Jejak Vol 16 (2) (2023): 372-380 DOI: https://doi.org/10.15294/jejak.v16i2.45732

JEJAK

Journal of Economics and Policy

http://journal.unnes.ac.id/nju/index.php/jejak

Estimating the Return on Education: Evidence from Indonesian Survey Data

Muhammad Ciro Danuza[1], Alfa Farah[2]✉

[1,2]Faculty of Economics and Business, Universitas Diponegoro, Semarang

Permalink/DOI: https://doi.org/10.15294/jejak.v16i2.45732

Received: May 2023; Accepted: July 2023; Published: September 2023

Abstract

In the Mincerian framework, the return on education shows how an incremental increase in earnings is related to an increase in schooling. Employing a survey data, the Indonesia Family Life Survey Wave 5(IFLS 5), this study attempts to estimate the return on education in Indonesia. The baseline results show that one extra year of schooling increases future earnings by 5.7%. When parental education used as instruments, the IV estimates show a rate of 12%. These results are consistent with the Mincerian framework and the previous studies.

Key words : Return on education, Human capital, Indonesian survey data

How to Cite: Danuza, M., & Farah, A. (2023). Estimating the Return on Education: Evidence from Indonesian Survey Data. *JEJAK: Jurnal Ekonomi dan Kebijakan, 16*(2). doi:https://doi.org/10.15294/jejak.v16i2.45732

✉ Corresponding author : Alfa Farah
Address: Universitas Diponegoro, Fak. Ekonomika dan Bisnis, Jl. Prof. Moeljono Trastotenojo, Tembalang, Semarang, Indonesia
E-mail: alfafarah@live.undip.ac.id

p-ISSN 1979-715X
e-ISSN 2460-5123

INTRODUCTION

As one of the most populated countries in the world, Indonesia has a massive education sector. In 2022, there are more than 52 million students, 4 million teaching staff, and 438,000 schools (Kemdikbudristek, 2022a). This massive education system naturally required large financing. Accordingly, an interesting question to post is: what exactly is the return on all the money spent on education?.

The latest Indonesian Family Life Survey data (IFLS 5) which fielded in 2014 and 2015 shows that the level of formal educated completed is still low. Only 32% Indonesians went to high school and only 14% continued to unive-rsity (Figure 1). The survey data also informs that those who went to a higher level of formal edu-cation earn more (Figure 2).

The positive relation between years of schooling and earnings depicted in Figure 2 suggests that education is an investment that affects future earnings. When people decide to stay at school, they invest their time and foregone potential earnings, expecting that their investment in education will give them a higher return in the future (See Becker, 1962, 1964). Although the benefits of obtaining education include not only economic but also social and cultural benefits, the most widely used measure of return on education is earnings. Education increases the

productivity of individuals who undertake it and, as a result, these individuals earn higher ea-rnings in the labor market (Becker, 1992).

