ECONOMIC RETURNS TO SCHOOLING IN A LESS DEVELOPED COUNTRY: EVIDENCE FOR INDONESIA

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Abstract

The purpose of this study is to provide an update of the empirical evidence on the private return to schooling in Indonesia using sample data from Indonesian Family Life Survey 4 (IFLS 4). The augmented Mincerian model is utilised to quantify the private return to schooling. The main result obtained indicates that the return to schooling in Indonesia is relatively low compare to other Asian and Less Developed Countries. It is also found that return to schooling for females are significantly different from those of males.

JEL codes: I210, I220, J240, J310

Key Words: earnings, experience, returns to schooling,

1. Introduction

There is a quiet wide literature on the empirical estimation of Mincerian wage return to schooling in less developed countries. In terms of the empirical findings from developed countries, there has been an ongoing debate concerning even the magnitude of the returns to schooling. Some studies, for example, provide evidence of a relatively low private return to schooling in developing countries, whereas there are numerous other empirical studies that find that the return to schooling is quite high. Some studies provide evidence that return to schooling for females are higher than those of males, and some find the return to schooling for females are lower than those of males.

Despite the voluminous empirical literatures on the returns to schooling in less developed countries, to date there have been only a limited number of studies based on Indonesian data. This study therefore has the potential to fill a major gap in the literature.

The paper is organized as follows. Section 2 focuses on literature review. Section 3 describes the data. Section 4 briefly discusses the empirical framework. Section 5 presents the estimate results. Section 6 draws some conclusions.

2. Brief Literature Review

There is a vast body of research on the labour market benefits associated with education. The human capital model and the signalling/screening model are widely used to explain the relationship between education and labour market outcomes. Human capital theory emphasizes that education provides information and skills to enhance the productive capacities of individuals. Individuals will invest in education through schooling to acquire skills and productivity. These skills and productivity raise the value of individuals to employers and thus lead to higher wages being offered (Schultz 1961, Ridell 2006). Further, Okuwa (2004) states that education is an essential determinant of earning in market economies. The higher an individual's educational attainment, the higher that individual's expected starting wage and the steeper the rise in earning capacity over time.

The estimation of causal links between schooling and earnings has been puzzling labour economists for several decades. One of the major questions about the relationship between education and earning is, then, how much is the returns to education? Many methodologies have been proposed in the literature to answer this question, but one that has become a cornerstone in this area of empirical research is human capital earning function, proposed by Mincer (1974), which reveals how wages are related to schooling and work experience.

Chiswick (2002, p. 22-23) states that the human capital earning function introduced by Mincer has several distinct characteristics that make it particularly attractive: First, the functional form is an equation based on the optimizing behaviour of individuals and represents the outcome of a labour market process. Second, it converts the monetary cost of the investment in human capital into years of schooling and years of labour market experience. In other words, it converts 'immeasureblas' into 'measurebles'. Third, the function is adaptable to inclusion of other variables that affect earnings. Fourth, it allows comparisons across time and demographic groups, since the coefficients of the regression equation have economic interpretations.

3. Data

The data set used in the empirical analysis is the Indonesian Family Life Survey 4 (IFLS4). IFLS4 is a nationally representative sample comprising 13,536 households and 50,580 individuals, spread across provinces on the islands of Java, Sumatra, Bali, West Nusa Tenggara, Kalimantan, and Sulawesi. Together these provinces encompass approximately 83 percent of the Indonesian population and much of its heterogeneity. The Indonesia Family Life Survey is a continuing longitudinal socioeconomic and health survey. The survey collects data on individual respondents, their families, their households, the communities in which they live, and the health and education facilities they use. IFLS4 was fielded in late 2007 and early 2008. IFLS4 was a collaborative effort by RAND, the Center for Population and Policy Studies (CPPS) of the University of Gadjah Mada, and Survey Meter.

For purposes of the empirical analysis for this paper, an extract of data was created from the IFLS4 data base. To create the extract, data from the individual-level files and household-level files had to be merged. As noted above, persons in the individual file who were aged less than 15 and more than 65 were excluded from the sample. In addition, only individuals who provided full

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information about their education, employment, and family background were included in the sample. Besides that, persons in school or the military during the survey week were omitted.

