Effects of Vocational Education on Wage: Case of the Philippines

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Abstract

Vocational Education and Training (VET), which creates skilled labor force through imparting practical skills is instrumental in providing employment opportunities to individuals as well as it enhances the productivity of firms. The Philippines is going to adopt K to 12 education program by restructuring the length of secondary education from 2 years to 4 years as well as will incorporate an option for formal Technical and Vocational education with a view to mitigating the shortage of skilled workers in the manufacturing sector along with developing middle-income level workers. This study has focused on detecting the positive wage effects to the skilled workers, who received VET after completing secondary eduction in the Philippines. In literature, it is rare to find studies that have examined the Wage Effect of Vocational education based on general education in the Philippines. Deploying the Mincerian Earnings Function, this study discovers the highest ROR for Vocational Education with elementary education. However, the ROR for vocational education after high school, which is affected by the duration of vocational education, can exceed the ROR of General Education. Moreover, the private sector manufacturing firms usually tend to offer good wages. Thus, if the government is successful in making vocational education more popular with its efforts, then a lot of workers who are currently working without pay can be absorbed in the private sector or work as self-employed which will ensure them wage. It is also expected to reduce underemployment and unemployment rates in the Philippines.

JEL Classification: B23, C21, I25, J24

Keywords: TVET, Skills Development, Philippines' education, Education returns, Mincer earning function, Cross-sectional Data, OLS, Heckman model

1. Introduction

1. 1 Background

"Vocational Education and Training (VET) could be considered as it imparts practical skills, which allow individuals to engage in a specific occupational activity," (Agrawal, 2013). VET is instrumental in providing employment opportunities to individuals as well as it enhances the productivity of firms, which reaffirmed that "Vocational education and training are indispensable instruments for improving labor mobility, adaptability and productivity, thus contributing to enhancing firms' competitiveness and redressing labor market imbalances," (Caillods ,1994).

The Philippines will adopt K to 12 education program by restructuring the length of secondary education from 2 years to 4 years. The additional 2 years will include and option for formal Technical and Vocational education. This is being done with the aim of mitigating the shortage of skilled workers in the manufacturing sector and to develop middle-income level workers[1] (See Figure 1). Henceforth this paper will refer to the term "vocational education based on general education" to mean a person who takes vocational education after general education not always in succession due to a decision to gain work experience before enrolling for the vocational education. It could also be stressed that in the Philippines, the returns to vocational education depends substantially on the general level of economic development, the progress of private sector which raises the availability of private sector jobs requiring middle-income level human capital and most importantly on the successful implementation of the prudent policies[2].

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[1] Department of Education, Republic of the Philippines (http://www.deped.gov.ph/k-to-12/curriculum-guides)

[2] Technical Education and Skilled Development Authority, Republic of the Philippines (http://www.tesda.gov.ph/About/TESDA/47)
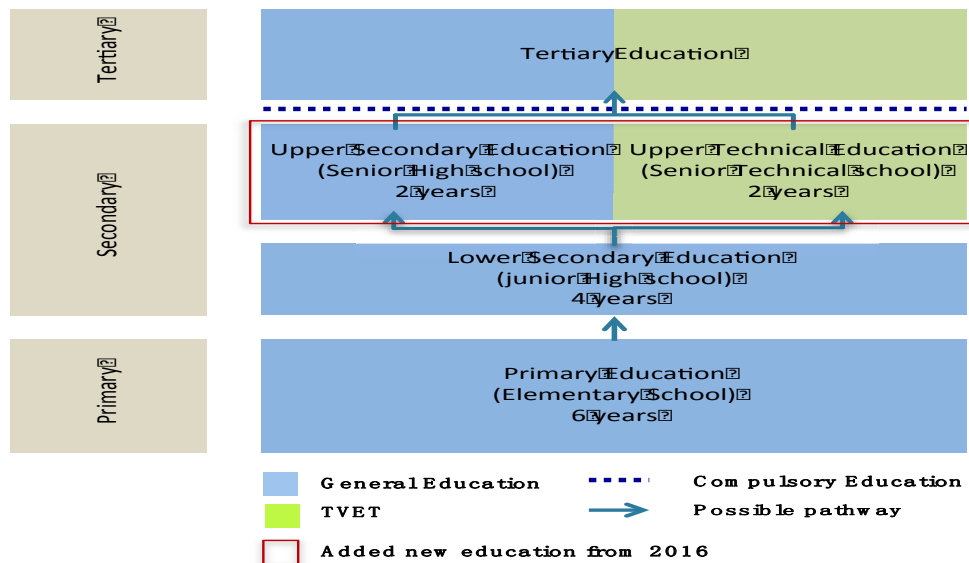
Figure 1. The Philippines New education system (K to 12) in 2016
Source: Represented by Author based on The Philippines New education system (from 2016)

       The Technical and Vocational education will start at senior high school with a two-year curriculum ensuring access to vocational tertiary education. Technical and vocational education is provided by Government of Philippines or private institutions, which accredited and approved by the Technical Education and Skills Development Authority (here after TEDSA).

       TEDSA was established through an enactment in 1994 aiming to encourage the full participation of industry, labor, local government units and technical-vocational institutions for skill development through the merging different entities. TEDSA offers center-based programs, community-based programs and enterprise-based training, or the Alternative Learning System (ALS) ranging in duration from a couple of weeks to two-year diploma courses. These programs have courses like automotive technology, computer technology, and electronic technology; service courses such as caregiver, nursing aide, hotel and restaurant management; and trading courses such as electrician, plumber, welder, automotive mechanic, diesel mechanic, heavy vehicle operator and practical nursing. Upon graduation, the students are provided with the relevant certification from TESDA[1].

       Vocational education in the Philippines dates back to 1994 when TVET and other private Technical institutions where set up to cater for the technical and vocational training needs of the Philippines educational system. The NTESDP (National Technical Education and Skills Development Plan), a strategic management plan created by TESDA for TVET is currently in its 3rd phase.

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[1] Technical Education and Skilled Development Authority, Republic of the Philippines (http://www.tesda.gov.ph/About/TESDA/10)

Table 1. Employed TVET Graduates by Priority Sector: Philippines (2008)

Priority sector	Employed	
Agriculture and Fishery	1,039	52.90%
Automotive	8,398	56.00%
Construction	6,135	61.80%
Electronics	4,444	54.40%
Footwear and Leather goods	66	100.00%
Furniture and Fixtures	112	77.30%
Garments	1,104	45.10%
Health, Social and Other Community Development Services	20,666	47.30%
Heating, Ventilation Airconditioning and Refrigeration	1,320	65.30%
Informaiton and Communications Technology	24,136	56.10%
Land Transportation	915	77.40%
Maritime	1,010	48.30%
Metals and Engineering	7,549	60.80%
Processed Food and Beverages	4,490	76.20%
Tourism/Hotel and Restaurant	11,388	52.60%
Others	4,681	63.20%

Source: 2008 Impact Evaluation Study of TVET programs

Table 1 shows that result of 2nd phase of NTESDP for evaluating the mismatch between Job and skills. The 3rd phase of NTESDP is focusing on "improved productivity and efficiency" from the 2nd phase of NTESDP that had a number of challenges including Lack of available training centers for community-based programs, Differences in quality of TVET trainers across regions, Limited labor market absorption of TVET graduates in manufacturing jobs, Low quality and relevance of TVET particularly for school-based and privately-run programs and Low recognition of the importance of labor market relevance in TVET etc.

1.2 Problem Statement

The Government of Philippines has identified a number of problems in the labor market including: (1) High underemployment and unemployment rate, (2) Small range of manufacturing sector with a lack of labor force (3) Stagnant tertiary school enrollment affecting human capital development[1]. Firstly, regarding underemployment and unemployment rate, Table 2 shows unemployment is largely prevalent among young workers (15-24 years old). In the Philippines, the transition from school to work for youth and college graduates is far from smooth.

In addition, many young workers struggle to find their place in the labor force, changing not only employers but also occupations multiple times before they settle down to stable jobs. One way to address this transition problem is to link students more closely to jobs through vocational education programs and through apprenticeships with firms (Ryan, 2001). Underemployment, another big concern, is prevalent mainly in regions where agriculture continues to play a dominant role. With limited wage employment opportunities, majority of the working population there engages in some other forms of economic activities which is little or inadequate. So, people are often searching for additional work or sources of income, as they are not counted as unemployed rather underemployed within the local workforce.

So, from the above discussion, it is clear that economic growth and development, poverty reduction through addressing unemployment and underemployment could be linked with vocational education, where VET could work as a remedy for these problems. The Philippines has a large urban population where almost fifty percent of people live in urban areas[2].

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[1] Culled from a report on Development of Labor and Employment, Republic of the Philippines, (http://www.dole.gov.ph/fndr/bong/files/PLEP-26%20April%20version.pdf)

[2] Philippine Statics Authority, Republic of the Philippines, (https://psa.gov.ph/statistics/survey/labor-force)

Table 2. Unemployment & Underemployment situation

Indicator	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Labor Force Participation Rate						64.1	66.3	64	63.9	64.4	63.3
Employment Rate						92.7	93.2	93	92.8	93.2	94.4
Unemployment	7.8	8	7.3	7.4	7.5	7.3	6.8	7	7.2	6.8	6.6
(15-25 years old)	17.2	17.8	16.8	17.4	17.6	17.6					
(colleage educated)	11.2	11.2	10.1	10.6	10.7	NA					
Underemployment Rate	21	22.6	20.1	19.3	19.1	18.8	19	22.8	19	18.4	17.7

Source: Philippine Statistics Authority

Secondly, Figure 2 shows for the share of labor by industry that the service sector deploys almost 53% of the total labor force, which indicates the importance of service sector over the manufacturing and the agriculture sectors in the Philippines, as mentioned earlier. But the labor force in the manufacturing industry adds more value. Furthermore, mechanization and the skilled labor force in agriculture sector are necessary for expansions. Still agriculture along with the agricultural exports does make big contributions to the Philippines economy (Coleman, Kalish, Konigsburg & Navarro, 2014).