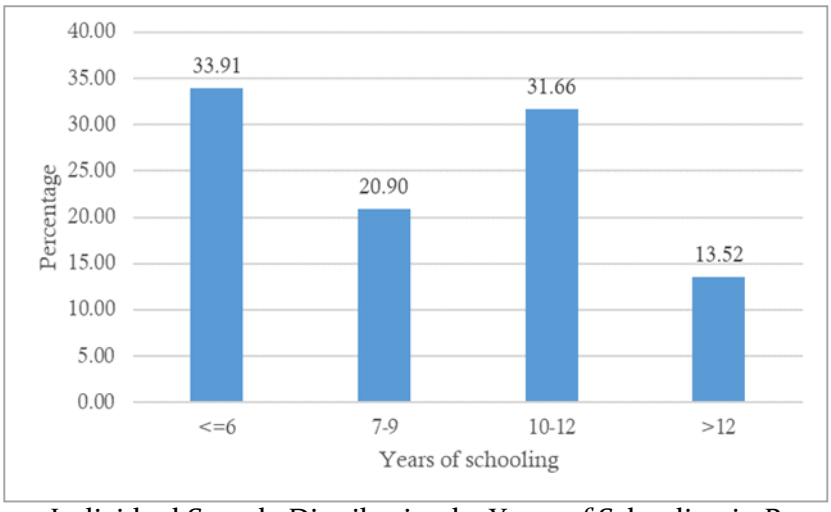

Figure 1. Individual Sample Distribution by Years of Schooling in Percentage

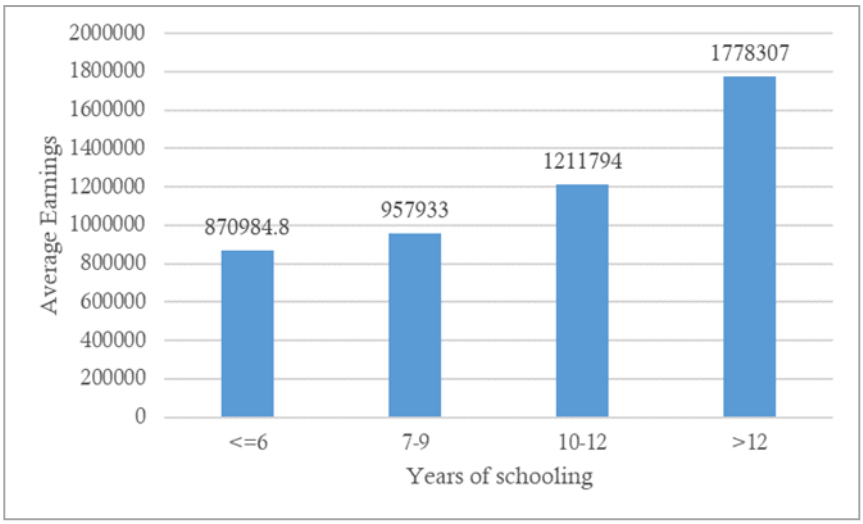

Figure 2. Individual Sample Average Earnings by Years of Schooling

Mincer (1958) introduced a simple earn-ing model—which is later widely known as the Mincerian Earning Function—that desc-ribe the relationship between investment in human capital and earnings. Assuming that the only cost of additional years of schooling is student's opportunity cost and if the sch-ooling's effect on earnings is constant, then earnings have a linear relationship with years of schooling (Mincer, 1958, 1974) The linear slope of the relationship reflects the return on investment in education or the return on education (Becker, 1964; Krueger & Lindahl, 2001; Mincer, 1974).

In the Mincerian Earning Function, earni-ngs can be illustrated as a concave curve. It assu-mes that the years of schooling or other form of investment in human capital linearly decreases over the individual's lifetime. In a typical empi-rical model, the natural log of earnings is estim-ated with the years of schooling and the quad-ratic function of years of experience as the main explanatory variables. Since the earnings is expr-essed in natural logarithm, the coefficient info-rms the marginal effects. Furthermore, the mo-del includes years of experience in a quadratic form to show a nonlinear relationship between earnings and experience, that is experience has a diminishing marginal return (Card, 1999; Mi-ncer, 1974; Polachek, 2008).

Many empirical studies have estimated the return on education for various countries, including developed countries such as Australia (Leigh, 2008), Italy (Cainarca & Sgobbi, 2012), the Netherlands (Levin &. Plug, 1999), the US (Ashenfelter & Krueger, 1994), and developing countries such as Pakistan (Aslam et al., 2012), Indonesia (Purnastuti et al., 2015), Botswana (Siphambe, 2000), Taiwan (Tangtipongkul, 2015). These studies generally show that earnings increase with the years of schooling. Additionally, experience positively affects earnings only until a point when it is not worthwhile anymore. Furthermore, the estimated rates for developed countries are generally higher than they are for developing countries.