The extract contains both IFLS4 variables and derived variables for each person. The variables contained in each person's record are as follows: unique identifiers for individuals and their household, years of schooling, highest level of education obtained, age, potential work experience, gender, marital status, area (rural-urban), amount of earnings by month, and household size.

The dependent variable in this analysis is the natural logarithm of monthly earnings. These monthly earnings include the value of all benefits secured by an individual in their job. The unit of measurement is rupiah (Rp) (US$1 was approximately equal to Rp9,000 at the time of the 2007/2008 survey). Monthly earnings are used instead of an hourly earnings indicator, because this is the figure respondents were explicitly asked to supply. While an hourly wage measure could be constructed, calculation of hourly wages would require using another variable, hours worked in the reference month, which is in turn subject to measurement error. Hence the monthly wage data are argued to be less prone to measurement error. There is also a preference for the use of monthly earnings based on the fact that in Indonesia employer/employee agreements are generally based on monthly wages.

There is one independent variable that needs to be constructed from other information in the data set, namely potential work experience. Measures of actual labour force experience, an important variable in the study of earnings determination, are absent from the IFLS4 data sets. However a potential labour force experience variable can be calculated from the information available. Most empirical studies usually use the following basic formula to derive a measure of potential work experience − age minus years of schooling minus official age to start primary school (6 or 7). However, for the purposes of calculating potential work experience in this study the following formula will be used: age minus years of schooling minus age first attended primary school. The aim of using this formula is to obtain more precise data on potential work experience since the age individuals first attended primary school varies appreciably. It ranges from 5 to 14 years.

The summary statistics for the main variables used in this study are reported in Table 1. The mean monthly earnings are Rp1,476,118 for male workers and Rp1,066,059 for female workers. The mean years of schooling are relatively low, specifically 10.61 years for males and 10.83 years for females, or just one year higher than the 9 years of compulsory study. The workers in the sample have mean potential work experience (job tenure) of approximately 18.04 (7.89) years and 17.23 (7.78) years for males and females, respectively. The Table 1 data reveal that male and female workers have broadly similar levels of schooling, potential labour market experience, age and job tenure. They differ appreciably in terms of earnings, where the mean for males (1,476,118) is 38.46 percent above the mean for females (1,066,059). We return to this issue below.

Table 1: Summary Statistics of Variables

Variables	Males		Females	
	Mean	Standard Deviation	Mean	Standard Deviation
Dependent Variable				
Monthly Earnings (IDR)	1,476,118	2,137,155	1,066,059	1,514,442
Monthly Earnings (log)	5.973	0.408	5.792	0.468
Independent Variables				
Years of schooling	10.608	3.616	10.833	3.986
Experience	18.042	10.259	17.279	11.238
Experience^2	430.709	472.415	424.780	492.716
Control Variables				
Tenure	7.890	8.036	7.779	8.275
Tenure^2	126.885	246.885	128.943	247.763
Marital status dummy	0.899	0.302	0.801	0.399
Dummy for urban area	0.649	0.477	0.730	0.444

Source: Author's calculation based IFLS4 data set.

Approximately 67.62 percent (3,108 individuals) of the male sample come from urban area. About 73.02 percent (1,118 individuals) of the female sample live in urban area. Based on the marital status, 3,065 individuals or about 59.94 percent of the male sample are married, and 1,227 individuals or about 80.14 percent of the female sample are married.

4. Empirical Framework

The specification of the earnings equation used below is based on the human capital model developed by Mincer (1974). This model assumes that (i) the only costs of schooling are the forgone earnings, and (ii) each individual starts working immediately after completion of school. The model shows that the natural logarithm of earnings can be expressed as a function of years of schooling, post schooling labour market experience and its quadratic term. Furthermore, this relationship provides a direct measure of the returns to schooling through the coefficient of the years of schooling variable in the earnings regression.

