THE WAGE EFFECTS ON EDUCATION:
AN ANALYSIS BY GENDER IN INDONESIA

Eddy Gunawan
Durham University, UK
Email: eddy.gunawan@durham.ac.uk

Abstract

Human capital embraces the notion that individuals acquire skills and knowledge to increase their value in labour market. Experience, training, and education are three main mechanisms for acquiring human capital, with education being primary for most individuals. The estimated coefficients reveal that the effect of education on earnings is larger as education level increases. The return to university education is highest return among other level of education, while sub-primary education is the lowest rate of return to education of male and female workers. Since levels of education contributes and have a positive impact on earning for male and female workers during 1989-2009, there are several reasons that can explain this evidence such as increasing in school enrolment, scarcity of skill workers, increasing number of education institution, and impose law of compulsory basic education.

Keywords: Wage effects, Gender, Indonesia
JEL Classification: J16, J24, J31

1. Introduction

In the global economy and in the age of information technology, education is a passport to get better job opportunities and improve the quality of live. In addition, the demand for education goes up with the further demand of labour force in labour market, especially in the developing countries where modern education system is still young and illiteracy rate is high compared to developed countries. Education is seen as an important determinant in increasing the wealth of a nation. In labour economics, education is considered as an investment in human capital, and it is often more important than investment in non-human capital

There has been an enormous increase of individual education, especially for females since 1960s. Barro and Lee (2010: 34) reports that the average years of schooling of world females population over 15 years has increased significantly from 3.86 percent in 1970 to 7.28 percent in 2010. Increasing in labour force skill

has caused wage inequality among workers. Juhn, Murphy, and Pierce (1993) for example, identified increasing in labour skills caused wage inequality among workers in the United States over the past two decades. Increasing the number of high school graduates who pursue higher education as labour market demand made wage gap among workers wider. Earnings between high school graduates and college-educated individual became more unequal. They found that the averages weekly wages for the least skilled workers has decreased by 5 percent compared to the most skilled workers earnings which rose up to 40 percent (Juhn, Murphy and Pierce, 1993: 416).

Psacharopoulos compared the returns to education for many different countries depending on their level of economic development. He found that women primary education has the highest returns to education within countries lesser per capita income. He attributed this to the low cost of primary education, and the high productivity differential between primary school graduates and those who are illiterate. Further, he found that the returns to any level of education were highest in least-developed countries, and the lowest return is in the advanced countries. For Indonesia, as one of developing country, Psacharopoulos reported a private return of 25.5% for primary school and 15.6 percent for secondary school graduate. (Psacharopoulos, 1985: 598).

Indonesian Law No. 20, 2003 obligated all citizens aged between to 7-12 to attend basic education which consists nine years of schooling, 6 years primary school and 3 years Junior High School. In response to education law, the ministry of National Education on behalf the government has regulated the compulsory of nine-year basic education. The central government and local governments guarantee the implementation of compulsory basic education for free of cost at the age of six for every citizen.

This research attempts to identify the percentage changes that took place over the period of time (1989 to 2009) in individual earnings due to their additional years of schooling. Through this research, we also determine how pivotal the educations in final earnings of workers. It explores that what may be best strategy to discourage or overcome the gender discrimination issue that exists in Indonesian labour market. At what level of education (primary, secondary or tertiary) the government effort should be most concentrated to enhance the workers' return.

2. Literature Review

Theory on human capital has developed by Schultz (1961), Becker (1962, 1964), and Mincer (1974). In their pioneering work, worker's productivity is related to the human capital. In this model, productivity can be enhanced through investment in formal education, training or other form of human capital such as health or information in the labour market. According to this theory, years of education and experience have a positive effect on workers' earnings. If there exists a difference in earnings in the absence of labour market discrimination, which believed that differences that is due to productivity among the workers. Therefore, if all workers were equally productive, then they would earn the same wages.

