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Ethnicity and the return to education in Indonesia

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ABSTRACT

Using data from the Indonesia Family Life Survey (IFLS) from 2014–2015, this study seeks to analyze the ethnic differences in the return to education in Indonesia. We discovered that IV models, as opposed to OLS estimation, are more suitable to evaluate returns to education in Indonesia. Additionally, rather than treating the ethnicity variable as an instrumental variable, it is preferable to use it as a grouping variable. After segmenting our samples into six ethnic groups, this study discovered that all ethnic groups, with the exception of the Chinese group, match the IV estimation. The non-Chinese groups with the best returns on schooling are Bataknese and Minangnese. The high return on education in these ethnic groups is attributed to the intense excitement for learning that permeates Bataknese and Minangnese cultures as native cultural assets. Earnings are also influenced favorably by marital status, masculinity, employment in the public sector, and urban-rural location. These findings suggest that ethnic and cultural topics should be covered in the national curriculum as well as local curricula. Since these characteristics have a direct impact on salaries, the government should also pay attention to gender segregation, career opportunities, and urban-rural growth.

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INTRODUCTION

There is a general concern that incomes are significantly impacted by the educational level of the labor market. Due to the country's extreme geographic and ethnic diversity, education has long been seen as a crucial social change strategy for attaining equitable socioeconomic development in Indonesia. Unfortunately, there has been little progress in Indonesia's educational system over the past ten years. Indonesia's education level in 2018 was only 8.17 years, according to data on the average number of school years. In other words, the average Indonesian merely completed junior high school. The problem is made worse in many places, including Papua and Nusa Tenggara Barat, where students spend an average of 6–7 years in school (Badan Pusat Statistik, 2018). Since higher salaries are linked to more years of education and escaping poverty, education and training programs targeted at increasing the incomes of the least qualified workers are frequently supported (Barrow & Rouse, 2006; Carneiro & Heckman, 2003; Krueger, 2003).

While it is obvious that education has a big impact on people's income, the return on education might vary depending on the subgroup of the population, such as gender, marital status, age, working industry, urban/rural location, and ethnicity. Numerous studies

have been done on the impact of factors like gender, marital status, age, place of employment, and industry on income disparities, such as in Comola & de Mello (2010), Dumauli (2015), Magdalyn (2013), Purnastuti, Salim, & Joarder (2015), and Sohn (2015). Happiness element also determines the return on education, notably for monetary return on education, in addition to typical economic and demographic considerations (Hendajany, Widodo, Sulistyaningrum, 2016; Sohn, 2013). Studies on the impact of ethnicity on returning to school, though, are still few and far between. Ethnicities in Indonesia, which are very diverse, commonly live together with their own ethnic members. Ethnic diversity in Indonesia may have an impact on the return to education because education becomes a part of an ethnic group's culture. To the author's knowledge, however, there is no quantitative study that extensively correlates ethnicity with return to education in Indonesia. In other multicultural nations, the variation in the return on education may be explained by the average level of education held by members of the ethnic group (ethnic capital). Several previous studies, such as Arshad (2016), Barrow & Rouse (2006), Borjas (1992), Shahiri & Park (2018), and Trentini (2014), showed that return on education may vary across ethnicities.

Besides varying according to sub-group characteristics, the return on education may vary depending on how it is measured. Empirical research has long debated the best way to assess the returns to education. The earlier studies on return to education, such as Becker & Chiswick (1966) and Mincer (1974) scrutinized education as an exogenous variable in the regression model with Ordinary Least Square (OLS) estimation. Several recent studies used OLS estimation (Arshad, 2016; Trentini 2014). However, the OLS method on return to education measurement is criticized due to the endogeneity of the education variable. One of the techniques to avoid endogeneity problems is the instrumental-variables (IVs) approach. This approach is used to determine variation that is exogenous in treatment and to estimate causal inferences, as recent studies (Dickson, 2013; Fossen & Büttner, 2013; Gong, 2019).

Since a poor decision can worsen already-existing issues, choosing the suitable instrument variables is difficult and not a simple design issue (Sturm, 1998). Factors related to family background are among the most often used instrumental variables in return to education models. The family background, especially the educational level of the parents, may have a considerable impact on earnings without being mediated by schooling, which is one potential problem with these parameters. Concerns about a relationship between parental education and income being directly correlated were disproved by Hoogerheide et al. (2012). By loosening the rigorous exclusion criteria, they discovered that the bias resulting from a potential direct impact of a father's education on salaries is smaller than the posterior interval of the important education coefficient in the IV model. They came to conclusion that, given the inadequacies of the alternatives mentioned above, employing a father's degree as an instrument in earnings regressions is a viable option based on this finding. In Indonesia, whose curriculum changes regularly, parents' education not only influences the educational choices they make for their children, but also plays a crucial role in ensuring their involvement in their children's education. In their study, Akresh, Halim, & Kleemans (2018) demonstrated the benefits of greater parental education for children's education through an analysis of a particular education program in Indonesia. In order to raise the caliber of human resources, they contend that intergenerational education is natural and sustainable education is essential.

The recent studies focused on ethnicity and parental education as an instrument variable since it affects family's behaviors to advance on higher education. Although the significance of ethnic capital on educational attainment is still debatable, Postepska (2019) conducted a recent study that shows that ethnic capital and parent capital in education have a positive and significant effect on the education period. Regarding the effect of ethnicity on education, Chua & Ng (2015) claimed that race plays a role in the effect of class on educational attainment in three ways. First, it's possible that parents of a particular ethnicity will apply knowledge (and intentional nurturing) to their children's academic success more deliberately. How teachers evaluate their students is the second thing to take into account. Based on the definitions given to categories like gender, ethnicity, and class, people frequently assume that some groups are better (or worse) than others. Finally, it's important to make a distinction between the amount and quality of education. The assumption that one group can enroll in more prominent and qualified institutions than other ethnic groups is based on the stereotype that it is richer than the others. Hence, as an alternative to the

ethnic approach on return to education, we also treat ethnicity as a grouping variable as that in studies conducted by Arshad (2016) in Malaysia and Trentini (2014) in Bulgaria.