To provide more detailed evidence on the returns to education in Indonesia, the basic earnings equation is augmented with other variables that may influence earnings. The first such variable is tenure. This variable represents the work experience in the present job. Current job tenure is usually viewed as a measure of firm-specific training and knowledge. The second variable is marital status. Marital status is typically associated with household specialisation. The specialisation hypothesis argues that a married couple can engage in specialisation of their household tasks. Then male workers are able to focus their time and effort on labour market activities (Gray, 1997), and females, having relatively low market wages, allocate proportionally more time to home duties. Therefore, being married most likely affects the wages of males positively while having the opposite effect on the wages of females due to child bearing and their other domestic tasks. The last variable is a residential dummy (rural versus urban), which is intended to control for the earnings differential between urban and rural areas. Hence, the equations with these control variables become:

$$ln(earnings_i) = \beta_0 + \beta_1 yrschyr_i + \beta_2 expr_i + \beta_3 expr_i^2 + \beta_4 tenure_i + \beta_5 tenure_i^2 + \beta_6 married_i + \beta_7 urban_i + \mu_i \quad (1)$$

where $earnings_i$ is monthly earnings for individual i, $yrschyr_i$ is years of schooling for individual i, $expr_i$ is a measure of work experience for individual i, $expr_i^2$ is experience squared for individual i, $tenure_i$ represents the job tenure for individual i, $tenure_i^2$ is tenure squared for individual i, $married_i$ denotes the dummy for marital status for individual i, and $urban_i$ is a residential dummy (urban versus rural) for individual i, and μ_i is a disturbance term representing other factors which cannot be explicitly measured, and which are assumed to be independent of $yrschyr_i$ and $expr_i$. According to human capital theory $\beta_1 = r$, and so the estimated regression coefficient β_1 is interpreted as the average private rate of return to one additional year of schooling.

It is frequently argued that in the case of females' returns to education derived from standard Mincerian models may be biased because the females that participate in the labour force are not representative of all females. In order to correct for such a potential selectivity bias, a two-step Heckman (1979) selection correction approach can be adopted. A probit model of the labour force participation probability of a female is estimated in the first step. Then, in the second step, the derived inverse Mills ratio (λ) is included in the earnings function as an additional explanatory variable.

5. Results

5.1. Return to Schooling

Table 2 presents the private rate of return to education from this augmented specification for the male and the female samples separately, and selection correction approach. The Chow tests reject the null hypothesis of equality of the regression coefficients for males and females. The estimated coefficients are jointly significant, as indicated by the F-test. Moreover, the two augmented models explain about 21.52 and 30.32 percent of the variation in actual earnings. Most of the coefficient are estimated with statistical precision (low standard error), and have the expected signs. Tenure, gender (female), and the urban variables are statistically significant at the 1 percent level of significance for all specifications. The marital status variable, however, is significant only for females. The t-test rejects the null hypothesis of equality of the regression coefficients of schooling for males and females.

Table 2: OLS Estimates of Augmented Mincerian Earnings Functions and the Selectivity Bias Corrected Earnings Equations

(a)	(b)	(c)
Variables	Males	Females
Constant	5.24319 (0.03406)***	4.95118 (0.04849)***
Years of Schooling	0.04586 (0.00221)***	0.05429 (0.00321)***
Experience	0.00734 (0.00284)***	0.00795 (0.00392)**
Experience^2	-0.00012 (0.00007)**	-0.00015 (0.00009)*
Tenure	0.01139 (0.00260)***	0.02432 (0.00388)***
Tenure^2	-0.00017 (0.00009)*	-0.00052 (0.00009)***
Married	0.03276 (0.02132)	-0.05018 (0.02499)**
Urban	0.09994 (0.01556)***	0.13455 (0.02541)***
R^2	0.2152	0.3032
Chow test (F-test)		37.43
p-value		0.0000
Observations	3065	1531

Notes: Robust standard errors in parentheses. *, ** and *** denote statistical significance at the 10 percent, 5 percent and 1 percent levels, respectively.