Mincer showed that if the only cost of attending school is the opportunity cost of student's time and if the proportional increase in earnings caused by additional years of schooling is constant over work time, then the log of wages will be linear to individual's year of schooling, where slope of coefficient equal to the rate of return to investment in education (Mincer, 1974: 11). Mincer found that changes in education level could be a determinant factor of increase in earnings. He developed a model that later was known as the Mincerian Wage Equation that can be written as follows:

$$LnW_i = \beta_0 + \beta_1 S_i + \beta_2 X_i + \beta_3 X_i^2 + \varepsilon_i$$

Where LnW_i is natural log of individual wage, S_i is years of schooling, X_i is working experience, X_i^2 is quadratic of working experience, and ε_i is error term. An interesting picture of the Mincer model is that the amount of time allocated to attain certain level of education is the main factor in increasing earnings. Therefore, if someone who has a higher education level, he would have a higher chance to obtain a higher income level than those who have low education levels.

In case of Indonesia, despite a limited research on gender earnings differentials, there are several studies that have been estimated the return to education in Indonesia. Byron and Takahashi (1989: 110), Behrman and Deolalikar (1991: 469, 1993: 479, and 1995: 112-113) found that there is a positive relationship of workers education and experience on earnings for both male and female. Interestingly, they found that female workers gained more earnings on education than males. The result also shows that University education is the highest in term rate of return to education. However, this study does not include any other variable except education, age and working experience variables into estimation,

since marital status, numbers of children in the family and living location affect of workers earnings.

Byron and Takahashi examined the return to education in Indonesian labour market using social economics survey (Susenas) data. In general, the returns to education in every additional school year increased 15-17 percents, and 66 percent of the earnings can be explained by education and experience (Byron and Takahashi, 1989: 117). The research showed that the returns were mostly higher in private than in the public sector. Compared to other countries, this rate had the highest return. There was sex discrimination in returns to education between genders. However, when female workers experience variable included in the estimation, the discrimination was insignificant. Unlike Behrman and Deolalikar study which covers to all areas in Indonesia. Byron and Takahashi study only covers in urban Java within public and private sector.

Behrman and Deolalikar estimated rates of return to schooling in Indonesia by using data from Indonesia National Labour Force Survey (sakernas). The sakernas data were gathered from Indonesia Statistics Agency in 1986. The research focused on 25,555 individuals out of 225,000 populations over ten years old who received wages as paid employees. The estimation did not show any significant difference by sex for sub-primary, primary and general junior secondary school. However, for vocational junior high school, and both vocational and general secondary and post secondary high school, women obtained significantly greater than men did. The rates of return to different levels of schooling ranged from 5 percent to 11.7 percent. (Behrman and Deolalikar, 1991: 470).

Using the same data from 1986 Indonesia national Labour Force Survey, Behrman and Deolalikar found the impact of an additional year of schooling on wage rates between 6 percent to 11 percent for males and 6 percent to 17 percent for females. The demographic data showed that male labour forces were 2.8 years older than female labour forces. In addition, average wages rate are 85 percent greater for male than female. The data indicated that male workers had higher level of education than the female workers did. The estimates indicated a positive impact of age on wages for both males and females. For females, the number of household under ten years of age reduces probability of wage labour, however, for males; it increases the probability of wages. In addition, they found that the effect of additional year of schooling was 2.5 to 11.4 percent range for wage rate and 2.8 to 9.7 percent range for earnings. (Behrman and Deolalikar, 1993: 468, 1995: 113). The return to post schooling experience were greater for males than females,

males experienced higher wage rates and earnings. Females indicated an increasing effect of age and effect of schooling. However, the percentage increases in wages with post primary schooling are greater for females.