Given the foregoing justification, the primary research objective of this study is to determine if ethnic capital and parent capital, which are components of community indicators, can account for variations in return to education. This study also compares the economic benefits of education among Indonesian ethnic groups.

This study primarily offers three contributions. To begin with, this analysis employs imputation on the microdata to prevent the bias brought on by missing data. Secondly, based on an empirical investigation, this study employs the ethnic component to justify why the IV technique is more likely to be reliable when examining return to education for particular ethnic groups. Thirdly, this study uncovers disparities in return to education measurement among Indonesia's ethnic groups and adds to the discussion on whether return to education research should use control variables or instrumental variables.

RESEARCH METHOD

The academic community is divided over how to calculate the benefits of education. OLS estimation, in the opinion of certain academics, is a trustworthy method for calculating the educational return. OLS estimate has been a common methodology in the first studies on the return to school, including Mincer (1974). But given the current state of the education variable, this method is controversial. Since it ignores the effects of parental education on the individual's earnings through the individual's educational attainment, it has been suggested in several previous research that the return to education using OLS estimation results frequently exhibits the downward bias. The study conducted by Card (2001) revived the debate regarding the (dis)advantages of the applications of the OLS and IV estimation approaches in estimating returns to education. The result is that OLS estimation is biased and it is preferable to utilize IV estimation, which needs the consideration of instrument variable selection. In calculating the return on education, it must therefore account for these unobservable variables. Selecting the unobservable variables that will serve as instrumental variables for schooling needs a number of considerations, including correlation, relevance, and exogeneity. Consequently, many tests are required to guarantee that the choosing variables meet the requirements.

Due to its substantial correlation with educational attainment, the intergenerational transmission factor is among the options for the appropriate instrumental variable of education. As a component of the intergenerational transmission factors, parental education is the most frequently used instrumental variable in past research estimating the return on education. This hypothesis was tested by Hoogerheide et al. (2012) and Lemke & Rischall (2003), despite criticism of the use of parental education as an instrument in return to education regression due to its close correlation with incomes. Accordingly, they determined that employing parental education as an instrument to return to education regression is a viable solution to the endogeneity problem. Several prior research on the return to education in Indonesia have considered the use of IV estimation to address the possibility of endogeneity bias. In addition, the IV is utilized to determine the significance of the omitted variables (especially the ability bias) in the OLS model. Many studies, including Dumauli (2015), Mugijayani (2020), Purnastuti (2013), and Xue (2019), have attempted to identify the most appropriate instrumental variables for education in Indonesian situations. The most common IV identified by these investigations is parental education.

An additional factor of intergenerational transmission is ethnicity. In contrast to parental capital, ethnic capital as an instrumental variable is less well-known. It is only utilized in a few studies, such as Damm (2009), with a modified definition of ethnic capital. Also, ethnicity is frequently utilized as a grouping variable as opposed to an instrumental variable. In Indonesia, where it is common to see ethnic neighborhood preferences, it is considered that ethnic culture influences educational attainment.

To examine the return to education, the most widely-used model is Mincer earning regression model, which evaluates education's effect while controlling age and other factors. Basically, this study uses the equation in Mincer (1974), known as the classical Mincer model of return to schooling. The model is as below:

$$\log[y] = \alpha_0 + \rho_s S + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \qquad (1)$$

Where y, S, X1, X2, ρ_s, ε are income, years of schooling, age, other independent factors, rate of return to education, and residuals, respectively.

Many studies, such as Arshad (2016) and Gong (2019), use a quadratic function of age in the earnings equation to catch the life-cycle effects in the form of an inverse U-shaped relationship between age and income implies a diminishing marginal income as experience is accumulated. A dummy variable for gender was also included to control the difference between men and women. At the same time, marital status and working sectors were used in the models to control the variation between married and unmarried and the difference among the working sector types. In this equation, we divided the working sector into three groups: public, private, and others consisting of self-employed, unpaid, and casual workers. For the working sector dummy variable, we used others as a control variable. Moreover, to control the difference between urban and rural areas, a dummy variable of residential was also used in the models. Thus, equation (1) is transformed as:

$$\ln wage_i = \beta_0 + \beta_1 educ_i + \gamma_1 age_i + \gamma_2 age2_i + \gamma_3 married_i + \gamma_4 male_i + \gamma_5 Public_i + \gamma_6 Private_i + \gamma_7 urban_i + \varepsilon_i \quad (2)$$

Furthermore, to clearly examine the effect of ethnicity on return to education, this study not only divided the sample into ethnicity subgroup, but also use interaction term in general samples. We added interaction term in equation (2), so the modified equation is as below:

$$\ln wage_i = \beta_0 + \beta_1 educ_i + \gamma_1 age_i + \gamma_2 age2_i + \gamma_3 married_i + \gamma_4 male_i + \gamma_5 Public_i + \gamma_6 Private_i + \gamma_7 urban_i + \beta_2 ethnic\_gr_i + \beta_3 educ_i * ethnic\_gr_i + \varepsilon_i \quad (3)$$

Due to the limitation of each ethnicity's samples, using equation (3) we only categorized the sample into maximum three subgroups. First, we categorized the samples into majority and minority, in which majority group consists of Javanese, Sundanese, Bataknese, and Minangnese, while minority group consists of other ethnicities. In the second estimation using interaction term, we also categorized the samples into majority and minority, but we classified Chinese into majority group due to their significant role in the economy. In the third estimation, we divided the samples into three groups based on their rooted island. Hence, the classifications were Sumatra-rooted, Java-rooted, and others.