Thus, for the above reasons, the Philippines as a Southeast Asian middle-income country has been experiencing development by a moderate and steady GDP growth rate which is quite high within the region averaging 5.4% for the past 10 years. However the pace of poverty reduction is sluggish and it is evident from the quite low per capita GDP[1].

One avenue through which these problems could be addressed is a more skilled labor force where vocational and technical education can play a pivotal role in skill development. It will not only ensure industrial expansion but also raise the productivity of the agriculture, which ultimately leads to economic growth.
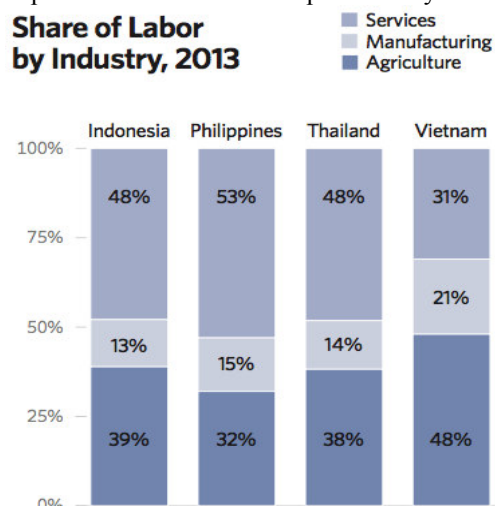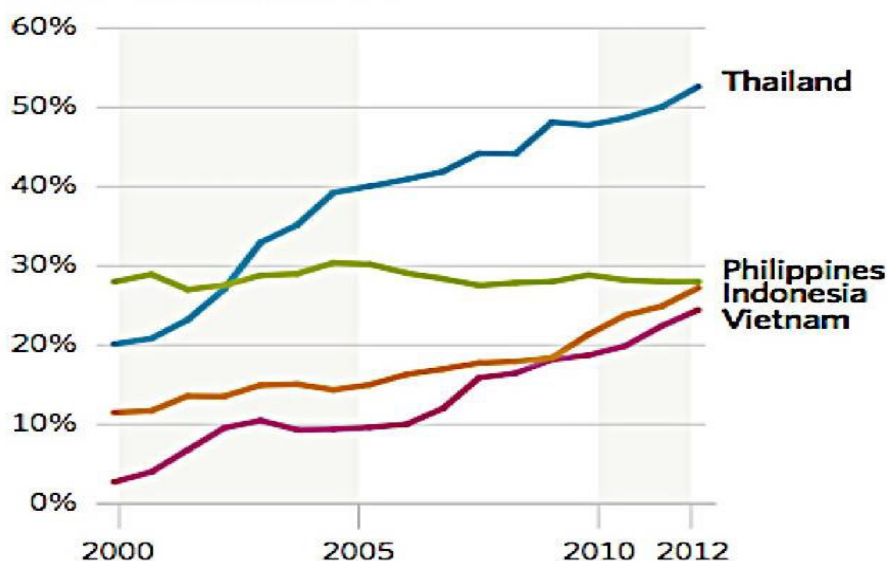

Figure 2. Share of Labor by Industry in Southeast Asia
Source: Central Intelligence Agency, World Factbook: East and Southeast Asia

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[1] Philippine Statistics Authority, Republic of the Philippines (2015)

GROSS ENROLLMENT RATIO

Figure 3. Tertiary School Enrollment in Southeast Asia
Source: World Bank, "School Enrollment, Tertiary (% Gross),"
http://data.worldbank.org/indicator/SE.TER.ENRR (accessed July 2, 2014)

Thirdly, Figure 3 depicts the comparison amongst some Southeast Asian countries regarding tertiary school enrollment ratio. A rapid expansion of the secondary and tertiary education system must be supported by population growth, incorporation of technology to escape poverty and boost the economy (William, 2014). It has been said that broad-based growth in tertiary education is precisely how the Republic of Korea achieved its successful transition from middle-income to high-income status. The data for last 15 years shows that the Philippines' tertiary education system has been more or less stagnant which has hindered its development. It could be interpreted that the secondary school system cannot support the tertiary level properly with its current 2years duration. It is believed that extending tertiary education with the adoption of the K to 12 program by incorporating formal vocational education up to the high school level will eventually raise the overall enrollment rate and create more job opportunities in the manufacturing sector.

1.3 Research Questions
The importance of education and more precisely the significance of vocational education for creating a skilled labor force to promote economic development are well recognized (Bennell, 1996). This paper attempts to answer the following research questions:

1. How general education or vocational education based on general education up to secondary school affects Wages in the Philippines?
2. Which private sector jobs could be suitable for an individual who received vocational education based on general education?

1.4 Objectives of the study
The prime objective of this study is to analyze the Effect of Vocational Education on Wage. The specific objectives in this regard are:

1. To analyze the Effect of different types of education on Wage with Mincerian earnings function.
2. To estimate the ROR for general and vocational education.

Secondly, this study would also enable us to explore the prospective job sectors where the workforce with vocational education can contribute immensely. The objectives are:

1. To identify the job sectors which need skilled workers through vocational education in the Philippines.
2. To estimate the Effect of job sectors on Wage.

1.5 Significance of the study
Several studies have focused on the Wage Effect of education considering general and vocational educations separately as well as the calculation of the Rate of Return (ROR) for vocational courses spanning 2 years, where the incumbent workers received vocational education right after completing different levels of general education. This kind of estimation hinders the precise approximation of the Effect of wage. Firstly, the vocational courses

do vary in length widely. Secondly, in the Philippines, many workers do receive vocational education even with job experience.

The uniqueness and significance of this study is that it attempts to analyze the Wage Effect of vocational education with general education unlike previous studies. In literature, it is rare to find studies that examine the Wage Effect of vocational education based on general education in the Philippines. This study will consider all workers with any form of vocational education.

The findings of this study could also be at justification for the introduction of the "K to 12" program from 2016 which will formally incorporate vocational education. It is based on the premise that it would contribute to the lack of skilled labor force in the manufacturing sector through creating a more skilled labor force.

2. Literature Review

2.1 ROR for vocational education vs. general education

There is an intense debate in literature among the economists and education experts regarding the impact of vocational education on wages. Bishop and Mane (2004) have revealed that students taking a certain percentage of vocational subjects in secondary school would more likely to earn higher wages and appear higher participation rates compared with academic education students. Meer (2007) has found positive Wage Effects of Vocational education. Myck and Vignoles (2002) have confirmed that academic education leads to higher returns, but also have documented that the majority of vocational education programs increase earnings relative to on vocational qualification. In this analysis, the endeavor has been to calculate the ROR in general and vocational education together to comment more precisely about the debate in the context of the Philippines. This study has also tried to verify if vocational education followed by academic education can fetch more return than the only one type of education. In this segment, a comprehensive overview of the literature has been attempted to put forward with a view to grasp the importance and effectiveness of TVET in regard to studies encompassing diverse regions and countries with mixed experiences regarding a wide range of viewpoints.

Comparing the wage levels of workers, a study by Neuman and Ziderma (2003) for Israel has showed the inability of vocational education to lead to higher wages. However acknowledged the positive impacts in countries with employment growth, skill shortages and good matching. More specifically in Israel, vocational education has been found to contribute in increasing the wages of various sub-sections of the labor force, especially minorities and disadvantaged groups (Neuman & Ziderma, 2003).

In an attempt to analyze the long-run earnings differentials between vocational and academic schooling at the secondary and college levels for Thailand. This study has detected vocational schooling to offer consistently higher returns for male and female at the secondary and post-secondary levels where the long-run decline in value of some vocational certificates and the growing importance of post-secondary degrees could temper the higher returns (Joshua, 2003).

The education-to-job transition has been at the epicenter of the policy debates regarding the balance between vocational and general education programs as rapid technological change has put brakes on the gains in youth employment from vocational education. To scrutinize the hypothesis that any relative labor force advantage of vocational education decreases with age through employing a difference-in-differences addressed that compares employment rates across different cohort for people with general and vocational education for a micro statistics for 18 countries from the International Adult Literacy Survey, there has been strong support for the existence of such a balancing, which is most pronounced in countries emphasizing apprenticeship programs (Zhang, 2011).

Bishop and Mane in their analysis of international cross-section data has discovered that nations enrolling a large proportion of high school students in vocational education have much higher school attendance rates and higher high school completion rates. Analysis of 12 years of longitudinal data has also found that students devoting more time in high school to occupation-specific vocational courses have earned extra one year after graduating and also in later years (holding attitudes and ability in 8th grade, family background and post-secondary attendance constant) even if not pursuing post-secondary education (Bishop & Mane, 2004).

Agarwal (2013) has attempted to provide a review on challenges, outcomes and current situation in vocational and training (VET) programs in some Asian countries. The country-specific studies have indicated the poor response of VET system in the South Asian region in spite of growing demand for a skilled labor force. Furthermore, the Governments are forcing to give overfull attention to making the VET system significant in Asian countries with various recent initiatives.

Kahyarara and Teal (2007) is mentioned that returns to Vocational Training and Academic Education in Tanzania. They have selected two main types of education - academic education (primary to O-level, to A-level, to professional or college) and vocational and technical education. Deploying OLS, IV and FEM, they have found that the academic stream has been the high level education as the returns to education are much higher at the A-Level stage and above than below that level which could explain the continuing strong preference for

academic education. The vocational stream is one entering at various levels from the academic where the return from vocational schooling can outstrip than the academic, at entry level and no level does the return from vocational schooling little match that at the higher academic graduates.

Deploying the data of the National Education Longitudinal Survey of 1988 to examine the claims that students on a vocational education would be advantage from a higher academic education, it has been unearthed that those on the technical education are not lead to earn more had they chosen differently. This study has incorporated an econometric framework that has taken care of the selection bias (Meer, 2006).