Studies that estimated the return on education in Indonesia largely use the Indonesian Family Life Survey (IFLS) data. A cross-sectional analysis using IFLS 4 (2007) by Purnastuti et al. (2015) estimated that the rates of return were 16% for males, 5.25% for females, and 4.72% for all. This rate is substantially lower than what Sohn (2013) estimated. Sohn (2013) employed panel data covering IFLS 3 (2003) and IFLS 4 (2007) estimating a rate of 10.7%. Other studies (e.g., Mahirda & Wahyuni, 2016; Qurniawan & Jasmina, 2021) demonstrated that there is no significant difference in the rate of return between high-school and vocational school graduates.

Similar to the previous studies, this study also estimates the return on education in Indonesia using the Mincerian framework. However, this study differs from the previous studies in that it employs the latest IFLS, namely IFLS 5, fielded in 2014 and 2015. By using the latest survey data, we can compare our estimates with the previous findings and evaluate the trend in the return on education.

The general finding of this study is as follows. The baseline estimate using the standard OLS shows a rate of 5.9%. However, since education is presumably endogenous, we also estimated using Instrumental Variable (IV) app-roach. Using father's and mother's education as instruments for education, the estimated rate of return is 12% or twice as large as the baseline es-timate.

The rest of the paper is as follows. Following introduction, we set out our empirical strategy. We then present our data and discuss the results. Finally, we conclude our findings.

METHOD

We employed the latest IFLS dataset, IFLS 5, to estimate the return on education. The IFLS dataset is a survey data of individuals, households, and communities across Indonesia. The survey is conducted by RAND Corporation in cooperation with Gadjah Mada University and SurveyMETER. The IFLS 5 was fielded in late 2014 and early 2015, covering 24 provinces (2014) and representing 83% of the population. We specifically consulted BOOK K, BOOK 3A, and Consumption/ Expenditure Aggregates (modified from IFLS 4).

Using the standard Mincerian model, the baseline equation is as follows:

$$logY_{ip} = \alpha + \beta EDUC_{ip} + X'\gamma + \delta_p + \varepsilon_{ip} \quad (1)$$

Where Y is the earning indicator for individual i who lives in province p and EDUC is the years of schooling for individual i who lives in province p, X is a set of controls that include work experience, gender (dummy female), marital status (dummy married), residence area (dummy urban), and work sector (dummy agriculture and mining sector). We measure experience by years of individual involvement in the labor market. These control variables have been widely used in previous literature (e.g., Sohn, 2013; Purnastuti, 2015; Mahinda, 2016). We also included province fixed-effects, δp, to control time-invariant heterogeneities across provinces. The inclusion of province fixed-effects implies that the model compared individuals within a province.

To indicate the per capita earnings variable, we used monthly expenditures, that is the total expenditure on food and non-food, expressed in a natural logarithm. We did not use the monthly earnings per capita due to large missing values. Additionally, earnings data is unreliable since it was difficult to collect, and respondents tend to manipulate when reporting their real earnings (Nguyen-Dinh, 1997). Using monthly expenditures to indicate earnings implies that this study assumes an individual does not have any assets and savings.

The baseline model formulated in Equation (1) presumably suffers from endogeneity bias. Even though the inclusion of control variables moderates the omitted variable bias, there might be other confounding factors. For example, the lack of suitable quantitative measures for ability and cognition has hindered us to control ability and cognitive skills. Thus, the correlation between years of schooling and monthly earnings is confounded by differences in individual unobserved ability, cognitive skills, and other possible unobserved individual characteristics.

To deal with endogeneity bias, we used the Instrumental Variable (IV) method. The IV method identifies variables that are correlated with years of schooling and monthly earnings but uncorrelated with unobserved heterogeneities. Following the previous studies (e.g., Trostel, 2002; Aslam et. al, 2012; Purnastuti, 2015), this study employed father's and mother's education as the instruments for schooling. Parental education likely determines children's education. Furthermore, it has an intergenerational solid correlation with schooling outcomes (Card, 1999).