This study adopts a basic Mincer earning model as in equation (2) rather than more complicated models, such as the control function method or matching method that required an excluded instrument for each treatment or plausibility of such identifying conditional independence, for several reasons. Firstly, this research used the Indonesia Family Life Survey, and the chosen variables should be available in the database. Secondly, an advanced wage determination equation that involves more control variables may not apply to all ethnic groups. Finally, the main focus of the study is to compare the return to education among the ethnics and clarifying the effect of IV variables on income.

Intergenerational transmission refers to the propagation of disparities in competence between generations. The abilities of the following generation are determined by parental contributions and the structure of the ethnic community in which parents engage, commonly referred to as "ethnic capital." The empirical research demonstrates that the skills of the current generation are influenced not only by the skills of their parents, but also by the average skills of the ethnic group in the generation of their parents (Borjas, 1992). The relationship between parental and child skills exists because parents invest in their children's human capital. People who grow up in high-quality ethnic environments are more likely to be exposed to social, cultural, and economic forces that enhance their productivity as adults; the greater or more frequent this exposure, the higher the quality of the ensuing workforce. The production function assumes the ethnic group's average human resource has an external effect on the production process. Consequently, the quality of the student is dictated not just by parental inputs, but also by the average quality of the ethnic community in which the individual grows up.

Regarding the intergenerational transmission of education through parental capital and ethnic capital, there are two main equations. The first equation is from Borjas (1992) as below:

$$k_{t+1} = \beta_0 (s_t k_t)^{\beta 1} \bar{k}_t^{\beta 2} \quad (4)$$

This production function represents the relation between children's human capital (kt+1), parental capital (kt), and ethnic capital ($k\bar{t}$). In this equation, parental capital is the average of parents' education years, and ethnic capital is the average of ethnic's

education years in the parent generation. The second equation is from Postepska (2019) as below:

$$edu_i = \gamma_1 edup_i + \gamma_2 eduav_i + \delta_0 X_i + u_i \qquad (5)$$

Where edu, edup, and eduav are the education level, the average of parents' education, and the average ethnic's education level.

Based on those above equations, in this study we followed the definition of parent capital and ethnic capital as in Postepska (2019). Thus, parent capital is the average of parents' education years and ethnic capital is the average of ethnic's education years.

Our study employed two methodologies to assess parental capital and ethnic role in Indonesia's return on education, taking into account the methods used to measure the return on education in previous research. First, to demonstrate that parental capital and ethnic capital influence wages through their effect on education, we utilized two instrumental variables of parental and ethnic capitals in the model estimate to test the hypothesis. Secondly, using the instrumental variable parental capital and the grouping variable ethnic, we demonstrated that the returns to education vary by ethnic group.

The research used the Indonesia Family Life Survey 5 (IFLS5). The IFLS5 was conducted between the end of October 2014 and the end of April 2015, with long-distance monitoring extending to August 2015. This survey was a joint project of RAND and Survey Meter and sponsored by the National Institute for Aging (NIA), the National Institute for Child Health and Welfare (NICHD), the Department of Foreign Affairs and Trade (DFAT) of Australia, and grants from the World Bank, Government of Indonesia, and GRM International. The IFLS dataset is suitable for this study since it is the only survey in Indonesia that collects information relating to community variables such as ethnicity. In addition, unlike other Indonesia's household surveys, IFLS5 covers the information about the parents of the household members that live even in different locations from the target household members. Therefore, this study incorporated the variable of parents' education level as an instrumental variable. Due to the minimum age limit for work and the type of education covered, this study only utilized 22,242 observations.

The null hypothesis that all group means are equal was rejected by our one-way Analysis of Variance (ANOVA) test. In addition, our multiple-comparison test indicated that the Chinese group had a much greater mean income than all other groups. The mean earnings of Bataknese and Minangnese differed from those of the other categories. This analysis revealed that there were substantial differences in income between ethnic groups.

The Missing Data

In many surveys, missing observations or incomplete data cannot be avoided. In spite of the fact that the IFLS5 dataset contains all variables necessary for studying the relevant determinants of the return to education, the absence of observations is one of the key limitations that cannot be avoided throughout the survey procedure. If the number of missing observations is negligible, they may be excluded from the analysis. In the absence of the correct treatment, sample bias is derived from the estimation. In IFLS5, over half of the income variable's observation units are missing.

Rubin (1976) classified missing data patterns into three categories: (a) Missing completely at random (MCAR), (b) Missing at random (MAR), and (c) Missing not at random (MNAR). The MCAR pattern indicates that the probability of being missing is the same for all cases and that causes of the missing data are unrelated to the observed data. The MAR pattern indicates that the probability of missing is the same only within groups defined by the observed data. A systematic relationship exists between the missing data in one variable and the observed data in other variables. If neither MCAR nor MAR holds, we have the MNAR pattern of a systematic relationship between the missing data in one variable and the missing data in other variables. The treatment for the missing observations varies by pattern. If the missing pattern follows MCAR, we can simply delete the non-missing variables with corresponding missing observations. If the pattern follows MAR, the imputation must handle the statistical bias (Takahashi & Ito, 2012).

Following the treatment rule, we applied Little's MCAR test to test the missing observation pattern empirically. Our MCAR test rejected the null hypothesis that the missing observations occur completely at random. In other words, our dataset followed the pattern of either MAR or MNAR. Assuming that our dataset follows the MAR pattern, the truncated regression-based single imputation approach with the bootstrap method was employed because the mean estimates from this method produce unbiased estimated parameters (Enders, 2010). Its steps were

as follows: (1) Estimate the relationship between observed values and missing values, using truncated regression, (2) Predict missing values with bootstrapping techniques 20 times, and (3) Calculate mean values of the predicted values in step 2. Finally, we created the dataset with the sample size (n = 22,242).