The results suggest that an additional year of education is associated with an annual 4.6, and 5.4 percent increase in earnings male, and female workers, respectively. These estimates of the return to schooling in Indonesia are substantially smaller than the Psacharopoulos (1981) average estimate of 14 percent for Less Developed Countries, and the Psacharopoulos (1994) average estimate of 9.6 percent for Asian countries. However these results are in agreement with some empirical studies, for example: Jamison & Gaag (1987) in China, Flanagan (1998) in the Czech Republic, Wei et al. (1999) in China, Fazio & Dinh (2004) in China, Aromolaran (2006) in Nigeria, and Aslam, Bari & Kingdon (2010) in Pakistan. A relatively low rate of return to schooling is generally faced by countries experiencing economic transition, such as China and the former Russian countries. Typically, the return to schooling in such countries is low in the early stage of the economic transition process, then gradually increases after market oriented economic reform is implemented. The Indonesian economy shifted from a controlled economy to a market driven economy in 1966 (Ananta & Arifin 2008). Referring to the general pattern of the return to schooling in economic transition countries, the low return to schooling in Indonesia in the late 2000s invites a question. At this period, where the economic reform process had already

reached the market driven economy stage, the return to schooling is expected to be higher than the estimates described above. Moreover, Duflo (2001) using data from a 1995 intercensal survey of Indonesia, found estimates of economic returns to schooling ranging from 6.8 to 10.6 percent. This suggests that the relatively low return to schooling in the current study of data for 2007-2008 is triggered by some other source. A likely candidate in this regard is a decline in the quality of school and a significant increase in the supply of educated worker in the labour market, due to a combination of events such as the massive school construction program in 1973 and 1974 and the compulsory education program in 1984. Both explanations, though particularly the latter, featured in accounts of the decline in the return to schooling in the US in the 1970s.

The estimates of the return to schooling for females (5.4 percent) are higher than that for males (4.6 percent). The t-test confirms that these differences are statistically different, indicating that schooling is more financially rewarding in the labour market for females than for males. This result is consistent with the findings of many empirical studies, such as Deolalikar (1991) in Indonesia, Miller Mulvey, & Martin (1997) in Australia, Flanagan (1998) in the Czech Republic, Brunello, Comi, & Lucifora (2000) in Italy, Avecedo (2001) in Mexico, and Asadullah (2006) in Bangladesh.

The coefficients on the potential labour market experience variable and its squared term have the expected signs, and portray the usual concavity of the experience-earnings profile. The increase in earnings associated with an extra year of potential labour market experience is given as:

$$\frac{\partial \, ln\, earnings}{\partial expr} = \widehat{\boldsymbol{\beta}}_{\mathbf{2}} + \mathbf{2}\widehat{\boldsymbol{\beta}}_{\mathbf{3}}\boldsymbol{expr},$$

where $\widehat{\boldsymbol{\beta}}_{\mathbf{2}}$ is the estimated coefficient on the experience variable, and $\widehat{\boldsymbol{\beta}}_{\mathbf{3}}$ is the estimated coefficient on the experience squared variable. Thus this payoff varies with the level of potential work experience. Also of interest is the level of experience at which the predicted experience-earnings profile peaks. This is where $\widehat{\boldsymbol{\beta}}_{\mathbf{2}} + \mathbf{2}\widehat{\boldsymbol{\beta}}_{\mathbf{3}}\boldsymbol{expr} = \mathbf{0}$. This occurs when potential work experience reaches 33.58 and 26.50 for male, and female samples respectively (see figure 1).

The next variable to consider is job tenure. This measure is included in the model along with work experience. By doing so, it is possible to obtain an indication on the relative importance of general and firm specific human capital for earnings determination. The increase in earnings associated with an extra year of tenure is given as:

$$\frac{\partial \, ln\, earnings}{\partial tenure} = \widehat{\boldsymbol{\beta}}_{\mathbf{4}} + \mathbf{2}\widehat{\boldsymbol{\beta}}_{\mathbf{5}}\boldsymbol{tenure},$$

where $\widehat{\boldsymbol{\beta}}_{\mathbf{4}}$ is the estimated coefficient on the tenure variable, and $\widehat{\boldsymbol{\beta}}_{\mathbf{5}}$ is the estimated coefficient on the tenure squared variable. Thus this payoff varies with the level of tenure. All the specifications show that tenure has a larger partial effect than experience and age over much of the early parts of the experience-earnings and age-earnings profiles. For example, in estimation using male (female) samples, the coefficient for potential work experience is 0.00734 (0.00795), and the coefficient for tenure is 0.01139 (0.02432). This suggests that seniority in terms of job tenure is relatively more important than potential work experience among those in their first year in the labour force or in their current job. This pattern holds over much of the early career. For example, after 10 years of seniority an additional year in the job increases earnings by 0.799 (1.392) percent for males (females), while after 10 years of work experience an additional year of experience increases earnings by approximately 0.494 (0.495) percent for males (females).