To ensure the validity of the instruments, we conducted two tests, namely the Sargan test and the Durbin-Wu-Hausman test. The purpose of conducting the Sargan test is to show that the instruments are not correlated with the error term and that the excluded instruments are correctly excluded from the estimated equation. The Durbin-Wu-Hausman test tests whether a variable presumed to be endogenous could instead be treated as an exogenous variable. We further estimated the IV model using Two Stage Least Squares (2SLS) estimator.

RESULTS AND DISCUSSION

Table 1 describes the sample used in this study. The maximum per capita earning is IDR 22,762,766, while the minimum is IDR 72,486. The average year of schooling is nine years, with the maximum is 21 years or equivalent to having a doctoral degree (S3); and the minimum is zero year or equivalent to never attending school. The average work-experience is 21 years, with the maximum being 58 years and the minimum being zero year. These imply that some Indonesians never attended school and have zero work experience. Furthermore, the sample shows a relatively equal distribution between males (60%) and females (40%) and between those who live in urban (50%) and rural areas (50%). However, most of the sample are those who work in non-agriculture and non-mining sectors (80%).

Table 2 shows the baseline estimates. It reports the estimates along with the robust standard errors to allow for heteroskedastic err-or variances. Columns (1) and (2) display our main estimates. Column (2) includes province fixed-effects to control time-invariant heterogeneities across provinces.

Table 1. Descriptive Statistics

Variables	N	Mean	SD	Min	Max
Per capita Earnings (IDR)	20,556	1,119,767	984,110	72,486	22,762,766
Year of schooling (Years)	20,556	9.202	4.095	0	21
Work experience (Years)	20,556	21.07	13.36	0	58
Female (Dummy)	20,556	0.418	0.493	0	1
Married (Dummy)	20,556	0.857	0.350	0	1
Urban (Dummy)	20,556	0.585	0.493	0	1
Work (Dummy)	20,556	0.263	0.440	0	1
Number of provinces	24	24	24	24	24

Table 2 Column (1) shows that the estimated coefficient of years of schooling is 0.05 78 (1% significant level). This means that the return on education is 5.7%, implying that one extra year of schooling rises future earnings by 5.7%. Results reported in Column (2) are consistent with those in Column (1). When province fixed-effects are controlled, the return on education estimate is only slightly higher, which is 5.9%. This implies that the estimate is only slightly sensitive to heterogeneity across provinces.

In addition, we report the difference in the rate of return between high school (SMA) and vocational high school (SMK) in Column (3). Here, instead of years of schooling, the main explanatory variable is a dummy that distinguishes these two types of high schools which takes the value of 1 if individual i who lives in province p completed SMK and 0 if this individual completed SMA. The sample for this estimation decreases from 20,556 to 5,929 because it included only individuals whose highest level of education is high school. Table 2 Column (3) shows that the rate of return on education for SMK is 5% less than for SMA.

The control variables are relatively consistent in all columns. The coefficient of work experience and its squared term are significant but do not exhibit a concave curve. Therefore, the results do not show the usual concavity of the experience-earnings relationship. The female dummy is positive but only significant in Columns (1) and (2).

This generally indicates that females face an earnings advantage in the labor market. The results also show that workers who are married earn more than those who are not. Furthermore, earnings in rural areas and agricultural and mining sectors are also lower.

The results presented in Table 2 presumably suffer from endogeneity bias. The endogeneity bias largely arises due to omitted variable bias. To deal with the endogeneity bias, we employed parental education as instruments for years of schooling. Durbin-Wu-Hausman's test for endogeneity rejects the null hypothesis of equality between OLS and IV estimates. This means that IV is more consistent than OLS. Furthermore, the Sargan test for the over-identifying restrictions does not reject the null hypothesis, implying that the instruments are all exogenous. We report the IV estimates in Table 3.

The IV estimates in Table 3 are generally consistent with the OLS estimates provided in Table 2. Years of schooling remain positive and significant at 1%. However, the coefficient becomes twice as large as the OLS estimates, that is 12%. The control variables are relatively consistent. Experience-earnings relationship remains not concave. The female dummy enters as expected; it is negative and significant. The married dummy remains consistent, which is negative and significant. Both the urban dummy and work sector dummy become insignificant.