Table 1. Little's MCAR Test

Test	Chi-square distance	Degrees of freedom	Sig. level
Little's MCAR test	1,531.567	1	0.000
Number of observations		22,242	
Number of missing data		11,136	

RESULT AND DISCUSSION

Descriptive Statistics

Table 2 presents a description of the 22,242 Indonesian respondents from the IFLS wave 5. They were made up of 44.9% Javanese, 11.1% Sundanese, 4.9% Minangnese, 4.8% Bataknese, 0.5% Chinese, and 33.8% other ethnicities. The sample consisted of slightly more men than women, and almost a third quarter of them was married at the time of the survey. These conditions were in almost all ethnicities, except for the Chinese group in which only 62.75% of the sample were married.

Some groups, such as the Chinese, Minangnese, and Batak, had a considerably greater level of education than others. The oldest sample's age was approximately ninety years old, and the distribution of ages among ethnicities was comparable. The Chinese, the Minangnese, and the Batak had a relatively greater income than other ethnic groups. This pattern paralleled the educational years. The following specific descriptive statistics for each variable are presented in Table 2.

Since income is the primary subject of this study, it is vital to explain the pattern of income among ethnicities. Using an estimate of Kernel density, Figure 1 displays the distribution of income in each group. The Chinese group had the highest average income and the smallest income disparity compared to other groups. This phenomenon is conceivable due to the fact that the majority of Chinese resided in urban. This result sheds light on our core research question. In addition, the descriptive income figure demonstrates that the minimum income of Chinese ethnicity was more than the median income of the entire population.

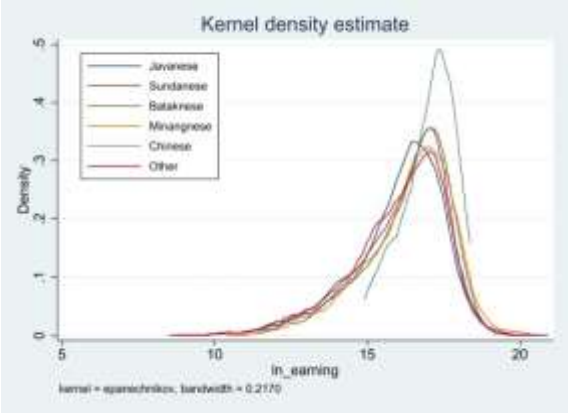

Figure 1. Income distribution by ethnic group

Table 2. Descriptive Statistics

Variable	Statistics	All	Java	Sundanese	Bataknese	Minang-nese	Chinese	Other
earning	Observation	11,106	5,161	1,387	410	581	48	3,519
(million rupiah)	Mean	21.100	20.100	22.100	22.800	28.000	31.900	20.800
	Median	12.000	12.000	14.000	16.900	15.600	30.000	12.000
	Std. Dev.	32.400	31.900	35.300	22.300	46.400	21.400	29.900
	Min	0.005	0.008	0.005	0.100	0.020	3.000	0.006
	Max	1000.00	1000.00	910.00	140.00	673.00	93.60	888.00
educ years	Observation	22,242	9,985	2,472	1,074	1,090	102	7,519
(education years)	Mean	8.627	8.566	8.53	9.915	10.049	11.441	8.31
	Median	9	9	9	12	12	12	9
	Std. Dev.	4.735	4.585	4.337	4.4	4.708	4.311	5.025
	Min	0	0	0	0	0	0	0
	Max	22	22	20	18	20	16	22
parent_cap	Observation	22,242	9,985	2,472	1,074	1,090	102	7,519
(parental capital)	Mean	3.176	3.06	3.88	4.485	4.226	3.353	2.757
	Median	2	2	3	4	3	0.75	0.500
	Std. Dev.	3.744	3.633	3.745	4.203	4.177	4.131	3.645

Variable	Statistics	All	Java	Sundanese	Bataknese	Minang-nese	Chinese	Other
	Min	0	0	0	0	0	0	0
	Max	18.5	17	16.5	16	17	16	18.5
ethnic_cap (ethnic capital)	Observation	22,242	9,985	2,472	1,074	1,090	102	7,519
	Observation	22242	9985	2472	1074	1090	102	7519
	Mean	9.985	10.04	9.599	10.735	11.677	11.330	9.67
	Median	10.040	10.040	9.599	10.735	11.677	11.330	9.701
	Std. Dev.	0.658	0	0	0	0	0	0.78
	Min	7.479	10.04	9.599	10.735	11.677	11.330	7.479
	Max	20.45	10.04	9.599	10.735	11.677	11.330	20.45
residential (location dummy variable, 1 if individual lived in Java; 0 otherwise)	Observation	22,242	9,985	2,472	1,074	1,090	102	7,519
	Proportion (%) if dummy=1	53.8	79.9	91.6	5.5	6.1	36.3	20.8
Age	Observation	22,236	9,984	2,472	1,073	1,090	102	7,515
	Mean	38.545	39.475	38.667	37.58	37.052	39.029	37.617
	Median	36	37	37	35	35	36	35
	Std. Dev.	13.756	13.969	13.805	13.682	12.594	14.697	13.527
	Min	15	15	15	15	15	15	15
	Max	99	93	91	84	99	73	92
Marital status (marital status dummy variable, 1 if individual was married; 0 otherwise)	Observation	22,242	9,985	2,472	1,074	1,090	102	7,519
	Proportion (%) if dummy=1	76.66	77.79	77.95	71.14	73.85	62.75	76.11
Gender (gender dummy variable, 1 if individual was male; 0 otherwise)	Observation	22,242	9,985	2,472	1,074	1,090	102	7,519
	Proportion (%) if dummy=1	57.1	57	58.9	53.4	56.3	63.7	57.1
Public (public sector dummy variable, 1 if individual worked in public government sector; 0 otherwise)	Observation	22,242	9,985	2,472	1,074	1,090	102	7,519
	Proportion (%) if dummy=1	6.8	4.9	5.2	8.7	12.7	1	8.8
Private (private sector dummy variable, 1 if individual worked in private sector; 0 otherwise)	Observation	22,242	9,985	2,472	1,074	1,090	102	7,519
	Proportion (%) if dummy=1	34.2	37	40.3	22.5	31.6	47.1	30.5
urban1 (location dummy variable, 1 if individual lived in urban area; 2 otherwise)	Observation	22,242	9,985	2,472	1,074	1,090	102	7,519
	Proportion (%) if dummy=1	57.3	57.6	69.3	42.6	70.4	99	52.5