A Pilipino case study of industry-academic linkages in the growing business process outsourcing sector has found foreign investors to engage in active increased territorial embedding focusing on beginning skills development and changing in the education system to supply mainly lower-end skills which could be supplemented by TVET (Kleiber, 2014).

2.2 Vocational education generates employment through industrialization
The current decade has experienced a significant interest in Vocational Education and Training (VET) among the international society. This appears in policy and programmatic attract to VET's role in development, however that stands in contrast to the state of the academic debate. Vocational and technical education has been believed to play a vital role in a society's economic growth and development. For a while now, studies have been vigorously stressing the significance of vocational education and training programs as a veritable instrument for economic development as it ensures access to the labor market, enhances the wages and empowers the impoverished. Numerous studies have revealed that these programs, if planned properly, are able to take care of the needs of the unemployed youths and adults looking to start up small-scale businesses as well as to take up private and public sector jobs. Vocational and technical education system delivers both basic and specialist skills to the individuals and enables them to find employment or launch their own business with a view to enhance both personal and social productivity. Sometimes, it could be a means of structural change. It also seems to be a crucial factor in solving earning disparities. Most importantly, it can assist in achieving national economic and social achievements, like raising regional and sectorial development, extending exports, attracting foreign investments, and increasing wages. In addition to the economic benefits, VET can generate huge social externalities in form of crime reduction.

In spite of this nagging debate, the importance of vocational and technical education is well established and as a consequence of that, UNESCO has placed increasing emphasis on TVET in recent decades through organizing two large international conferences in 1987 and 1999 to recognize skills as critical for education development, labor market inclusion and economic growth.

With the inspiration of becoming the world's most dynamic knowledge-based economy, the European Union since long has stressed on the development of high-quality vocational education and training as a crucial and integral part of its strategy in terms of promoting social inclusion, cohesion, mobility, employability and competitiveness (Wollschläger & Guggenheim, 2004). The importance of TVET, therefore has also prompted a detailed review based on a comparative analysis of country reports on 25 European countries on Initial Vocational Education and Training (IVET) covering the trends and debates, policies, program structure and the existing scenario.

In an attempt to reevaluate the effects of high school vocational programs on students' odds of being unemployed and students' occupational achievement in the transition from school to work in USA, it has been revealed that vocational education holds back students' likelihood of attending college and accordingly of bring employment in the professions of managerial occupations However, it reduces the risk of unemployment and rise students' chances of employment as skilled workers ensuring a sort of safety net for the students who are unlikely to continue on to college, through reducing the risk of falling to the bottom of the labor queue (Arum & Shavit, 1995).

Both globalization and technological change has necessitated enhancement of literacy education and training. To deal with this situation, Lieon has tagged youth employment with the PRSP as well as bring the national policy of TVET in line with the national curriculum. The development and implementation of TVET reform programs have been seriously hindered by budgetary restricts in all 16 countries in ECOWAS. Basis of the experience of TVET reforms in other developing countries, future inclusive design and achievement of strategies for TVET has been drafted suggesting good performance of TVET reforms in promoting sustainable growth through private sector development (Kingombe, 2011).
Considering the paramount importance of TVET, OECD has come up with a review for China highlighting the strengths, challenges and policy options (Kuczera & Field, 2010).

A paper examining the impact of vocational coursework on the labor market success has showed that students taking four years vocational courses and eight years academic courses in their final three years have earned substantially more, immediately after graduating, than students going for twelve academic courses. It has also pointed that further increases in vocational coursework at the cost of academic courses have small or

negative effect on earnings immediately after graduation (Kang & Bishop , 1989).

The World Bank has advocated that vocational programs and training in developing countries could yield the maximum return if government interventions are kept to a minimum. Bannell and Segerstro (1998) has argued that this policy cure is seriously detected both conceptually and in correlation to the present VET policies adopted by governments in the advanced industrial sector as well as the high performance of Asian economies.

In Indonesia, Newbouse and Suryadarma (2011) have attempted to figure out the determinants of households' choice of senior secondary schools and the labor market consequences of attending different types of high schools considering heterogeneity in the effects with respect to age, cohort, parental education, and ability separately.

3. Methodology
3.1 Analytical framework

At the most basic level, the linkages between vocational education and the labor market can be defined with a three-tiered relationship: Motivation for choosing vocational education affects educational outcomes, which, in turn, affect the labor market outcomes of individuals (see figure 4). On the demand side, the decision for vocational education can be influenced by the limited ability of the students, middle-income labor, unemployment and underemployment. On the supply side, the overall quality and management of TVET does motivate decision. The Philippines Government can and do influence how these determinants affect educational outcomes with vocational education facilities, teaching qualities and the other materials. It will also affect demand side determinants of educational outcomes with Skills Development.

As seen in figure 4, employment is the basic labor market outcome of individuals with vocational education. Firstly, those with lesser skills, lesser knowledge, and fewer degrees are less attractive to the potential employers and less prepared to obtain jobs. Secondly, individuals who follow a vocational education track will enter the job market and compete with the others who have not followed a vocational education track. A third way in which vocational educational attainment affects employment is by ensuring greater earnings within an occupation. For both Private and Public sectors, vocational education can generate positive labor market outcomes. Positive labor market outcomes are also influenced by educational outcomes and their determinants, as well as by previous employment experience. For people who are employed in the private sector, these outcomes can include increased productivity, possibility of enhanced wages as well as better standard of living. Finally, job stability and satisfaction are outcomes that could reduce poverty, unemployment and underemployment rate.

Figure 4. Vocational education and Labor Force linkages
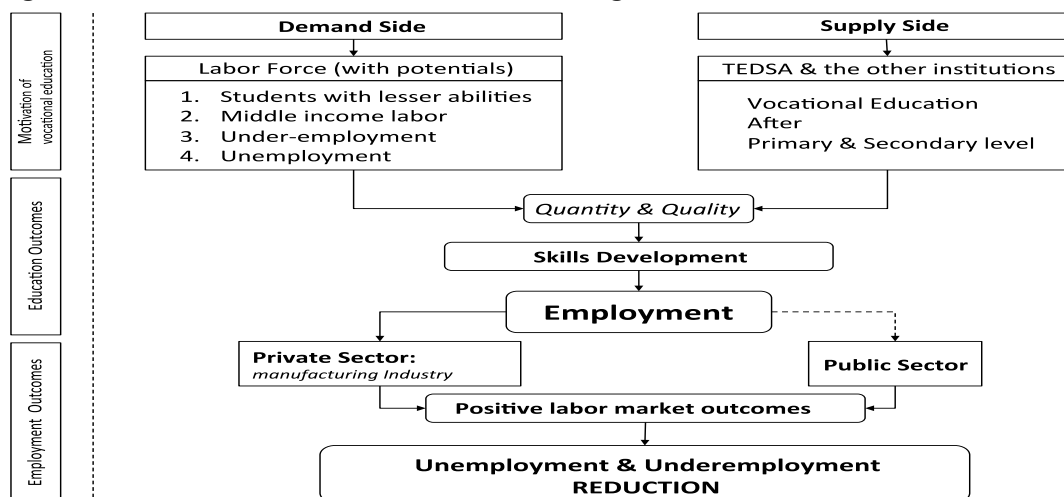
Source: Created by author on Vocational education and Labor Force linkages

3.2 Hypothesis

Hypothesis #1. It is inferred that the vocational education based on general education up to secondary school would yield higher ROR than general education only.

In a recent study, Godius Kahyarara and Francis Teal (2007) have analyzed returns to Vocational Training and Academic Education in Tanzania. Their study focused on two main types of education: academic education (primary to O-level, to A-level, to professional or university) and vocational and technical education. Deploying OLS, IV and FEM, they found that the academic stream from primary level up to university has been the preferred route because returns are high. However, the returns for an individual with primary education are lower though with the addition of vocational and technical education can be much higher.

The vocational stream is one entering at various levels from the academic where the return from vocational schooling can exceed that for the academic, at the level at which entry occurs, at no level does the return from vocational schooling remotely match that at the higher academic levels.

Hypothesis #2. Vocational education would be helpful for students who have only completed primary or secondary level and middle-income workers to obtain a job in the manufacturing sector.

TESDA reports an existing gap for skilled workers in the manufacturing sector of the Philippines. Thus, in this analysis, the endeavor has been to calculate the ROR (Rate of Return) in general and vocational education together to comment more precisely about the debate in the context of the Philippines. This study tried to verify if vocational education followed by academic education could fetch more return than the only one type of education.

Goodlad (1984) and Adler (1983) allude to vocational education as outmoded and even biased however real wages for blue-collar workers raised 4.8% compared with 1.5% for white-collar jobs between 1997 and 2002 (Bureau of Labor Statistics, 2003).

3.3 Model

Specification of the earnings function is of paramount importance in this study, as it would be relied upon to derive the rates of returns for different forms of education. That is why the strategy has been to search for the most appropriate form of the earnings functions empirically. Consequently, the earnings function has recommended by Becker (1964) and Mincer (1974) is the most appropriate for this study. This form of the earnings function has been created through controlling for age, gender, different educational streams as well as employment opportunities in different sectors. The deployed specification is

$$L_nW = \beta_1 age_i + \beta_2 age_i^2 + \beta_3 male_i + \theta_e elementary_i + \theta_{ve}Voc\_elementary_i$$
$$+\theta_h highschool_i + \theta_{vh}Voc\_high_i + \theta_c college_i + \theta_{vc}Voc\_college_i + \varepsilon_i$$

L_nW is log of real earnings per day for the workers, age is the age of the worker, $male$ represents the gender of the worker, $elementary$ means if the worker has completed elementary education, $Voc\_elementary$ implies if the worker has vocational education after completing elementary education, $highschool$ represents a high school graduate worker, Voc_high means a worker having vocational education after high school, *college* represents the highest level of general education meaning the worker is a university graduate, $Voc\_college$ implies a university graduate worker with vocational education, ε is the error term and i denotes the respective individual workers. The educational attainments are captured through the dummy variables for the workers graduating from elementary school, high school, and college. The base category is the workers without any form of education. Vocational education is undertaken at different types of general schools. For vocational education, it is identified if the student enters vocational school after elementary school (Voc_elementary) or after high school (Voc_high).