The estimates also suggest that, on average, residents of urban areas receive significantly higher earnings than individuals living in the rural areas. The coefficient of the urban dummy variable is 0.09994 and 0.13455 for male and females samples, respectively. Thus the relative effect on earnings is 0.105 (exp (0.09994) -1 = 1.105105 – 1) for male workers and 0.144 (exp (0.13455) – 1 = 1.144022 – 1), and these imply that the male (female) workers from urban areas earn 10.5(14.4) percent more than workers from rural areas, with the difference being significant at the 1 percent significance level.[16] Comparing the male and female samples, the coefficient of the urban dummy variable is higher for females than males. This gender differential in estimates of the partial effects of urban area residence in the earnings equation, where the effect is larger for females, is consistent with the evidence in relation to schooling and job tenure.

The marital status variable is significant only for females. Being married has a positive, though statistically insignificant, effect on earnings for males but leads to around 5 percent lower earnings for female workers, presumably because of the extra home duties they undertake and child bearing/rearing activities. In other words, being married is most likely to have little effect on the wages of male workers while it has a negative effect on the wages of female workers.

5.2. Experience-Earnings and Tenure-Earnings Profiles

Figure 1 compares the experience-earnings and the tenure-earnings profiles. Panel A (B) presents the experience-earnings and tenure-earnings profiles for male (female) sample. The experience-earnings and the tenure-earnings profiles display rapid initial earnings growth, and then decline after reaching a maximum point. For both specifications (Panels A and B), the tenure-earnings profiles lie above the experience-earnings profiles and have a steeper shape. This pattern reinforces the comment above, to the effect that tenure is a more important determinant for earnings than potential labour market experience among both males and females. That is, employers value seniority in terms of job tenure more than potential work experience.

Panel C compares the experience-earnings profiles by gender. Male workers reach their experience-earnings peak at 30.6 years of experience, while female workers reach their experience-earnings peak earlier than their male counterparts, which is at 26.5 years of experience. Thus for a male leaving education at age 16, this peak would be at age 47 and for females leaving school at age 16 this peak would occur at 43 years.