Ethnic Capital and Parental Capital

The regression results of Equation (2) for original and imputed data are presented in Table 3. For each of these two datasets, both OLS and IV estimations are provided. The IV model includes ethnic capital and parental capital as instrument variables.

Using OLS estimation, both original and imputed data regression findings indicated that the returns to education are significant. In each of these datasets, the rates of return to education are roughly eight percent. In contrast to OLS estimation findings, IV estimation results are extremely diverse. Although the return to education and the effect of other variables

were still statistically significant in both datasets, the amount of the return to education varied. In the actual data, an additional year of education raised income by 18.5%. However, in the imputed data, the return on education was only 13.6%. This result is consistent with previous studies, such as Comola & de Mello (2010), Dumauli (2015), Magdalyn (2013), Patrinos, Ridao-Cano, & Sakellariou (2006), Purnastuti, Miller, & Salim (2013), and Purnastuti, Salim, & Joarder (2015), which found that the return to education in Indonesia is about 5% - 17.3% depending on the research method. When comparing the OLS estimation to the IV estimation in both the observed and imputed datasets, the OLS estimation tended to be conservative.

The IV-estimated return to education was unbiased and consistent estimators. In addition, the results of the Durbin Wu Hausman Test, the Sargan Test, and the Weak Instrument Test verified its validity. The Durbin Wu Hausman Test is a test to assess whether the expected endogenous independent variable is endogenous or not. This test's null hypothesis was that the assumed endogenous independent variable is actually exogenous. In columns 3 and 4 of Table 3, Durbin Wu Hausman Test p-values are less than the 0.01 significance threshold. Therefore, it suggests that the variable education is an endogenous independent variable. In addition, the Sargan test investigates whether or not the chosen instrument variables are exogenous. The p-values of the Sargan test were greater than 5% in this study. The test result therefore did not reject the null hypothesis of exogenous instrumental factors. This result suggests that when used as instruments, ethnic capital and parental capital are unrelated to the error term. The weak test, on the other hand, which assesses the conformity of instrument variables and endogenous independent variable, rejected the null hypothesis that instrument variables are weak instruments. Consequently, it suggests that ethnic capital and parental capital are not weak instruments. Therefore, since education is an endogenous independent variable and parental capital and ethnic capital are exogenous and not weak instrument variables, the IV estimation method is preferable for estimating the return on education.

Table 1. OLS and IV Regression Using Original and Imputed Data

VARIABLES	OLS original (1)	OLS imputed (2)	IV original# (3)	IV imputed# (4)
educ_years	0.079***	0.084***	0.185***	0.136***
	(0.003)	(0.002)	(0.011)	(0.005)
age	0.104***	0.0388***	0.0861***	0.0364***
	(0.006)	(0.002)	(0.008)	(0.003)
age2	-0.001***	-0.0003***	-0.0008***	-0.0002***
	(7.56e-05)	(2.82e-05)	(9.76e-05)	(2.91e-05)
married	0.204***	0.345***	0.213***	0.326***
	(0.032)	(0.016)	(0.035)	(0.018)
male	0.586***	0.591***	0.595***	0.579***
	(0.024)	(0.012)	(0.027)	(0.013)
Public_Gov	1.333***	1.332***	0.615***	1.024***
	(0.047)	(0.027)	(0.086)	(0.044)
Private_Sector	0.916***	0.924***	0.677***	0.855***
	(0.032)	(0.014)	(0.045)	(0.018)
urban1	-0.350***	-0.343***	-0.209***	-0.253***
	(0.026)	(0.013)	(0.032)	(0.016)
Constant	12.36***	13.34***	11.52***	12.76***
	(0.120)	(0.056)	(0.167)	(0.085)
Observations	11,101	22,242	11,101	22,242
R-squared	0.299	0.477	0.226	0.450
p-value of Sargan Test	-	-	0.892	0.511
p-value of Durbin Test	-	-	0.000	0.000
p-value of Weak Test	-	-	0.000	0.000

Robust standard errors in parentheses
***, **, and * denote significant level at 0.01, 0.05 and 0.1
ethnic capital and parental capital as the instrument variables

The correlation between the instrument variable(s) and the endogenous independent variable must be somewhat strong. Even if ethnic capital and parental capital passed the weak instrument test, the association between these factors and the education variable must be examined.

Table 2. Correlation Between Education, Ethnic Capital, and Parental Capital

Variables	(1)	(2)	(3)
(1) education	1.000		
(2) ethnic capital	0.095	1.000	
(3) parent capital	0.411	0.088	1.000

The association between ethnic capital and education was weaker than the correlation between parental capital and education, as seen in Table 4. Consequently, we analyzed the returns of education on individual incomes by ethnic group, using parental capital as an instrumental variable.

Parental Capital on Return to Education Model by Ethnicity

Since the link between ethnic capital and educational attainment was rather weak, this study employed ethnicity as a grouping variable to analyze the return to education across Indonesia's many ethnic groups. The estimation of return to education is provided in Table 5 for all samples and six ethnic groups in Indonesia.