Table 2. Baseline OLS Regression

	Dependent variable: Per capita earnings (Log)		
	(1)	(2)	(3)
Years of schooling	0.0578***	0.0591***	
	(0.00133)	(0.00294)	
Vocational (Dummy)			-0.0487***
			(0.0165)
Work experience	0.00154	0.00256	0.000113
	(0.00131)	(0.00236)	(0.00318)
Work experience²	0.000130***	0.000128**	0.000168**
	(2.41e-05)	(4.58e-05)	(6.90e-05)
Female (Dummy)	0.0182**	0.0289***	0.0165
	(0.00861)	(0.00475)	(0.0120)
Married (Dummy)	-0.0823***	-0.0824***	-0.0261
	(0.0162)	(0.0139)	(0.0300)
Urban (Dummy)	0.130***	0.0698***	0.0865**
	(0.00944)	(0.0187)	(0.0314)
Work sector (Dummy)	-0.128***	-0.122**	-0.179***
	(0.0105)	(0.0179)	(0.0370)
Constant	13.07***	13.07***	13.75***
	(0.0218)	(0.0432)	(0.0311)
Observations	20,556	20,556	5,929
Province FE	NO	YES	YES
Adjusted R-squared	0.145	0.130	0.031

Notes: Robust standard errors are in parentheses. In Column (3) the number of observations drops to 5,929 because it includes only individuals whose highest educational attainment is high schools. ***p<0.01, **p<0.05, *p<0.1

Table 3. Instrumental Variable Estimation

	Dependent variable: Per capita earnings (Log)
Years of schooling	0.120***
	(0.00982)
Work experience	0.0101**
	(0.00425)
Work experience²	0.000170*
	(9.07e-05)
Female (Dummy)	-0.0419*
	(0.0248)
Married (Dummy)	-0.169***
	(0.0286)
Urban (Dummy)	0.0162
	(0.0411)
Work Sector (Dummy)	0.0349
	(0.0245)
Constant	12.23***
	(0.0995)
Observations	3,357
Province FE	YES
Hausman (F)	115.305***
Sargan (Chi²)	4.571**

Notes: Robust standard errors are in parentheses. Father's and mother's years of schooling are the instruments for the years of schooling.The number of observations dropped to 3,357due to missing values caused by parents who died and parents who did not live in the same household anymore. ***p<0.01, **p<0.05, *p<0.1

We can summarize our main findings as follows. The baseline estimates using OLS show that the rate of return is approximately 6%. When we moderated the endogeneity bias, the rate increased to 12%. These rates are generally higher than the previous studies by Purnastuti et al. (2015) who used IFLS 4 which was fielded in 2007 and 2008. Purnastuti et al. (2015) estimated the rate of 4.72% when using OLS and 6.93% when using father's and mother's education as instruments. This suggests that the rate of return almost doubles between 2008 and 2014. During these years, the Government of Indonesia has introduced policies such as Program Indonesia Pintar and government strategic objectives that aim to ensure the availability and affordability access to good quality and equal education (Kemendikbud, 2014). These policies have expanded access and learning opportunities for children, especially those from poor and vulnerable families. In addition, the new school curricula, *Kurikulum 2013*, which focuses to improve the learning competence in terms of being faithful, productive, creative, innovative, effective, and contributive has been imposed during those years.

In addition to the main findings, our results do not show the usual marginal diminishing effect of work experience. This implies that Indonesia has a different experience-earnings profile compared to other countries. Furthermore, our estimations show that the rate of return for SMK is lower than for SMA. This is in contrast to Mahirda and Wahyuni (2016), and Qurniawan and Jasmina (2021). Different from Mahirda and Wahyuni (2016), and Qurniawan and Jasmina (2021) who treated possible selection and endogeneity bias, we only conducted the standard OLS. Thus, our finding is only indicative.