This way of classification implies that the return on vocational school can differ depending on the stage when the student enters the general education stream i.e. school or college as it is perceived that these returns to vocational schooling may well differ depending on the stage of the general educational cycle at which it takes place. The returns from education are strongly non-linear and convex which is well documented by Söderbom et al. (2006) in their paper through a spline function allowing for the returns to education to differ across levels, which is one of the fundamental assumptions of this paper as well. The deployed dummy variable approach is the most general specification in measuring the increment in earnings, which accrue due to attending vocational school. So the returns to vocational education after elementary school and high school are termed as the (ROR_{ve}), (ROR_{vh}) respectively and defined as

$$ROR_{ve} = exp((\theta_v + \theta_{ve} - \theta_e)/2) - 1$$
$$ROR_{vh} = exp((\theta_v + \theta_{vh} - \theta_h)/2) - 1$$

These rates of return are compared with those, who have exclusively followed an academic stream, which is defined as

$$ROR_e = exp(\theta_e/3) - 1$$
$$ROR_h = exp((\theta_h - \theta_e)/4) - 1$$
$$ROR_c = exp((\theta_c - \theta_h)/4) - 1$$

The Mincerian rates of return from the alternative paths through the education system are assumed to grow exponentially between the levels. In Table 3, the number of years requiring completing any level of education is reported along with the assumptions. The median years of education is used in the Mincerian calculation of Rate of Returns.

Calculation of ROR is the prime objective of this paper. But in doing so there are quite a few considerations. Francis (2007) has mentioned two econometric problems in the literature about Mincerian ROR,

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which arises in estimating earnings functions in developing countries. The first one is about selectivity bias as wage earners are not a random sample of the population. Moenjak and Worswick (2003) have found a much higher return on vocational education for Thailand allowing for selectivity. Tansel (1994) also has had similar experience in Turkey for the young. The second problem is about the upward bias on the ROR for education due to omission of ability from the earnings specification. Both these issues have been extensively discussed in So¨derbom, Teal, Wambugu, and Kahyarara (2006). Although the selection bias problem has been properly taken care of in this paper but lack of proper IVs has obstructed to deploy the appropriate solution for endogeneity.

One of the objectives of this paper is to show that rates of return differ depending on how students proceed through the education system as mentioned earlier. Along with this, it contributes to comment if there exists any difference with respect to returns between the private and public sectors. It is perceived that in the data generation process there could be selection bias problem that is associated with non-random selection of individuals, groups or data for analysis. It makes the obtained sample non-representative of the population targeted for analysis as well as creates distortions for the statistical analysis, which threatens the findings to be inappropriate. For that, the Heckman correction method is incorporated in the study which is simply a statistical analysis based on non-randomly selected samples. The Heckman correction, a two-step statistical approach, offers a means of correcting for non-randomly selected samples based on normality assumption, and it also provides a test for sample selection bias and formulates model for bias correction. Along with selection bias, it is quite well documented that these types of studies are prone to endogeneity problems. But lack of appropriate IVs has forced to not incorporate the correction through IV approach.

3.4 Data

The data source for this study has been the Philippines's Labor Force Survey (LFS) of 2014. The data on each household are collected from the big pool of household sample containing around 51,000 households, which was gathered through a nationwide survey in every quarter.

Table 3 (although only covers the 4th quarter but it is representative of the others as well, as almost each quarter contains similar number of observations) shows the summary statistics for educational attainments as well as earnings and employment status across the observations for the Philippines. The sample is consisting of 51,000 households (almost over 200,000 observations). However, for each quarter, more than 35,000 observations, aging between 15 to 65 years are picked, who are participating in the labor force as well as working for salary. It has been done keeping in mind the focus of the study, which is to derive the ROR for different streams of education in the Philippines.

Figure 5 presents the educational background of workers in both the Private & Public Sectors. Private sector has a high level of high school graduates. Whereas the public sector has a higher number of college graduates.

Table 3. Education and earnings

level of education (1)	Labor force (2)	% (3)	Employed (4)	% (5)	Unemployed (6)	% (7)	Median Years of education (8)	Employed with salary (9)	mean of wage perday (PHP) for general education (10)	Number of Sample in vocational school after level of general school completed (11)	mean of wage perday (PHP) for Voc_general education (12)
no education	1,376	1.7%	1,357	1.7%	19	0.4%	0	236	167.6525	0	
under elementatry	11,385	13.8%	11,133	14.3%	252	5.8%	3	3,693	202.3601	10	**272.2**
elementary	11,957	14.4%	11,617	14.9%	340	7.3%	6	4,206	225.5716	30	**274.3**
under highschool	10,594	12.8%	10,058	12.9%	536	11.4%	9	4,254	232.4071	69	**283.8116**
high school	26,890	32.5%	25,015	32.0%	1,875	40.0%	10	12,642	293.7202	1,554	**331.8552**
under college	7,623	9.2%	6,984	8.9%	639	13.6%	12	3,572	**360.1856**	227	329.1894
college	12,942	15.6%	11,916	15.3%	1,026	21.9%	14	8,841	**687.6598**	212	617.6745
Total	82,767	100%	78,080	100%	4,687	100.5%		37,444		2,102	

Source: Represented by Author based on Education and earnings (2014)
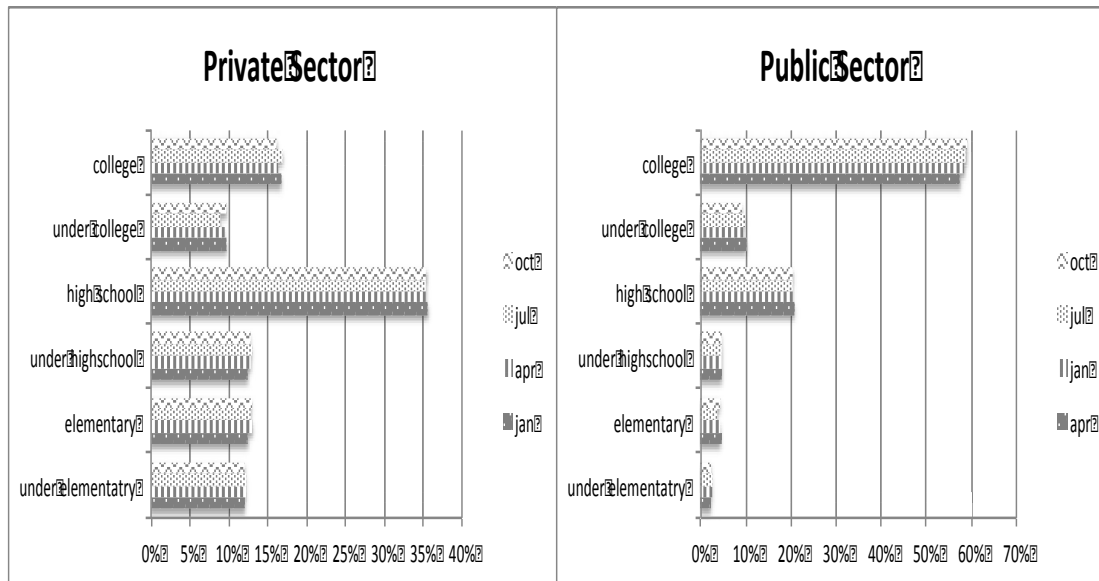
Figure 5. The educational background of workers in the Private & Public Sector
Source: Represented by Author based on The educational of workers in the Private & Public Sector (2014)

The sample comprises 37,444 observations for the final quarter of 2014, which is quite a good representation of the others as mentioned before. Column (1) shows the various options available within the stream of general education (as vocational education had not been termed as formal until 2015). Columns (2) and (3) show the number of observations and their percentage within the labor force in terms of educational attainments. The proportion of high school graduates has the biggest share in the labor force. Columns (4 to 7) display employment status of the labor force, whereas columns (9 to 12) exhibit employment scenario with salary structure of the observations with both general education and vocational education based on general education. It is quite apparent that the mean salary for vocational education based on general education is higher than that of general education up to high school level. This justifies the significance and extension as well as formal incorporation of vocational education within the mainstream, hoping to boost up the development process through industrialization. Surprisingly, after high school the mean salary is higher for the highest levels of general education, which is absolutely consistent with the theory. Column 8 gives an idea about the average length of graduation for different categories of formal education. The entire picture remains unchanged for almost all the observations throughout the other quarters.

From the final quarter data in Table 4, it is seen that 78,080 is the number of individuals who are employed implying that they are working either with pay or without pay or self-employed in the labor force is 82,767. But among the employed people only 37,444 receives wage or work with pay. Definitely, there are missing values as well as unreported values due about wage for the self-employed workers and workers who work for own families. But still there remain 9,209 workers who work without pay indicating underemployment.

Table 4. Classification of worker

Class of worker	Observation Number	Percentage	Observation Number in terms of wage	Mean wage per day
Work for Private household	3,635	4.60%	3,601	164.4066
Work for Private company	33,109	41.00%	28,498	336.0077
Work for Government company	6,476	8.10%	5,173	693.2629
Self Employed	22,998	30.90%	0	
Employer in Own family	2,434	3.50%	0	
Work with pay on Own family	219	0.30%	172	289.9186
Work without pay	9,209	11.80%	0	
Total	78,080	100.00%	37,444	

Source: Represented by Author based on Classification of worker (2014)

4. Results

4.1 ROR to vocational education based on general education

In this section, the empirical results assessing the Effects of Vocational and general education on earnings in the form of ROR are presented. Tables 5,6,7 and 8 represent the regression results for 4 quarters, which are the basis for the initial analysis for all the quarters. Each table conveys the results obtained from 6 types of regression

specifications, contained in 6 columns: 1) simple OLS with all the observations; 2) OLS only for the private sector firms; 3) OLS for the public sector; 4) Heckmans Correction Model for the anticipated Sample Bias for all the observations; 5) Heckmans correction for only the private sector firms and finally and 6) Heckmans correction for the public sector respectively. All the regressions have controlled for gender and age. Column (1) in Tables 5 to 8 exhibit the basic regression using simple OLS, where the returns to vocational as well as general education are allowed to vary depending on the entry level of the student as well as different employment generating sectors within the economy. Column (2) and (3) report the identical results with the private and public sectors respectively. Column (4) allows for the correction for potential selection bias problem within the data generation process through incorporating Heckmans Correction Model. Finally, columns (5) and (6) repeat the similar analyses for the private and public sectors respectively.