It is evident that the Chinese group had a distinct pattern than other groups. Only the Chinese group demonstrated an insignificant connection between parental education and educational attainment. Based on the p-value of the Durbin test, the educational attainment of the Chinese population was an exogenous independent variable. Also, the F-statistics value demonstrated that parent capital was a weak instrument variable in the case of the Chinese group. It implies that parental education has no effect on educational attainment.

In contrast, in other groups, educational attainment was an endogenous independent variable whose value is impacted by parental education. Different estimations of the return on education were made for each of these categories due to their diverse educational characteristics. In estimating the return on education for the Chinese group, OLS estimation was preferrable than IV estimation, in contrary to other groups.

The rate of return to education for the Chinese group was 0.076. It suggests that every additional year of school improves income by around 7.6%. In the Chinese group, we did not establish a causal association between parental education and their children's earnings via the equivalent schooling. As a result, the return to education in this group cannot be compared to the return to education in other groups due to the different estimating methodologies used.

The return on education for five additional categories, however, may be estimated using IV estimation. Education is an endogenous independent variable, and parental education is an appropriate instrument variable for describing educational attainment. Bataknese earned the highest return on schooling among these communities. Each additional year of schooling raised Bataknese's earnings by 17.3 percent. The Bataknese are considered to be competitive, especially when it comes to their children's accomplishments. They believe that they can reach three main achievements in their life, which are known as *hamoraon* (wealth), *hagabeon* (having descendants), and *hasangapon* (honor), through education. They also believe in an old Bataknese proverb, "*Anakhonki do hamoraon in ahu*," which implies that children are the treasure of parents, highlighting how valuable the children of the Batak family are (Situmorang, 2017; Valentina & Martani, 2018). The second highest return to education was Minangnese, in which for an additional year of education, the income increased by 15.1 percent. Like Bataknese, Minangnese is also known for persistence and ingeniousness in their effort to escalate their economic status through education (Navis, 1984; Sutantoputri, Murniati, & Purwanti, 2015). The returns to education in the rest ethnicities were 14.1 percent, 13.9 percent, and 12.9% for Sundanese, Javanese, and other ethnicities, respectively.

Table 5 also provides statistics about non-educational factors that influence wages. Chinese ethnicity, which utilizes different estimating techniques, has different income determinants. According to OLS estimates, only education and employment that considerably impacted income.

Table 5. Return to Education by Ethnicity Using OLS and IV Estimation

	All		Other		Javanese		Sundanese		Bataknese		Minangnese		Chinese	
VARIABLES	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
educ_years	0.084***	0.137***	0.078***	0.129***	0.087***	0.139***	0.098***	0.141***	0.080***	0.173***	0.068***	0.151***	0.077***	-0.360
	(0.002)	(0.005)	(0.002)	(0.009)	(0.002)	(0.008)	(0.005)	(0.017)	(0.006)	(0.029)	(0.007)	(0.033)	(0.017)	(0.828)
mi_age	0.039***	0.036***	0.048***	0.044***	0.032***	0.031***	0.023***	0.021***	0.051***	0.039***	0.055***	0.055***	0.033	0.197
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.008)	(0.008)	(0.011)	(0.012)	(0.012)	(0.013)	(0.032)	(0.322)
mi_age2	-0.0003***	-0.0002***	-0.0004***	-0.0003***	-0.0002***	-0.0002***	-0.00016*	-9.95e-05	-0.0004***	-0.0002	-0.0005***	-0.0004***	-0.0003	-0.0028
	(2.82e-05)	(3.04e-05)	(4.94e-05)	(5.36e-05)	(4.07e-05)	(4.33e-05)	(9.06e-05)	(9.45e-05)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0004)	(0.0049)
married	0.345***	0.325***	0.335***	0.326***	0.348***	0.322***	0.340***	0.316***	0.356***	0.314***	0.425***	0.345***	0.064	-0.085
	(0.0165)	(0.017)	(0.028)	(0.029)	(0.025)	(0.026)	(0.054)	(0.055)	(0.064)	(0.072)	(0.077)	(0.087)	(0.159)	(0.508)
male	0.591***	0.579***	0.614***	0.589***	0.593***	0.578***	0.578***	0.575***	0.545***	0.634***	0.528***	0.570***	0.169	-0.174
	(0.012)	(0.013)	(0.022)	(0.022)	(0.018)	(0.019)	(0.041)	(0.041)	(0.048)	(0.059)	(0.059)	(0.065)	(0.135)	(0.743)
Public_Gov	1.332***	1.017***	1.189***	0.868***	1.450***	1.151***	1.348***	1.071***	1.536***	1.116***	1.506***	1.075***	2.441***	3.977
	(0.027)	(0.040)	(0.042)	(0.067)	(0.045)	(0.063)	(0.098)	(0.142)	(0.090)	(0.163)	(0.098)	(0.195)	(0.663)	(3.400)
Private_Sector	0.924***	0.853***	0.873***	0.792***	0.904***	0.844***	1.027***	0.964***	1.008***	0.873***	1.036***	0.921***	1.360***	1.652**
	(0.014)	(0.016)	(0.025)	(0.029)	(0.021)	(0.023)	(0.046)	(0.052)	(0.062)	(0.080)	(0.067)	(0.084)	(0.149)	(0.680)
urban1	-0.343***	-0.251***	-0.391***	-0.312***	-0.301***	-0.202***	-0.326***	-0.240***	-0.298***	-0.181***	-0.315***	-0.245***	-0.164	-1.084
	(0.013)	(0.016)	(0.022)	(0.026)	(0.019)	(0.025)	(0.046)	(0.056)	(0.050)	(0.066)	(0.064)	(0.073)	(0.656)	(2.464)
Constant	13.34***	12.75***	13.26***	12.73***	13.40***	12.78***	13.57***	13.11***	13.06***	12.10***	13.15***	12.22***	13.94***	18.00**
	(0.056)	(0.079)	(0.094)	(0.128)	(0.084)	(0.125)	(0.182)	(0.252)	(0.221)	(0.382)	(0.259)	(0.450)	(0.911)	(8.061)
Observations	22,242	22,242	7,519	7,519	9,985	9,985	2,472	2,472	1,074	1,074	1,090	1,090	102	102
R-squared	0.477		0.482		0.471		0.460		0.575		0.460		0.617	
F-stat of weak identification		1124.6		724.899		1065.220		292.436		57.387		56.646		0.292
p-value of Durbin test		0.0000		0.0000		0.0000		0.006		0.000		0.005		0.142
Preferred				Yes		Yes		Yes		Yes		Yes	Yes	

