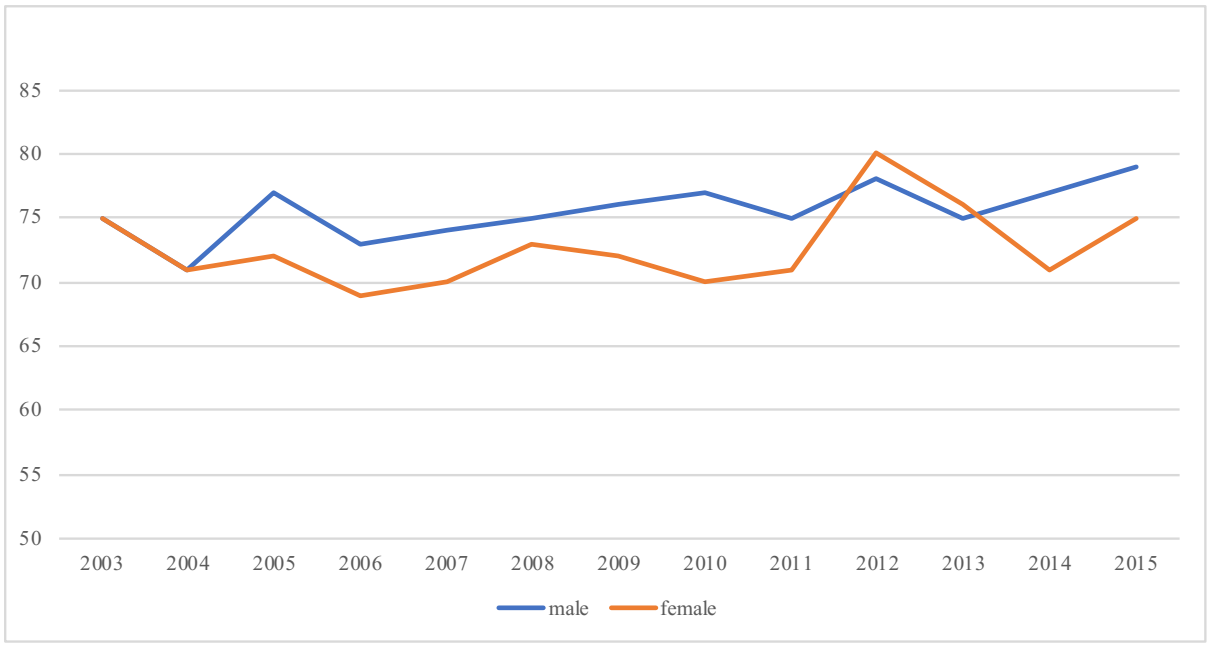
(Unit: %)



Source: Created by Author using Korean Statistical Information Service (KOSIS)

Figure A-39: The rate of regular-job workers by educational background (4-year university)

(Unit: %)



Source: Created by Author using Korean Statistical Information Service (KOSIS)

Figure A-40: The Organization of the Ministry of Education

Minister of Education	
Policy Advisor to the Minister	Spokesperson
	Public Relations Division
	Communications Support Team

Vice Minister of Education	
Inspector General	Social Policy Cooperation Bureau
Audit and Inspection Division	
Anti-corruption and Integrity Division	
Plnning and Audult for Private Schools Division	

Planning and Coordination Office	General Services Division	Higher Education Policy Office	School Innovation Support Office
Policy Planning Bureau		Higher Education Policy Bureau	School Innnovation Policy Bureau
		Higher Eduation Policy Division	School Innnovation Policy Division
Planning Division		National University Policy Division	Teacher Policy Division
Budget Division		National University Resources Management Team	Teacher Training Division
Organization and Management Innovation Division		Private University Policy Division	Education Coorperation Division
Government-issued Histroy Textbook Investgation Team		Private Education Innovation Support Division	National Curriculum Policy Bureau
Regultion Reform and Legal Affairs Division		University Affairs and Academic Research Policy Bureau	High School Education System Innovation Team
Emergency and Safety Division		Academic Research affairs Division	Textbook Policy Dvision
Interantional Cooperation Bureau		University Financial Aid and Scholarship Division	Northeast Asian Education Policy Team
International Education Cooperation Bureau		**Vocational Education Policy Bureau**	Teaching and Learning Evaluation Division
Overseas Korean Education Division		Edjucation Policy for Employment Affairs Division	Citizenship Education Division
		University-Industry Cooperation Policy Division	
		Secondary Vocational Education Policy Division	
		Junior College Policy Division	
		Junior College Corporation Team	

Educational Welfare Policy Bureau	Student Support Bureau	Lifelong Learning and Future Education Bureau	Educational Safety Information Bureau
Educational Welfare Policy Division Division	Educational Opportunity Promotion Division	Future Education Plannning Division	School Safety Division
Local Educational Finance Division	School Life and Culture Division	**STEAM Education Support Team**	Education Facilities Division
Local Educational Finance and Analysis Team	Student Health Pollicy Division	Lifelong Education Policy Division	Educational Information Management Division
Early Childhood Education Policy Division	Special Education Policy Division	Career Education Policy Division	Information Security Team
After-school Care Policy Divison	Career and Lifelong Education for Students with Disablities Team	e-Learning Divion	Educational Statistics Division

Source: Created by Author based on MOU (2018)