For all the quarters, as per the theory, males earn higher than females, there is a threshold level of age after which earnings tend to decline with the drop in productivity, all forms of education seem to have positive influence on earnings especially the impact from highest level of formal education i.e. college graduation is showing the most robust positive impact on earnings followed by high school graduation. Moreover, vocational education exerts positive influence on earnings overall, where the impact seems to be highest if vocational education is pursued right after elementary education. Most importantly, general education is exhibiting stronger impact than vocational education on earnings that is a worthy proof in favor of mainstream education mode (Chung, 1995). Commenting about the sector wise impact, it could be asserted that progressive earnings growth in the manufacturing sector justifies the emphasis for expanding vocational education. The ROR for different modes of education depends on the educational path chosen by the worker.

Figure 6 reports the implied estimates of Columns (1) and (4) from Tables 5 to 8 representing quarters 1 to 4 respectively for the Mincerian Rates of Return. The 1st quarter results from Table 5 shows that in assessing the returns to vocational education the level of entry does matter. For those who enter vocational school after elementary school graduation, the Mincerian return is higher as well as that of those who gets employed after simple college graduation without any vocational education. In both cases the ROR is almost 20% for both the simple OLS and Heckit considering the entire cross-section, but interestingly, vocational education is exhibiting higher ROR over the highest level of orthodox mode of education. For both, the high school graduates without vocational education as well as high school graduates with vocational education, the ROR is above 5%, which leaves the sole category of elementary school graduate without vocational education with a ROR more than 5%. From the figure, we cannot generalize and comment about the ROR between the simple OLS and the Heckit Model.

The 2nd quarter results from Table 6 shows that in assessing the returns to vocational education again the level of entry does matter but the results are not perfectly similar with the 1st quarter. In the 2nd quarter, clearly, the highest level of mainstream education has got the highest ROR in the form of college graduates without vocational education, who has more than 20% ROR, followed by the elementary school graduates with vocational education. Still this group gets the 2nd highest ROR but this time it is less than 20%. For both, high school graduates without vocational education as well as high school graduates with vocational education, the ROR is moderate like the 1st quarter but less than 10%. Again in the 2nd quarter, an elementary school graduate without vocational education has the lowest ROR.

The 3rd quarter results from Table 7 show that returns to both general and vocational education could be high in the 3rd quarter. For those who enter vocational school after elementary school graduation, as well as the college graduates without vocational education have high ROR, where again general education yields a higher ROR. Surprisingly, high school graduates with vocational education have very low ROR, even negative for the OLS estimations. The Mincerian returns of the other 4 groups are moderate and ranges between 5% and 20%.

The 4th quarter results from Table 8 shows that the ROR for both general and vocational education could be high like the previous quarter. For those who enter vocational school after elementary school graduation, as well as the college graduates without vocational education have high ROR, exactly almost same as the 3rd quarter but in this 4th quarter, both streams have almost identical ROR. Surprisingly, again the high school graduates with vocational education have very low ROR, but this times no negative ROR. The Mincerian returns of the other 4 groups are moderate and range between 5% and 20% once again.

4.2 Effect of job sector on wage

It has been as mentioned earlier that the Philippines is suffering from the lack of skilled labor force in manufacturing sector; however, development of manufacturing sector is extremely crucial for economic growth as it contains high value-added industries. Thus, vocational education could be imperative in complementing the shortage of skilled workers within the manufacturing sector in the Philippines. Moreover, the private sector manufacturing firms usually tend to offer good wages. It is evident from the tables 5 to 8, that the manufacturing firms belonging to the private sector can exert a positive influence on wage at least up to 15% for all 4 quarters.
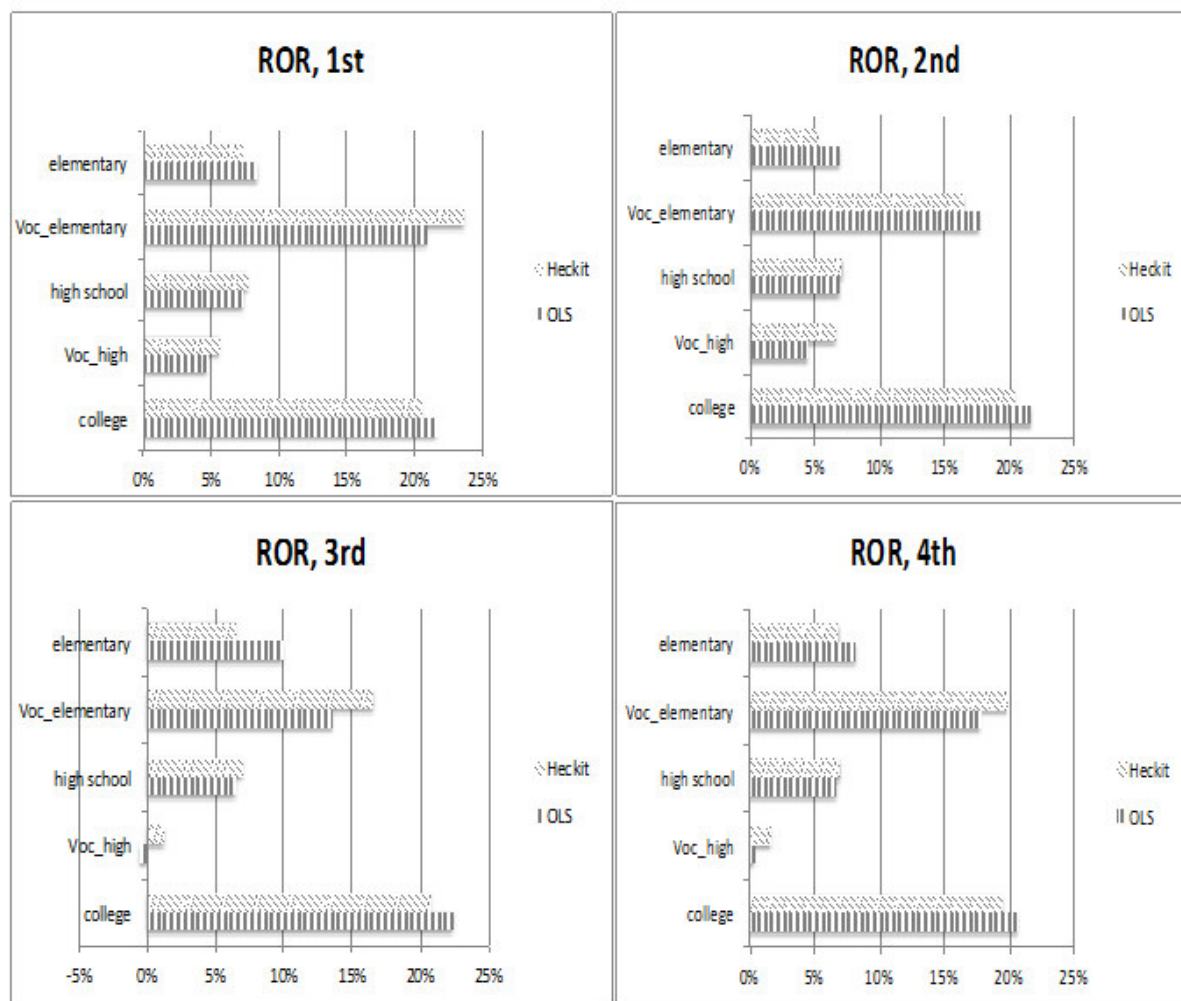
Figure 6. Mincerian ROR with Selection bias (4 quarters in 2014) *Source: Represented by Author based on the Mincerian ROR with Selection bias (4 quarters in 2014)*

Table 5. Dependent variable: $L_n W$ (1st quarter earnings in 2014)