Standard errors in parentheses

***, **, and * denote significant level at 0.01, 0.05 and 0.1

In contrast, in five other racial groups, all independent factors had a substantial effect on income when estimated using the IV method. The age and age-squared variables were utilized to analyze the influence of the life cycle on income. The data show that in the Other, Javanese, and Minangkabau groups, wages would first grow and then gradually dropped with age, ceteris paribus. In contrast, the quadratic shape of age variables was not significant in the models of the Sundanese and Bataknese, indicating that in both populations, earnings grow with age. In the remaining five ethnic groups, marital status had a major impact on income. On average, married people earned between 31 and 34% more than unmarried people. This conclusion seems reasonable, given that married individuals often have greater expenditure and more dependents. Therefore, they necessitate a greater salary to meet their daily requirements (Arshad, 2016; Trentini, 2014).

Variables based on gender and residence also indicated the same patterns. In some categories, there were considerable economic disparities between men and women, with males earning a greater salary. According to Arshad (2016), in the family, the male breadwinner works hard to ensure a better living for his dependents. In addition to that, this statistic implies that there is a salary disparity between men and women in Indonesia. The presence of the wage disparity parallels the conclusion of Taniguchi and Tuwo (2014). Perhaps patriarchal society is to blame for this chasm. In the Chinese group, there was no difference in income between men and women. In addition, the Chinese group demonstrated that there was no major economic gap between urban and rural residents. Nonetheless, some studies indicated that urban residents have a greater income than rural residents. The average salaries of urban employees were 18-31% higher than those of rural workers. This conclusion is comparable to that observed by Arshad (2016), who discovered that the income disparity between rural and urban regions is around 20%. Occupation factors were the only variables that demonstrated similarities between Chinese and other ethnicities. All categories indicated that government and private sector employees earned more than informal sector employees. Regardless of the unique findings of the Chinese group in relation to equation models, we must take these results with caution due to the small sample size of the Chinese group in comparison to other groups.

To ensure the effect of ethnicity on return to education, this study also used interaction term on all samples (Table 6).

Table 6. Return to Education with Interaction Term

Variables	(1)[+]	(2)[++]	(3)[#]
educ_years	0.160***	0.160***	0.358***
	(0.00718)	(0.00716)	(0.0310)
age	0.0351***	0.0352***	0.0373***
	(0.00260)	(0.00260)	(0.00285)
age2	-0.000194***	-0.000196***	-0.000246***
	(3.09e-05)	(3.08e-05)	(3.26e-05)
married	0.325***	0.324***	0.322***
	(0.0171)	(0.0171)	(0.0189)
male	0.587***	0.586***	0.614***
	(0.0128)	(0.0128)	(0.0144)
Public_Gov	1.070***	1.068***	0.976***
	(0.0383)	(0.0382)	(0.0509)
Private_Sector	0.859***	0.860***	0.854***
	(0.0160)	(0.0160)	(0.0178)
urban1	-0.248***	-0.250***	-0.238***
	(0.0162)	(0.0161)	(0.0184)
eth_minor1	0.601***		
	(0.0565)		
int_minor1	-0.0716***		
	(0.00616)		
eth_minor2		0.597***	
		(0.0563)	
int_eth_minor2		-0.0705***	
		(0.00616)	
Other-island_rooted			2.461***
			(0.286)
Jawa_rooted			2.413***
			(0.284)
int_jawa			-0.255***
			(0.0295)
int_oth_isl			-0.272***
			(0.0296)
Constant	12.56***	12.56***	10.64***
	(0.0935)	(0.0932)	(0.318)
Observations	22,242	22,242	22,242
R-squared	0.443	0.443	0.326

[+] eth_minor1 is a dummy variable for minority group, 1 if minority, 0 otherwise. Chinese is excluded from a minority group.
[++] eth_minor2 is a dummy variable for minority group, 1 if minority, 0 otherwise. Chinese is included as a minority group.
[#] The samples are grouped into three groups based on their rooted island. Sumatra-rooted ethnicity is the base of the comparison.
Variable with "int_" means interaction variable between groups and education years.
Standard errors in parentheses
***, **, and * denote significant level at 0.01, 0.05 and 0.1

This finding demonstrated that the return to education varied dramatically between ethnic groups. Assuming that all other factors stayed unchanged, based on the results in columns (1) and (2), minority ethnic groups earned approximately 7% less return on schooling than the majority group. This conclusion is consistent with Trentini's (2014) study in Bulgaria that

minorities earned a lower return to education than the majority.

We also estimated using ethnicity by island of origin, as shown in column 3 of Table 6. Results indicate that ethnic groups with roots on Sumatra Island earn a greater return on schooling than those with roots on Java Island and other islands. This conclusion is consistent with Table 5 in which Bataknese and Minangnese, who rooted in Sumatra Island, obtained greater return to education compared to others. Additionally, ethnicities with origins on other islands earned the lowest return to education.