3. The Data and Methodology

The data used in this study come from 1989, 1999 and 2009 Indonesian national Labour Force Survey (SAKERNAS) on households. The samples included in this study are individuals over the age of 15 years and only individuals who received wages as paid employees. Total number respondents of these three surveys can be summarizing as follows:

Table 1: Total Sample of Sakernas Data

Sakernas	Males	Females	total
1989	23005	9741	32746
1999	18580	8687	27267
2009	81010	42745	123755

The model used is the human capital model developed by Mincer (1974) with some modifications that earning is a function of education, experience, and other personal characteristics such as marital status and number of dependent children. The human capital earnings equations are estimated using standard Ordinary Least Square to compute rates of return to education with separate regressions for male and female:

$$LnMW = \beta_0 + a_1 NS + \beta_2 SUBPRIM + \beta_3 JHS + \beta_4 VJHS$$
$$+ \beta_5 SHS + \beta_6 VSHS + \beta_7 DIP1 + \beta_8 DIP2 + \beta_9 UNI + \beta_{10} URBAN$$
$$+ \beta_{11} HMA10 + \beta_{12} HMB10 + \beta_{13} WEXP + \beta_{14} WEXPSQ + \beta_{15} MARRIED + \varepsilon$$

Where :

- LnMW is log of monthly wage
- Education variables are dummy variables
  - a. NS = No schooling
  - b. Subprim = Subprimary schooling
  - c. JHS = Junior High School
  - d. VSHS = Vocational Junior High School
  - e. SHS = Senior High school
  - f. VSHS = Vocational Senior High School
  - g. Dip1 = Diploma 1 and 2
  - h. Dip2 = Diploma 3

    i. Uni= University
- Urban took a value of 1 if workers from urban area, zero otherwise
- HMA10 is household member above 10 years
- HMB10 is household member below 10 years
- Wexp and wexpsq refers to work experience and its square
- Male is dummy variable equal to one if respondent is male
- Married is a dummy variable equal to one if respondent is married

Furthermore, there are two variables as demographic variables to be considered in this estimation, these two variables are the number of young people in the family, this number leads to increase the opportunity cost of participating in the paid labour force and the second one is vice versa. In this study, wage defined as the total salary received weekly or monthly either in cash or in kind. Schooling in Indonesia as recorded in the survey data consists of primary school that started at age 7 and completed at age twelve. Then there are secondary education and tertiary education. Secondary education consists lower secondary education or more commonly known as junior high school which is 3 years and upper secondary education, which mostly known as senior high school that also for 3 years. As in several other countries, in Indonesia at secondary school level, there have been several vocational high schools such as technical high school. Tertiary education included diploma 1-3 and bachelor degree.

4. Findings and Discussions

The empirical estimates of earning equations for both male and female workers are tabulated in table 2. The dependent variable is log monthly wage. The t-statistics for each parameter are large in general, indicating the quality of coefficient estimates. The education variables do significantly affect earnings, while no schooling and sub-primary education has a negative effect on earnings. The estimated coefficients reveal that the effect of education on earnings is larger as education level increases. This result is similar to Behrman's study on effect of education on earnings in Indonesia, which proves that earning is higher with higher level of education. The return to University education is highest return among other level of education, while sub-primary education is the lowest rate of return to education of Male and Female workers.

Since levels of education contributes and have a positive impact on earning for male and female workers during 1989-2009, there are several reasons that can explain this evidence such as increasing in school enrolment, scarcity of skill workers, increasing number of education institution, and impose law of

compulsory basic education. There is a positive relationship between levels of education and earning, until 1980s there was not many school age population enter formal education, many of them dropped out until primary education. However, after 1980s, there was a significant enrolment of all level of education. As a result, earning increased gradually as level of education increased for both male and female during 1989 to 2009.

According to human capital theory, education contributes and has a positive impact on earnings and as expected education has positive sign for both male and female workers during this study period, it implies that additional education produces higher returns. The result also shows that the estimated coefficient of education variables is generally higher for females than for males. This result is consistent with the finding of Behrman study that the women experience has stronger returns on education compare to men (Behrman and Deolalikar, 1995: 105). However, Behrman's work only estimates the education level and age on workers earnings. This research attempts to complete previous on male-female earnings differentials on education, which includes urban, working experience and marital status variable into estimation.