	(1) OLS	(2) OLS_Private	(3) OLS_Public	(4) Heckit	(5) Heckit_Private	(6) Heckit_Public
male	0.220***	0.154***	0.098***	0.120***	0.164***	0.122***
	(0.008)	(0.009)	(0.018)	(0.019)	(0.022)	(0.043)
Age	0.036***	0.035***	0.039***	0.028***	0.035***	0.041***
	(0.002)	(0.002)	(0.005)	(0.002)	(0.003)	(0.006)
Age2	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
elementary	0.255***	0.258***	-0.157	0.219***	0.261***	-0.149
	(0.034)	(0.035)	(0.252)	(0.035)	(0.036)	(0.252)
highschool	0.542***	0.564***	0.459*	0.518***	0.566***	0.464*
	(0.034)	(0.035)	(0.247)	(0.034)	(0.035)	(0.247)
college	1.327***	1.276***	1.179***	1.264***	1.282***	1.195***
	(0.034)	(0.035)	(0.247)	(0.036)	(0.037)	(0.248)
vocational_school	0.244***	0.310***	0.132**	0.256***	0.309***	0.128**
	(0.039)	(0.050)	(0.061)	(0.039)	(0.050)	(0.061)
Voc_elementary	0.390***	0.563***	0.485	0.388***	0.563***	0.484
	(0.109)	(0.124)	(0.556)	(0.109)	(0.124)	(0.556)
Voc_high	0.374***	0.404***	0.310***	0.372***	0.404***	0.310***
	(0.041)	(0.052)	(0.076)	(0.041)	(0.052)	(0.076)
mining	0.142***	0.069*		0.137***	0.069*	
	(0.043)	(0.040)		(0.043)	(0.040)	
manufacturing	0.284***	0.186***		0.283***	0.186***	
	(0.011)	(0.011)		(0.011)	(0.011)	
electricity	0.453***	0.391***	0.233**	0.452***	0.391***	0.235**
	(0.040)	(0.040)	(0.117)	(0.040)	(0.040)	(0.117)
constuction	0.298***	0.230***		0.296***	0.230***	
	(0.012)	(0.012)		(0.012)	(0.012)	
vehicleS_repair	0.076***	-0.022*		0.075***	-0.022*	
	(0.011)	(0.011)		(0.011)	(0.011)	
Trans_storage	0.250***	0.180***	0.076	0.247***	0.180***	0.076
	(0.021)	(0.020)	(0.227)	(0.021)	(0.020)	(0.227)
o.Accom_Food	-	-	-	-	-	-
Infor_Communi	0.387***	0.315***	0.476*	0.387***	0.315***	0.476*
	(0.027)	(0.026)	(0.278)	(0.027)	(0.026)	(0.278)
Financial	0.300***	0.194***	0.629***	0.296***	0.195***	0.630***
	(0.022)	(0.021)	(0.099)	(0.022)	(0.021)	(0.099)
professional	0.502***	0.454***	-0.225	0.505***	0.453***	-0.225
	(0.044)	(0.043)	(0.227)	(0.044)	(0.043)	(0.227)
Pubadmin	0.257***		-0.080**	0.256***		-0.080**
	(0.014)		(0.033)	(0.014)		(0.033)
edu_job	0.455***	0.066***	0.216***	0.447***	0.067***	0.218***
	(0.014)	(0.022)	(0.034)	(0.014)	(0.022)	(0.034)
imr				-0.234***	0.022	0.070
				(0.040)	(0.046)	(0.110)
Constant	3.407***	3.473***	3.948***	3.788***	3.437***	3.842***
	(0.091)	(0.111)	(0.296)	(0.112)	(0.134)	(0.340)
Observations	25,001	18,179	4,368	25,001	18,179	4,368
R-squared	0.480	0.378	0.356	0.481	0.378	0.356

Source: Represented by Author based on the Dependent variable: L_n W (2014)

*Note: *** p<0.01, ** p<0.05, * p<0.1*

Table 6. Dependent variable: $L_n W$ (2nd quarter earnings in 2014)

	(1) OLS	(2) OLS_Private	(3) OLS_Public	(4) Heckit	(5) Heckit_Private	(6) Heckit_Public
male	0.199***	0.131***	0.099***	0.046**	0.133***	-0.023
	(0.007)	(0.008)	(0.018)	(0.019)	(0.022)	(0.044)
Age	0.037***	0.039***	0.039***	0.026***	0.039***	0.029***
	(0.002)	(0.002)	(0.005)	(0.002)	(0.002)	(0.006)
Age2	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
elementary	0.206***	0.278***	-0.164	0.158***	0.278***	-0.216
	(0.034)	(0.034)	(0.325)	(0.034)	(0.034)	(0.326)
highschool	0.473***	0.551***	0.339	0.450***	0.552***	0.302
	(0.033)	(0.033)	(0.322)	(0.033)	(0.034)	(0.321)
college	1.258***	1.247***	1.111***	1.192***	1.248***	1.037***
	(0.034)	(0.034)	(0.321)	(0.035)	(0.035)	(0.322)
vocational_school	0.188***	0.255***	0.105**	0.207***	0.255***	0.121**
	(0.037)	(0.051)	(0.053)	(0.037)	(0.051)	(0.053)
Voc_elementary	0.344***	0.441***		0.344***	0.441***	
	(0.091)	(0.099)		(0.091)	(0.099)	
Voc_high	0.373***	0.407***	0.307***	0.371***	0.407***	0.305***
	(0.039)	(0.053)	(0.068)	(0.039)	(0.053)	(0.068)
mining	0.190***	0.107***		0.187***	0.107***	
	(0.039)	(0.037)		(0.039)	(0.037)	
manufacturing	0.269***	0.167***		0.267***	0.167***	
	(0.011)	(0.011)		(0.011)	(0.011)	
electricity	0.316***	0.257***	0.086	0.314***	0.257***	0.078
	(0.038)	(0.038)	(0.112)	(0.038)	(0.038)	(0.112)
constuction	0.295***	0.219***		0.294***	0.219***	
	(0.012)	(0.012)		(0.012)	(0.012)	
vehicleS_repair	0.067***	-0.038***		0.067***	-0.038***	
	(0.011)	(0.011)		(0.011)	(0.011)	
Trans_storage	0.228***	0.154***	0.123	0.226***	0.154***	0.121
	(0.020)	(0.020)	(0.171)	(0.020)	(0.020)	(0.170)
o.Accom_Food	-	-	-	-	-	-
Infor_Communi	0.313***	0.259***		0.315***	0.259***	
	(0.028)	(0.027)		(0.028)	(0.027)	
Financial	0.305***	0.234***	0.340***	0.303***	0.235***	0.343***
	(0.022)	(0.021)	(0.111)	(0.022)	(0.021)	(0.111)
professional	0.497***	0.426***	0.381*	0.501***	0.426***	0.389*
	(0.047)	(0.045)	(0.229)	(0.047)	(0.045)	(0.229)
Pubadmin	0.283***		-0.016	0.280***		-0.019
	(0.013)		(0.033)	(0.013)		(0.033)
edu_job	0.478***	0.077***	0.261***	0.466***	0.077***	0.254***
	(0.014)	(0.023)	(0.034)	(0.014)	(0.023)	(0.034)
imr				-0.361***	0.006	-0.337***
				(0.041)	(0.047)	(0.112)
Constant	3.567***	3.538***	4.015***	4.109***	3.530***	4.535***
	(0.087)	(0.113)	(0.356)	(0.107)	(0.133)	(0.395)
Observations	25,539	18,724	4,478	25,539	18,724	4,478
R-squared	0.483	0.372	0.367	0.484	0.372	0.368

Source: Represented by Author based on the Dependent variable: L_n W (2014)
*Note: *** p<0.01, ** p<0.05, * p<0.1*

Table 7. Dependent variable: $L_n W$ (3rd quarter earnings in 2014)

	(1) OLS	(2) OLS_Private	(3) OLS_Public	(4) Heckit	(5) Heckit_Private	(6) Heckit_Public
male	0.203***	0.130***	0.106***	0.043**	0.107***	-0.011
	(0.007)	(0.008)	(0.018)	(0.018)	(0.021)	(0.042)
Age	0.038***	0.042***	0.037***	0.026***	0.040***	0.026***
	(0.002)	(0.002)	(0.005)	(0.002)	(0.002)	(0.006)
Age2	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
elementary	0.247***	0.298***	0.033	0.196***	0.291***	-0.027
	(0.037)	(0.038)	(0.325)	(0.037)	(0.038)	(0.326)
highschool	0.500***	0.566***	0.519	0.467***	0.561***	0.472
	(0.036)	(0.037)	(0.321)	(0.037)	(0.038)	(0.321)
college	1.309***	1.272***	1.330***	1.220***	1.259***	1.236***
	(0.037)	(0.038)	(0.321)	(0.038)	(0.039)	(0.322)
vocational_school	0.157***	0.204***	0.085	0.170***	0.205***	0.099*
	(0.036)	(0.046)	(0.056)	(0.036)	(0.046)	(0.056)
Voc_elementary	0.345***	0.329***	1.055*	0.332***	0.326***	1.043*
	(0.094)	(0.099)	(0.561)	(0.094)	(0.099)	(0.560)
Voc_high	0.332***	0.347***	0.279***	0.322***	0.346***	0.273***
	(0.039)	(0.049)	(0.073)	(0.039)	(0.049)	(0.073)
mining	0.180***	0.124***	0.605	0.175***	0.124***	0.614
	(0.039)	(0.037)	(0.556)	(0.039)	(0.037)	(0.555)
manufacturing	0.287***	0.181***		0.285***	0.181***	
	(0.011)	(0.011)		(0.011)	(0.011)	
electricity	0.348***	0.280***	0.149	0.347***	0.280***	0.146
	(0.039)	(0.039)	(0.120)	(0.039)	(0.039)	(0.120)
constuction	0.305***	0.229***		0.302***	0.229***	
	(0.012)	(0.012)		(0.012)	(0.012)	
vehicleS_repair	0.074***	-0.026**		0.073***	-0.026**	
	(0.011)	(0.011)		(0.011)	(0.011)	
Trans_storage	0.266***	0.193***	0.065	0.261***	0.193***	0.051
	(0.020)	(0.019)	(0.188)	(0.020)	(0.019)	(0.188)
o.Accom_Food	-	-	-	-	-	-
Infor_Communi	0.368***	0.304***		0.368***	0.305***	
	(0.028)	(0.026)		(0.028)	(0.026)	
Financial	0.263***	0.190***	0.369***	0.259***	0.190***	0.372***
	(0.022)	(0.021)	(0.122)	(0.022)	(0.021)	(0.122)
professional	0.401***	0.334***	0.550	0.406***	0.335***	0.565
	(0.042)	(0.040)	(0.394)	(0.042)	(0.040)	(0.393)
Pubadmin	0.265***		-0.114***	0.261***		-0.118***
	(0.013)		(0.033)	(0.013)		(0.033)
edu_job	0.447***	0.055***	0.171***	0.434***	0.055***	0.165***
	(0.014)	(0.020)	(0.034)	(0.014)	(0.020)	(0.034)
imr				-0.377***	-0.054	-0.333***
				(0.039)	(0.045)	(0.108)
Constant	3.581***	3.573***	4.001***	4.200***	3.661***	4.546***
	(0.087)	(0.106)	(0.355)	(0.108)	(0.129)	(0.396)
Observations	26,120	18,953	4,561	26,120	18,953	4,561
R-squared	0.487	0.380	0.373	0.489	0.380	0.374

Source: Represented by Author based on the Dependent variable: L_n W (2014)
*Note: *** p<0.01, ** p<0.05, * p<0.1*