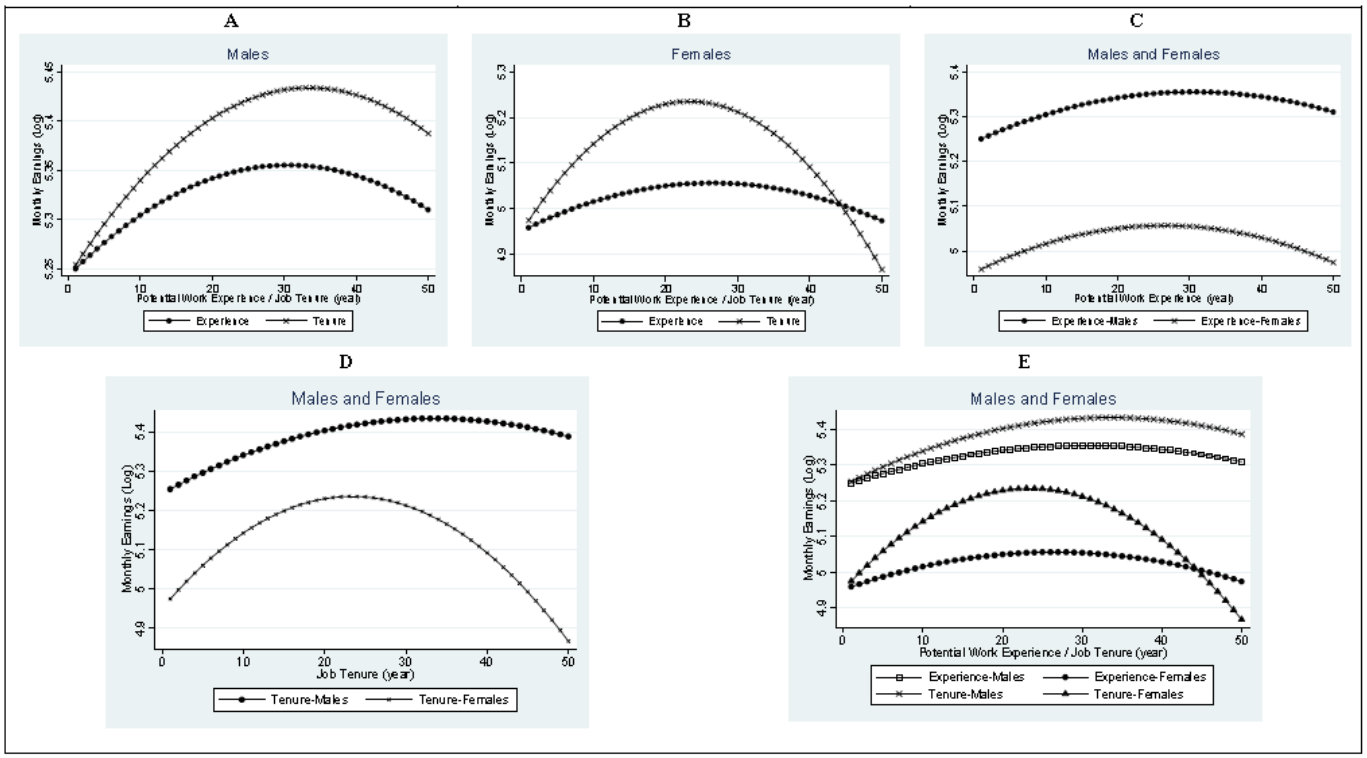
Comparing the tenure-earning profiles for females and males (see Panel D), there are two main points of interest. First, the gap between females' tenure-earnings profile and that of males initially narrows with years in the job. However, after females' tenure-

[16] For detailed explanation how to calculate relative effects from dummy variable coefficients can be found in Halvorsen and Palmquist (1980).

earnings profile reaches its peak, the gender gap gets wider. Second, the peak of the tenure-earnings profile, where $\widehat{\beta}_4 + 2\widehat{\beta}_5 tenure = 0$, for females (24 years) occurs before that for males (35.9 years). This also means that male workers get to their experience-earnings peak earlier than their tenure-earnings peak. In the case of female workers, however, the tenure-earnings peak comes earlier than the experience-earnings peak.

Panel E compares the experience-earnings and tenure-earnings profiles for male and female samples. Both the experience-earnings and tenure-earnings profiles of female workers lie below those of male workers and have a steeper shape. Females reach the turning point earlier than males in the case of both the experience-earnings and tenure tenure-earnings profiles.

Figure 1: Experience – Earnings and Tenure – Earnings Profiles



Source: Author's calculation based on Table 2.

5.3. Selectivity Bias

It is frequently argued that the returns to education for females derived from either the standard or augmented Mincerian models may be biased because the females that participate in the labour force are not representative of all females. This is known as sample selection bias, and it is generally regarded as a potentially important, though difficult to address, econometric issue in this type of applied research.

Table 3: Estimates of the Selectivity Bias Corrected Earnings Equations

	Probit	Mincerian
Constant	0.35173 (0.11293)***	5.02265 (0.06938)***
Year of Schooling	-0.01695 (0.00584)***	0.05499 (0.00317)***
Experience	0.03595 (0.00539)***	0.00601 (0.00378)
Experience^2	-0.00112 (0.00012)***	-0.00009 (0.00009)
Tenure		0.02422 (0.00369)***
Tenure^2		-0.00052 (0.00012)***
Married	-0.63521 (0.05638)***	-0.01260 (0.03679)
Urban	0.43750 (0.03760)***	0.11234 (0.02765)***
Household size	-0.03515 (0.00662)***	
Child under 5	-0.34892 (0.03867)***	
Muslim	-0.43157 (0.05521)***	
Father/mother lives in the same house	-2.00666 (0.11293)***	
λ		-0.06906 (0.04528)
Adj R^2		0.1198
Observations	7911	7911
Censored observation	6380	6380
Uncensored	1531	1531

observation

*Notes: Standard errors in parentheses. *, ** and *** denote statistical significance at the 10 percent, 5 percent and 1 percent levels, respectively.*