Table 2 provides additional evidence that among education variables where University level has the highest return to education and the lowest return was vocational junior high school. For those female who has no schooling has bigger impact on earning compares to man's earning. When there was no schooling, male workers reduced income from 36.4 percent in 1989 to 29.8 percent in 2009. While female workers, no schooling reduced earnings up to 45.8 percent in 1989 and 31.6 percent 2009. Sub-primary defines as three years of schooling, respondent has participated in primary education but not completed. Sub-primary education shows lower percentage of negative sign on income level for both male and female workers compare to who completed primary education.

General and vocational junior education shows a falling rate of return for male and female workers during 1989 until 2009. Interestingly, a female worker with 9 years of schooling earns higher than male workers. For example in 1989, female gets 44.3 percent earning compare to male workers who get only 27.8 percent, the same trend also show in 2009 where male worker earn less than female at 15.6 percent and 27.6 percent respectively.

Table 2: OLS regression for log of monthly earning of male and female workers

| Variables | 1989 | | | | 1999 | | | | 2009 | | | |
| | Females | | Males | | Females | | Males | | Females | | Males | |
	Coeff.	T-ratio	Coeff.	T-ratio	Coeff.	T-ratio	Coeff.	T-ratio	Coeff.	T-ratio	Coeff.	T-ratio
Intercept	9.857	*403.5*	10.198	*659.8*	11.268	*376.4*	11.685	*603.5*	12.511	*885.3*	13.144	*1360.5*
No Schooling	-0.458	*-19.4*	-0.364	*-20.7*	-0.318	*-9.7*	-0.271	*-9.2*	-0.316	*-11.0*	-0.298	*-12.2*
Subprimary	-0.346	*-17.4*	-0.267	*-23.0*	-0.291	*-11.3*	-0.198	*-11.8*	-0.111	*-7.0*	-0.104	*-10.4*
Junior High School	0.443	*17.3*	0.278	*23.5*	0.402	*15.1*	0.254	*18.0*	0.276	*20.1*	0.156	*19.0*
Vocational Junior High Sch.	0.523	*8.7*	0.259	*11.4*	0.483	*6.9*	0.317	*10.5*	0.294	*7.4*	0.170	*8.6*
Senior High School	0.854	*39.2*	0.529	*46.2*	0.799	*34.1*	0.541	*40.7*	0.538	*44.2*	0.421	*56.3*
Vocational Senior High Sch.	0.877	*48.1*	0.543	*47.3*	0.960	*42.2*	0.575	*38.5*	0.689	*50.2*	0.447	*52.4*
Diploma1_2	1.069	*23.6*	0.704	*22.0*	1.186	*32.0*	0.803	*24.2*	0.745	*48.9*	0.568	*37.5*
Diploma3	1.238	*33.9*	0.862	*39.7*	1.291	*34.5*	0.893	*32.2*	1.013	*61.2*	0.786	*51.7*
University	1.398	*34.7*	1.037	*53.9*	1.274	*41.5*	0.957	*48.6*	1.088	*86.6*	0.919	*103.8*
Urban	0.155	*11.9*	0.148	*19.5*	0.128	*8.4*	0.106	*11.5*	0.158	*21.6*	0.106	*21.8*
HMA10	0.004	***1.3***	0.007	*4.5*	0.004	***1.0***	-0.001	***-0.465***	0.017	*8.8*	-0.010	*-7.0*
HMB10	0.000	***.1***	0.018	*6.2*	-0.006	***-0.749***	-0.001	***-0.254***	0.002	***.4***	0.001	***.3***
Experience	0.046	*28.7*	0.059	*58.9*	0.044	*21.7*	0.047	*32.5*	0.056	*64.1*	0.032	*54.1*
Experience Square	-0.001	*-22.8*	-0.001	*-44.0*	-0.001	*-18.1*	-0.001	*-27.7*	-0.001	*-28.8*	0.000	*-22.9*
Married	-		-		-0.015	*-.9*	0.114	*8.1*	0.092	*11.6*	0.260	*42.2*
R-squared	0.495		0.399		0.437		0.328		0.393		0.312	
Numbers of observations	9,741		23,005		8,687		18,580		42,745		81,010	

notes : (i) all coefficients are significant at 1% level unless indicated otherwise;
(ii) figures in bolds are not statistically significant at the 10% level.