Table 8. Dependent variable: $L_n W$ (4th quarter earnings in 2014)

	(1) OLS	(2) OLS_Private	(3) OLS_Public	(4) Heckit	(5) Heckit_Private	(6) Heckit_Public
male	0.210***	0.147***	0.109***	0.101***	0.168***	0.054
	(0.007)	(0.008)	(0.018)	(0.018)	(0.021)	(0.042)
Age	0.036***	0.037***	0.035***	0.028***	0.039***	0.030***
	(0.002)	(0.002)	(0.005)	(0.002)	(0.002)	(0.006)
Age2	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
elementary	0.246***	0.279***	-0.540*	0.209***	0.286***	-0.576*
	(0.036)	(0.036)	(0.323)	(0.036)	(0.037)	(0.324)
highschool	0.509***	0.561***	-0.149	0.481***	0.566***	-0.181
	(0.035)	(0.036)	(0.320)	(0.035)	(0.036)	(0.321)
college	1.261***	1.212***	0.637**	1.193***	1.225***	0.583*
	(0.036)	(0.036)	(0.319)	(0.037)	(0.038)	(0.321)
vocational_school	0.204***	0.211***	0.151**	0.210***	0.209***	0.155**
	(0.037)	(0.046)	(0.061)	(0.037)	(0.046)	(0.061)
Voc_elementary	0.370***	0.417***	0.345	0.362***	0.417***	0.345
	(0.105)	(0.114)	(0.558)	(0.104)	(0.114)	(0.558)
Voc_high	0.313***	0.292***	0.289***	0.305***	0.292***	0.286***
	(0.040)	(0.048)	(0.078)	(0.040)	(0.048)	(0.078)
mining	0.189***	0.115***		0.182***	0.116***	
	(0.040)	(0.038)		(0.040)	(0.038)	
manufacturing	0.263***	0.162***		0.262***	0.162***	
	(0.011)	(0.011)		(0.011)	(0.011)	
electricity	0.429***	0.409***	-0.114	0.428***	0.409***	-0.115
	(0.043)	(0.042)	(0.151)	(0.043)	(0.042)	(0.151)
constuction	0.292***	0.219***		0.290***	0.219***	
	(0.012)	(0.012)		(0.012)	(0.012)	
vehicleS_repair	0.042***	-0.055***		0.042***	-0.056***	
	(0.011)	(0.011)		(0.011)	(0.011)	
Trans_storage	0.213***	0.141***	0.048	0.210***	0.141***	0.042
	(0.019)	(0.018)	(0.146)	(0.019)	(0.018)	(0.146)
o.Accom_Food	-	-	-	-	-	-
Infor_Communi	0.296***	0.243***		0.298***	0.242***	
	(0.028)	(0.026)		(0.028)	(0.026)	
Financial	0.280***	0.215***	0.257**	0.277***	0.215***	0.254**
	(0.022)	(0.021)	(0.103)	(0.022)	(0.021)	(0.103)
professional	0.383***	0.323***	0.414	0.386***	0.322***	0.412
	(0.046)	(0.043)	(0.392)	(0.046)	(0.043)	(0.392)
Pubadmin	0.273***		-0.111***	0.270***		-0.113***
	(0.013)		(0.033)	(0.013)		(0.033)
edu_job	0.450***	0.059***	0.170***	0.441***	0.059***	0.166***
	(0.014)	(0.021)	(0.034)	(0.014)	(0.021)	(0.034)
imr				-0.258***	0.048	-0.161
				(0.040)	(0.046)	(0.112)
Constant	3.590***	3.695***	4.647***	4.014***	3.618***	4.919***
	(0.088)	(0.104)	(0.356)	(0.110)	(0.127)	(0.403)
Observations	**25,925**	**18,938**	**4,550**	**25,925**	**18,938**	**4,550**
R-squared	0.462	0.351	0.340	0.463	0.351	0.340

Source: Represented by Author based on the Dependent variable: L_n W (2014)
*Note: *** p<0.01, ** p<0.05, * p<0.1*

5. Discussion and Conclusion
5.1 Discussion
Regarding the results, it was expected that An Effect of Vocational Education on Wage in the ROR would be higher than that of only general education in high school level. But the results were different from the expectation. This should not be a concern as the appropriate duration of vocational course though it is very important for the calculation of ROR. Many vocational courses are offered where the lengths range from 2

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months to 2 years in this data. In this study, 2 years have been considered as length, even though there are only 27 observations that have taken courses for 2 years in this study. So, the ROR could very well be inflated as high as the graduates following the general educational path. Thus, it is predicted that the ROR is higher for both elementary and high school level than these results, as most of the vocational education recipients prefer to take shorter duration courses, with less than 1-year duration.

This research has attempted to highlight the importance of overall education more precisely the significance of vocational education for creating a skilled labor force to address problems such as unemployment and underemployment by trying to find out which form of education yields higher ROR and which sector can yield the highest ROR ensuring maximum contribution from the workforce with the vocational education. This study reveals that the work force with the vocational education can yield higher ROR and vocational education based on general education can help to increase the ROR. Moreover, It is anticipated that unemployment and underemployment will decrease with more vocational graduates obtaining jobs. The salary structure has depicted that the mean salary of vocational education based on general education is higher than that of general education up to high school level, which could be a justification for the formal incorporation of vocational education.

If the government is successful in making vocational education more popular with its efforts, then majority of workers who are currently working without pay can be absorbed in the private sector or work as self-employed which will ensure them pay. This could have a significant impact on reducing underemployment and unemployment rate in the Philippines.

5.2 Limitation

Vocational education is not a part of formal education system yet and still optional in the Philippines and that's why the number of vocational graduates is only a few representing less than 5% of the entire data set. Even though the number of vocational graduates is small, the ROR is very high after elementary level. There are many vocational courses offered where the lengths range from 2 months to 2 years. Moreover, there are some missing values for the vocational education courses. The appropriate length of vocational education course is very important for the calculation of ROR with years. In this paper, 2 years have been considered as the appropriate length, even though there are only 27 observations that have taken courses for 2 years. So, the ROR is undervalued as low as the graduates following vocational based on general educational path. The ROR for vocational education based on general education is higher only after elementary level. However, it is predicted that the ROR is higher for both elementary and high school level than these results, as most of the vocational education recipients prefer to take shorter duration courses, having less than 1-year duration.

The Mincerian earning functions have a possibility of a selectivity bias as wage earners are not a random sample of the population. The Heckman correction model has been deployed to overcome that. However, the results didn't vary much between OLS and Heckman correction model. Along with selection bias, it is quite well documented that these types of studies are prone to endogeneity problems. The lack of appropriate IVs like parental education, number of siblings, distance from the school and test score has restricted the use of an IV approach in this study.

It has been found in literature that apart from educational path chosen by the worker, firm sizes as well as ownership of firms are crucial determinants of ROR. In this paper, the data set has enabled us to distinguish between private and public sector workers. However, the data set did not have the exact number of workers in each sector, also data on firm sizes were not conclusive thereby preventing the calculation of ROR between the private and public sector.

5.3 Conclusion

This study was aimed at finding out an Effect of Vocational education on Wage. It could probably assist in solving the existing problems in labor market of the Philippines, which are related to Human capital development. As expected, the ROR of Vocational education is higher for primary graduates contrary to high school graduates ROR which is lower than the general ROR. However, the ROR for high school graduates would have been higher if the appropriate duration of schooling was used in the analysis.

Besides, the education policy of the Philippines will be changed and the length of secondary education will be restructured from 2 years to 4 years in 2016. There will be an addition of formal vocational education in the upper secondary level with the aim of overcoming the shortage of skilled workers in the manufacturing sector and to develop middle-income level workers. The results have justified these initiatives undertaken by the Philippine government to modify the existing education system to the K to 12 Program.

Hence, it is predicted that emphasis on vocational education would be useful in reducing the underemployment and unemployment rate as well as creating a skilled labor force for the extension of the manufacturing sector in the Philippines. The results have revealed a robust relation between elementary school graduates with vocational training and manufacturing sector jobs indicating the manufacturing sectors preference for workers with vocational education. Therefore, the Philippine government should bear in mind the issue of job

matching while restructuring the education system.

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APPENDIX

1. The data (1ˢᵗ quarter)

Variable	Obs	Mean	Std. Dev.	Min	Max
region	201551	13.23148	12.02212	1	42
Employment Status	134242	1.777447	0.9521559	1	3
lnwage_perDAY	36320	5.616433	0.7260214	1.791759	9.21034
Age	128046	35.31321	14.33845	15	65
Age2	128046	1452.612	1093.515	225	4225
male	201551	0.5059216	0.4999662	0	1
female	201551	0.4940784	0.4999662	0	1
married	201551	0.3879713	0.4872892	0	1
single	201551	0.4639868	0.4987026	0	1
employment	134242	0.5893387	0.4919557	0	1
Class of worker	79114	2.361933	1.676527	0	6
nograde	183309	0.0767938	0.2662648	0	1
Under elementary	183309	0.237517	0.4255627	0	1
elementary	183309	0.1238892	0.329456	0	1
Under high school	183309	0.1422407	0.3492978	0	1
high school	183309	0.2273265	0.4191064	0	1
Under college	183309	0.090612	0.2870574	0	1
college	183309	0.1016208	0.3021498	0	1
Vocational school	138490	0.049296	0.2164861	0	1
Voc_elementary	201551	0.0010816	0.0328702	0	1
Voc_high	201551	0.0247828	0.155463	0	1
Voc_college	201551	0.0025353	0.0502884	0	1
agriculture	201551	0.1384761	0.3453999	0	1
mining	201551	0.0029323	0.054071	0	1
manufacturing	201551	0.0293325	0.1687373	0	1
electricity	201551	0.0012801	0.0357553	0	1
water_supply	201551	0.0005755	0.0239835	0	1
constuction	201551	0.0232894	0.1508214	0	1
vehicleS_repair	201551	0.0723737	0.2591064	0	1
Trans_storage	201551	0.0261472	0.1595734	0	1
Accom_Food	201551	0	0	0	0
Infor_Communi	201551	0.0033341	0.0576458	0	1
Financial	201551	0.0045348	0.0671885	0	1
real_estate	201551	0.0017613	0.0419315	0	1
professional	201551	0.0012057	0.0347016	0	1
support_service	201551	0.0092532	0.0957479	0	1
Pubadmin	201551	0.0202182	0.1407463	0	1
edu_job	201551	0.0126618	0.1118103	0	1
human_health_socialwork	201551	0.0046936	0.0683491	0	1
arts	201551	0.0013644	0.0369129	0	1
other_service_activities	201551	0.0209525	0.1432257	0	1
householdASemployers	201551	0.0056016	0.0746338	0	1
extra_territorial	201551	0	0	0	0
modified_tourism_related	201551	0.0176432	0.131651	0	1