CONCLUSION

This study empirically examines the education-earnings relationship in Indonesia using the log-linear earnings function introduced by Jacob Mincer (1958) and found that earnings progressively increase with education level. This study estimated that the return on education is 5.7% implying that attending school for one extra year increases future earnings by 5.7%. When using parental education as instruments, the estimates show that the rate of return is 6 percentage points higher or 12%. Compared to the previous empirical research, this study is relatively similar to Sohn (2013), Purnastuti et al. (2015), and Mahirda and Wahyuni (2016). The difference is that those studies employed IFLS 4 (2007), while this study used IFLS 5 (2014). Our results indicate that the return on education is improving between 2007 and 2014. Nevertheless, the rate of return is lower than the average rate in Asia as well as in the world. One possible explanation is that the quality of schooling is low in that it does not increase skills and productivity. This might lead to underpayment or, in the worst case, unemployment.

REFERENCES

Ashenfelter Orley, K. A. (1994). Estimates of the Economic Return to Schooling from a New Sample of Twins. *The American Economic Review, 84*(5), 1157–1173.

Aslam Monazza, Bari Faisal, K. G. (2012). Returns to schooling, ability and cognitive skills in Pakistan. Education Economics. *Routledge, 20*(2), 139–173.

Becker, G. S. (1964). Investment in Human Capital: Effects on Earnings. *investment in Human Beings, 2*, 13–44.

Becker, G. S. (1962). Investment in Human Capital: A Theoretical Analysis. *Journal of Political Economy, 70*(5), 9–49.

Becker, G. S. (1994). Investment in Human Capital: Rates of Return. Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education, 59–160.

Ben-Porath, Y. (1967). The Production of Human Capital and the Life Cycle of Earnings.

The Journal of Political Economy, 75(4), 352–365.

Boissiere, M. et al. (1985). Earnings, Schooling, Ability, and Cognitive Skills. *American Economic Review, 75*(5), 1016–1030.

Borjas, G. J. (2013) *Labor Economics. 6th edn*. McGraw-Hill.

Cainarca, G. C. & Sgobbi, F. (2012). The return to education and skills in Italy. International *Journal of Manpower, 33*(2), 187–205.

Card, D. (1999). Chapter 30 The causal effect of education on earnings. *Handbook of Labor Economics, 3 PART*(1), 1801–1863.

Chiswick, B. R. (2021). Jacob Mincer, Experience and the Distribution of Earnings. *SSRN Electronic Journal*, 343–361.

Deolalikar, A. B. (1993). Gender Differences in the Returns to Schooling and in School Enrollment Rates in Indonesia. *The Journal of Human Resources, 28*(4).

Direktorat SMA Kemendikbud RI (2022). Program Kerja Direktorat SMA 2022'.

Duflo, E. (2001). Schooling and Labor Market Consequences of School. *American Economic Journal*.

Faizah, N., Akbar, W. & Nisa, A. K. (2019). Pemetaan Regulasi Pendidikan SMA. Direktorat Pembinaan SMA.

Griliches, Z. (1977). Estimating the Returns To Schooling: Some Econometric Problems. *The Econometric Society, 45*(1), 1–22.

Kahyarara, G. and Teal, F. (2008). The Returns to Vocational Training and Academic Education: Evidence from Tanzania. World Development. *Elsevier Ltd, 36*(11), 2223–2242.

Kemendikbud Ristek (2021). *Keputusan Menteri Pendidikan, Kebudayaan, Riset dan Teknologi Republik Indonesia tentang Program SMK Pusat Keunggulan. Kemendikbud Ristek, 73.*

Kim, B. M. (2013) Estimating Returns to Vocational Education at High Schools in Korea.

Kominfo (2011). *Program Penanggulangan Kemiskinan Kabinet Indonesia Bersatu II. Kemkominfo, 18.*

Krueger, A. B. & Lindahl, M. (2001). Education for growth: Why and for whom?. Journal of Economic Literature, 39(4), 1101–1136.