124

At the same time, the return to senior high school also shows similar trend as described in junior education level, female earns more income than male workers compare to who did not complete primary education. Finally, among three level of higher education, a female worker with university education shows as the highest level of earning and again female earns more than male workers do. In 1986, the premium earnings of female worker with university education dropped from 139.8 percent to 127.4 percent in 1999 and 108.8 percent in 2009 relative to individual with no primary education. On the other hand, in 1989 to 2009 earnings of male worker with university education dropped from 103.7 percent to 91.9 percent relative to individual with no primary education. There is also clear sign that the effect of education on earning decreased over study period even though the effect is still larger compared with those of no education. This is not surprisingly, since for last two-decade women participation in paid labour force increase significantly in Indonesia. In addition to that, women enrolments in higher education also rise sharply. This result brings to conclusion that women getting higher benefit when females have higher level of education from junior high school level. The fact that the female has higher significant effect of education on earning is clear. This results mean that higher education qualifications are always associated with higher earnings.

Table 2 provides an additional result of rate of return to education and gender earnings differentials. As expected, the effect of working experience is positive and working experience square is negative, which is showing an inverted U-shape curve. This indicates that the more work experience an individual has the higher the earnings of worker are able to gain. The effect of an additional year of experience reaches the peak at certain point and then tends to decline over time. The sign demonstrate that the returns of work experience for male are higher than for female worker in 1989 and 2009. However, in 1999 the returns to working experience of female slightly higher than male workers. An additional year of work experience rises the earning of female worker from 4.6 percent in 1989 to 5.6 percent in 2009. On the contrary, an additional year of experience of male worker tends to decrease wage from 5.9 percent to 5.4 percent during 1989-2009.

5. Conclusion

The education variables do significantly affect earnings, while no schooling and sub-primary education has a negative effect on earnings. The estimated coefficients reveal that the effect of education on earnings is larger as education level increases. The return to University education is highest return among other

level of education. These results imply that female workers benefit from getting higher education, rural and experience.

Bibliography

Barro, Robert Joseph. and Lee, Jong Wha (2010), "A New Data Set of Educational Attainment In The World, 1950–2010", *NBER working paper series, No. 15902.* Cambridge, MA.: National Bureau of Economic Research.

Becker, Gary (1962), "Investment in Human Capital: A Theoretical Analysis", *The Journal of Political Economy,* Vol. 30, No. 5, pp. 9-49.

Behrman, Jere and Deolalikar, Anil (1991), "School Repetition, Dropouts, and The Rates of Return to schooling: The Case of Indonesia", *Oxford Bulletin of Economics and Statistics,* Vol. 53, No. 4, pp. 467-480.

Behrman, Jere and Deolalikar, Anil (1993), "Unobserved Household and Community Heterogeneity and the Labor Market Impact of Schooling: A Case Study for Indonesia", *Economic Development and Cultural Change*, Vol. 41, No. 3, pp. 461-488.

Behrman, Jere and Deolalikar, Anil (1995), "Are there differences returns to schooling by gender? The case of Indonesian labour markets", *Oxford Bulletin of Economics and Statistics,* Vol. 57, No. 1, pp. 97-117.

Byron, Raymon and Takahashi, Hiroshi (1989), "An Analysis of the Effect Earnings in the Government and Private Sectors of Urban Java", *Bulletin of Indonesian Economic Studies,* Vol. 25, No. 10, pp. 105-117.

Juhn, Chinhui, Murphy, Kevin and Pierce, Brooks (1993), "Wage Inequality and the Rise in the Returns to Skill", *Journal of Political Economy,* Vol. 101, No. 3, pp. 410–442.

Mincer, Jacob (1974), Schooling, Experience, and Earnings, New York: National Bureau of Economic Research.

Psacharopoulos, George (1985), "Return to education: A further International Update and Implications", *Journal of Human Resources*, Vol. 20, No. 4, pp. 583-604.

Schultz, Theodore (1961), "Investment in Human Capital", *The American Economic Review,* Vol. 51, No. 1, pp. 1-17.