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1. The data (2nd quarter)

Variable	Obs	Mean	Std. Dev.	Min	Max
region	201374	13.15856	11.97943	1	42
Employment Status	135135	1.74615	0.9458293	1	3
lnwage_perDAY	37255	5.623459	0.7238368	2.397895	9.21034
Age	128629	35.32902	14.40997	15	65
Age2	128629	1455.785	1100.118	225	4225
male	201374	0.5053483	0.4999726	0	1
female	201374	0.4946517	0.4999726	0	1
married	201374	0.3890522	0.4875364	0	1
single	201374	0.465065	0.4987793	0	1
employment	135135	0.606438	0.4885414	0	1
Class of worker	81951	2.387353	1.697595	0	6
nograde	183833	0.0567526	0.2313699	0	1
Under elementary	183833	0.237335	0.4254504	0	1
elementary	183833	0.1273765	0.3333951	0	1
Under high school	183833	0.1454255	0.3525302	0	1
high school	183833	0.231966	0.4220885	0	1
Under college	183833	0.0941452	0.2920315	0	1
college	183833	0.1069993	0.3091132	0	1
Vocational school	139325	0.052417	0.2228673	0	1
Voc_elementary	201374	0.0010329	0.0321223	0	1
Voc_high	201374	0.0261603	0.1596122	0	1
Voc_college	201374	0.0028603	0.0534058	0	1
agriculture	201374	0.1492397	0.3563255	0	1
mining	201374	0.0033122	0.0574569	0	1
manufacturing	201374	0.0307984	0.1727716	0	1
electricity	201374	0.0014004	0.0373955	0	1
water_supply	201374	0.0005562	0.0235769	0	1
constuction	201374	0.0254104	0.1573686	0	1
vehicleS_repair	201374	0.0768272	0.2663177	0	1
Trans_storage	201374	0.0258872	0.158799	0	1
Accom_Food	201374	0	0	0	0
Infor_Communi	201374	0.0031235	0.0558014	0	1
Financial	201374	0.0044296	0.0664076	0	1
real_estate	201374	0.0015494	0.0393315	0	1
professional	201374	0.0010528	0.0324294	0	1
support_service	201374	0.0092365	0.0956623	0	1
Pubadmin	201374	0.0211894	0.1440158	0	1
edu_job	201374	0.0121962	0.1097612	0	1
human_health_socialwork	201374	0.0045438	0.0672544	0	1
arts	201374	0.0015593	0.0394571	0	1
other_service_activities	201374	0.0210256	0.1434698	0	1
householdASemployers	201374	0.004658	0.0680906	0	1
extra_territorial	201374	0.0000596	0.0077193	0	1
modified_tourism_related	201374	0.0181155	0.1333696	0	1

1. The data (3rd quarter)

Variable	Obs	Mean	Std. Dev.	Min	Max
region	200334	13.05503	11.85936	1	42
Employment Status	133965	1.757131	0.9497622	1	3
lnwage_perDAY	37906	5.629186	0.7260455	2.302585	9.190138
Age	127194	35.47327	14.37317	15	65
Age2	127194	1464.939	1097.244	225	4225
male	200334	0.5053511	0.4999726	0	1
female	200334	0.4946489	0.4999726	0	1
married	200334	0.3912516	0.4880317	0	1
single	200334	0.4637955	0.4986888	0	1
employment	133965	0.6019483	0.489498	0	1
Class of worker	80640	2.33502	1.665408	0	6
nograde	183013	0.0638807	0.244541	0	1
Under elementary	183013	0.2401196	0.4271571	0	1
elementary	183013	0.1251605	0.3309017	0	1
Under high school	183013	0.1474595	0.3545643	0	1
high school	183013	0.2283226	0.4197527	0	1
Under college	183013	0.0897423	0.2858129	0	1
college	183013	0.1053149	0.3069596	0	1
Vocational school	138062	0.04737	0.2124298	0	1
Voc_elementary	200334	0.0010782	0.0328183	0	1
Voc_high	200334	0.0230166	0.1499564	0	1
Voc_college	200334	0.0028502	0.0533116	0	1
agriculture	200334	0.1427766	0.3498457	0	1
mining	200334	0.002975	0.0544628	0	1
manufacturing	200334	0.029341	0.1687609	0	1
electricity	200334	0.0012729	0.0356547	0	1
water_supply	200334	0.0004393	0.0209541	0	1
constuction	200334	0.0246988	0.1552058	0	1
vehicleS_repair	200334	0.0749648	0.2633352	0	1
Trans_storage	200334	0.0262362	0.1598373	0	1
Accom_Food	200334	0	0	0	0
Infor_Communi	200334	0.0033244	0.0575623	0	1
Financial	200334	0.0041281	0.0641177	0	1
real_estate	200334	0.0017571	0.0418806	0	1
professional	200334	0.0012679	0.0355848	0	1
support_service	200334	0.0096689	0.097854	0	1
Pubadmin	200334	0.0216389	0.1455016	0	1
edu_job	200334	0.0130732	0.1135884	0	1
human_health_socialwork	200334	0.0044875	0.0668385	0	1
arts	200334	0.0012928	0.0359329	0	1
other_service_activities	200334	0.0219483	0.1465153	0	1
householdASemployers	200334	0.005406	0.0733265	0	1
extra_territorial	200334	0.0001497	0.0122363	0	1
modified_tourism_related	200334	0.0182845	0.1339785	0	1

1. The data (4ᵗʰ quarter)

Variable	Obs	Mean	Std. Dev.	Min	Max
region	202047	13.08104	11.8404	1	42
Employment Status	135161	1.754522	0.9512079	1	3
lnwage_perDAY	37908	5.648725	0.7128761	0	8.827468
Age	128602	35.36615	14.38148	15	65
Age2	128602	1457.59	1098.013	225	4225
male	202047	0.5060456	0.4999647	0	1
female	202047	0.4939544	0.4999647	0	1
married	202047	0.3884146	0.4873909	0	1
single	202047	0.4656837	0.4988222	0	1
employment	135161	0.6052634	0.4887959	0	1
Class of worker	81808	2.354635	1.678767	0	6
nograde	184485	0.069133	0.2536808	0	1
Under elementary	184485	0.2377429	0.425702	0	1
elementary	184485	0.1263463	0.3322402	0	1
Under high school	184485	0.1447435	0.351843	0	1
high school	184485	0.2287557	0.4200327	0	1
Under college	184485	0.0914817	0.2882937	0	1
college	184485	0.1017969	0.3023818	0	1
Vocational school	139480	0.0452538	0.207861	0	1
Voc_elementary	202047	0.0009206	0.0303271	0	1
Voc_high	202047	0.0222968	0.1476474	0	1
Voc_college	202047	0.0026825	0.0517239	0	1
agriculture	202047	0.1465204	0.353628	0	1
mining	202047	0.0028459	0.0532709	0	1
manufacturing	202047	0.028825	0.1673148	0	1
electricity	202047	0.0011977	0.0345878	0	1
water_supply	202047	0.0005197	0.0227906	0	1
constuction	202047	0.0247665	0.1554132	0	1
vehicleS_repair	202047	0.074844	0.2631401	0	1
Trans_storage	202047	0.0264146	0.1603653	0	1
Accom_Food	202047	0	0	0	0
Infor_Communi	202047	0.0031428	0.055973	0	1
Financial	202047	0.0044297	0.0664083	0	1
real_estate	202047	0.0016085	0.0400744	0	1
professional	202047	0.001173	0.034229	0	1
support_service	202047	0.0092751	0.0958597	0	1
Pubadmin	202047	0.0213515	0.1445534	0	1
edu_job	202047	0.0129475	0.1130483	0	1
human_health_socialwork	202047	0.0045583	0.0673616	0	1
arts	202047	0.0013462	0.0366663	0	1
other_service_activities	202047	0.0214158	0.1447663	0	1
householdASemployers	202047	0.0044099	0.0662604	0	1
extra_territorial	202047	0.0000247	0.0049746	0	1
modified_tourism_related	202047	0.0193024	0.1375862	0	1

2. The Mincerian Rate of Return

	1st		2nd		3rd		4th	
	OLS	Heckit	OLS	Heckit	OLS	Heckit	OLS	Heckit
college	22%	21%	22%	20%	22%	21%	21%	20%
Voc_high	5%	6%	5%	7%	-1%	1%	0%	2%
high school	7%	8%	7%	7%	7%	7%	7%	7%
Voc_elementary	21%	24%	18%	17%	14%	17%	18%	20%
elementary	9%	7%	7%	5%	10%	7%	8%	7%

3. Share of Worker by Education level in Private & Public Sector

	Private Sector				Public Sector			
	1st	2nd	3rd	4th	1st	2nd	3rd	4th
under elementatry	12%	12%	12%	12%	3%	2%	2%	2%
elementary	12%	13%	13%	13%	4%	4%	4%	4%
under highschool	12%	13%	13%	13%	5%	5%	5%	5%
high school	36%	35%	35%	35%	20%	21%	20%	20%
under college	10%	9%	9%	10%	10%	10%	10%	9%
college	17%	16%	17%	16%	58%	58%	59%	59%