Layard, R. & Psacharopoulos, G. (1974). The Screening Hypothesis and the Returns to Education. *Journal of Political Economy, 82*(5), 985–998.

Leigh, A. (2008). Returns to Education in Australia. *Economic Papers, 27*(3), 233–249.

Lemieux, T. (2006). The "Mincer Equation" Thirty Years After Schooling, Experience, and Earnings. *Jacob Mincer A Pioneer of Modern Labor Economics*, 127–145.

Levin, J. & Plug, E. J. S. (1999). Instrumenting education and the returns to schooling in the *Netherlands. Labour Economics, 6*(4), 521–534.

Mahirda, K. & Wahyuni, H. (2016). Returning to General and Vocational High-Schools in Indonesia. *Review of Economic and Business Studies, 9*(2), 9–28.

Mincer, J. (1970). The distribution of labor incomes: A survey. With special reference to the human capital approach. *Journal of Economic Literature, 8*(1), 1–26.

Mincer, J. (1958). Investment in Human Capital and Personal Income Distribution. *Journal of Political Economy, 66*(4), 281–302.

Mincer, J. (1974). Schooling, Experience, and Earnings. *National Bureau of Economic Research, 1*(1), 303–335.

Neuman, S. & Ziderman, A. (1991). Vocational Schooling, Occupational Matching, and Labor Market Earnings in Israel. The Journal of Human Resources. University of Wisconsin Press, 26(2), 256–281.

Newhouse, D. & Suryadarma, D. (2011). The value of vocational education: High sch-

ool type and labor market outcomes in Indonesia. *World Bank Economic Review, 25*(2), 296–322.

Nguyen-Dinh, H. (1997). A socioeconomic analysis of the determinants of fertility: The case of Vietnam. *Journal of Population Economics, 10*(3), 251–271.

Olfindo, R. (2018). Rethinking vocational education in the Philippines: Does it really lead to higher wages?. *Journal of Southeast Asian Economies. ISEAS - Yusof Ishak Institute, 35*(1), 79–100.

Polachek, S. W. (2006). Proving Mincer Right: Mincer's Overtaking Point and the Lifecycle Earnings Distribution. *Jacob Mincer A Pioneer of Modern Labor Economics*, 81–108.

Polachek, S. W. (2008). Earnings over the life cycle: The mincer earnings function and its applications. *Foundations and Trends in Microeconomics, 4*(3), 165–272.

Psacharopoulos, G. & Patrinos, H. A. (2004). Returns to investment in education: A further update. Education Economics, 12(2), 111–134.

Purnastuti, L., Salim, R., & Joarder, M. A. M. (2015). The returns to education in Indonesia: Post reform estimates. *The Journal of Developing Areas,* 183-204.

Qurniawan, R. & Jasmina, T. (2021). The Effect of General and Vocational High School Quality on Labor Market Outcomes in Indonesia. *The Journal of Indonesia Sustainable Development Planning, 2*(3), 307–323.

Schultz, T. W. (1961). Investment in Human Capital. *American Economic Association, 51*(5), 1035–1039.

Siphambe, H. K. (2000). Rates of return to education in Botswana. *Economics of Education Review, 19*(3), 291–300.

Sohn, K. (2013). Monetary and Nonmonetary Returns to Education in Indonesia. The Developing Economies. *IDE-JETRO, 51*(1), 34–59.

Spence, M. (1973). Job Market Signaling. *The Quarterly Journal of Economics, 87*(3), 355–374.

Strauss, J., Sikoki, B.& Witoelar, F. (2016). The 5th Wave of the Indonesia Family Life Survey (IFLS): Overview and Field Report. (WR-144/1-NIA/NCHID).

Tangtipongkul, K. (2015). Rates of return to schooling in Thailand. *Asian Development Review, 32*(2), 38–64.

Trostel et al. (2002). Estimates of the economic return to schooling for 28 countries. *Labour Economics, 9*(1), 1–16.

Wooldride, J. M. (2012) Introductory Econometrics: A Modern Approach. 5th edn. Cengage Learning.