In order to correct for such a potential selectivity bias, a two-step Heckman (1979) selection correction approach can be adopted. This two-step approach re-casts the sample selection problem as an omitted variable problem, and so provides, in principle at least, a tractable means of addressing the issue. A probit model of the labour force participation probability of a female is estimated in the first step. Then, in the second step, the derived inverse Mills ratio (λ) is included in the earnings function as an additional explanatory variable. In addition to years of schooling or the dummies for education level, potential experience or age, experience squared or age squared, marital status and urban area of residence, household size, a dummy variable for the existence of a child younger than five years old in the household, a dummy variable for religion, and a dummy variable for the existence of either a father or mother in the household are included in the probit model. These four variables are included in the model of the decision of whether females participate in labour market because it is presumed that they are some of the factors that directly influence whether females join the labour market and which do not affect market earnings. It is argued that household size, the presence of children younger than five years old, and the presence of the father or mother in the household influence females' decision to join the labour market since these three variables have an impact on females in terms of the amount of domestic duties and time that has to be devoted to their family. The religion of the respondent (Islam) is included in the probit model since religious/Islamic values are of critical importance in many parts of Indonesia. Many believe that female Muslims are not supposed to join the labour market. Given this model of labour force participation, and the earnings equations used previously, it is seen that the dummy variable for the existence of a child younger than five years old in the household, the dummy variable for religion, the dummy variable for the existence of father of other in the household and the variable for household size are used, along with the non-linearity of the sample selectivity (λ) term, for identification purposes.

The Heckman model estimates are reported in Tables 3. All the variables in the probit labour force participation model have the expected signs and are statistically significant. All the identifying variables have strong, negative impacts on the participation probability. Each of these effects is highly statistically significant, which suggest that there should not be any major multicollinieearity problems following the inclusion of the λ term in the earnings equation. However, when the inverse Mills ratio, λ, is included in the earnings function it turns out to be statistically not significant. Therefore, it can be argued that the corresponding estimates for this model reported in Table 2 column (c) do not suffer from selectivity bias.

6. Conclusion

This paper uncovers evidence of returns to schooling in Indonesia and highlights some important points. In this study, males and females estimates for separating the causal effect of education on earnings between these two genders have been compared. This study employs OLS as methodological approach to measure the return to schooling. In order to correct the possibility of bias selectivity, two step Heckman's model is adopted. The results suggest that there is no selectivity bias. This confirms that the conventional estimates without correcting selectivity are valid and acceptable.

The estimation of the augmented Mincerian earnings functions revealed that the return for an extra year of schooling is positive and significant. Employing the augmented Mincerian model that includes the control variables for tenure and its squared, marital status, and urban area of residence, the return to schooling are 4.6, and 5.4 for male, and female samples, respectively. These results confirm that the returns to schooling in Indonesia are low in comparison with the return to schooling in many other countries, particularly Asian and developing countries. Furthermore, it is clearly shown that the returns to schooling are higher for females than for males, which is in agreement with the findings of other studies, e.g. Deolelikar (1991) in Indonesia, Miller, Mulvey, & Martin. (1997) in Australia, Flanagan (1998) in the Czech Republic, Brunello, Comi, & Lucifora (2000) in Italy, Avecedo (2001) in Mexico, and Asadullah (2006) in Bangladesh.

The results show that statistical control for tenure and its squared term is more important than potential work experience. Marital status has a positive impact on earnings for males but it has a negative impact on earnings for females. These results support the household specialisation hypothesis. The estimates also suggest that, on average, residents of urban areas receive significantly higher earnings than individuals living in the rural areas.

The estimates of the return to schooling based on additional years of schooling using the OLS method presented in this paper provide some valuable information on the Indonesian education sector. However, these empirical analyses may have limitations. In particular, in this chapter the endogeneity of schooling was not taken into account. Devoting a separate study to it may shed more light on the return to schooling in Indonesia.

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