In Indonesia, the results may also be impacted by the location of minority ethnic groups, the majority of whom reside in Eastern Indonesia, where the average income is often lower than in Western Indonesia. However, further research on return to school, race, and geography should be undertaken properly to bolster this argument.

Research Implication

These findings propose a number of policy suggestions. First, the cultural aspect is crucial to the education process in order to get a greater return on investment in education. In addition to transfer of knowledge, educational process also involves transmission of culture. Through cultural socialization, the government may employ the cultural heritage strategy to increase educational attainment. Since the return on education varies significantly among ethnicities, culture distinguishes the income of the people. Therefore, ethnic-cultural factors should be included in the formation of the national curriculum, not merely the local curriculum. It will increase people's awareness and capacity to absorb the positive cultures of diverse ethnic groups, particularly among the younger generation. Khamsini (2010) made a similar proposal, stating that community mobilization programs can improve their socioeconomic condition and eradicate harmful customs prior to achieving considerable increase in educational attainment.

Second, sustained education is required since parental wealth corresponds substantially with educational attainment. The cultural riches that children receive from their parents is often strongly tied to their ethnicity's culture. The children's cultural capital is subsequently converted into academic credentials. In industrialized economies, educational qualifications play a crucial role in the reproduction of society. Consequently, investments in current education have an effect not only on the current generation but also the future ones. Government involvement is required to interrupt the vicious cycle of poor education among low-class families, given that not all children live in privileged households. Creating an inclusive environment for less affluent persons in the process of accumulating human capital can have a significant impact on social mobility over the long run (Azomahou, 2016).

Third, education and employment policies must be integrated. Therefore, beginning in the classroom, integration initiatives should strive to improve the employability and skill sets of vulnerable groups (Trentini, 2014). To reduce racial prejudice and enhance the education and skills of children and teenagers in order to increase their employability, integration of public education and a substantial improvement in its quality are necessary. The public education providing strategy will also be effective, particularly in low-income areas. Public financing to reduce the opportunity cost of education will boost the chances for students from disadvantaged origins to catch up to their more privileged peers (Pohan & Vitale, 2016).

Moreover, policy debates need not be restricted to narrow ethnically-focused schooling subjects related to regional issues. Additionally, gender segregation, career opportunities, and urban-rural development must be emphasized since they have direct effects on incomes. Gender segregation, for instance, is a significant issue. The findings of this study indicate that the gender factor continues to distinguish the return to education across nearly all ethnic groups. In Indonesia, male obtains a greater return to education than female. Despite the nation's rapid industrialization and the significant progress women have achieved in the job and in school, a convergence of social, religious, and cultural norms still limits women to their house (Sohn, 2013). Nevertheless, it is crucial to define the target group of women more specifically, as the extent of prejudice may vary among industries and job types. Targeting the populations who face a substantial gender wage disparity due to discrimination may be a policy focus.

A further factor to take into account is the occupational prospect. According to this study, the different types of jobs significantly affect how much education pays off. A minimum wage policy that takes into account specific local circumstances is crucial to

reducing the discrepancy between the industries (Fajnzylber, 2001). Although there are disagreements about this policy in a number of developing nations, as in Bird & Manning (2008) and Chun & Khor (2010), minimum wage policy appears to suggest that slightly raising the minimum wage could be just as effective as raising monthly salaries as a whole in terms of raising wages at the bottom of the wage distribution.

The mismatch in educational outcomes caused by differences in geography (urban-rural group) is a challenge, particularly in a developing and archipelagic nation like Indonesia. In comparison to people who live in rural areas, those who reside in urban areas typically get a larger return on their educational investment. Regarding this matter, the policy suggestions concern spending on planned urbanization, infrastructure development, and spending on the educational systems in rural areas (Su & Heshmati, 2013). Indonesia's economy relies mainly on the agriculture sector. Family farms on a small scale are regularly affected by natural disasters. The government should provide more financial and technical support in order to boost the productivity and crop diversity of family farms and to expand the number of agro-processing businesses in towns and villages. Additionally, as non-agricultural industries often have greater incomes than the agricultural sector, additional non-farm work options should be made available to persons with low income levels. Finally, the rural educational system must be transformed in order to give rural kids the same opportunities as urban students. Raising the standard of rural schools to meet that of urban schools is necessary. Thus, it is possible to close the gap in return to education in the whole Indonesian archipelago.

CONCLUSION AND SUGGESTION

This study compares the returns to education among ethnic groups in Indonesia and examines at how parental education and ethnicity affect income through educational attainment. Estimations of instrumental variables and ordinary least squares were used to gauge how much education affects income.

According to the research, Bataknese and Minangnese has the highest returns on education among the six ethnic groups. This is due to the culture of the Bataknese and Minangnese people, who hold the conviction that their children's education will help them fulfill their primary life goals. As a result, the children are encouraged to pursue better and higher education, even if they must relocate to other cities or nations. This study also discovered that the Chinese group differs from other groups in terms of its characteristics. OLS estimation was therefore a better method for estimating the return to school in the Chinese group. It implies that parental education has no bearing on the education of their kids. For the other groups, it is preferable to estimate the return to schooling using IV estimation. Additionally, this study discovered that nearly all Indonesian ethnic groups' salaries are highly impacted by gender, occupational options, and urban/rural location.

There are some drawbacks to this study. Evaluation of the influence of parental education and ethnicity on return to education and comparison of return to education by ethnicity are the primary objectives of this paper. However, additional characteristics, such as skill and experience, are not included. Consequently, the anticipated return to education may continue to be skewed. In addition, this study utilizes only cross-sectional data, as opposed to panel data, which may provide additional light on the impact of intergenerational transmission in return to education. Also, years of schooling are used less frequently than education level. This variable's bias is greater than that of the education level variable.

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