The Journal of Social Sciences Research
ISSN(e): 2411-9458, ISSN(p): 2413-6670
Vol. 5, Issue. 10, pp: 1463-1479, 2019
URL: https://arpgweb.com/journal/journal/7
DOI: https://doi.org/10.32861/jssr.510.1463.1479

Academic Research Publishing Group

Original Research Open Access

The Effect of Human Capital on Workers' Income in Western and Eastern Regions of Indonesia

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Abstract

This study examines the effect of human capital (HC) on three median (quintile) income, namely the low median income category (Q1 = 0.25), middle median income (Q2 = 0.5) and high median income (Q3 = 0, 75). for Indonesian workers in the west and east regions. Total respondents for this study were 51,210 workers, consisting of employers, workers and casual workers. All respondent data were recorded in the National Labor Force Survey (SAKERNAS) in 2016. The HC variables in this study were years of schooling, certified training, length of work and age. This study also discusses the interaction effect between (1) vocational education background and length of study, (2) participation in certified training and length of study (3) experience and participation in certified training. This study applies the Mincer model with quantitative regression analysis to break the effect of HC at a certain level of income. The results showed that the length of study had a positive and significant effect on the income of workers in both regions, especially for western Indonesia who graduated or continued their education at vocational schools. Meanwhile, workers in the eastern region who participated in certified training had a more significant influence on their income. It was also found that lower length of work reduced the effect of training participation especially for eastern workers. It is interesting that these results can be fully observed for workers with lower incomes. Therefore, the specific implications of this research must be developed, especially programs for vocational education and legal protection of workers' careers to maintain optimal labor market outcomes in Indonesia.

Keywords: Human capital; Income; Education; Training; Tenure; Vocational.

1. Introduction

Education, training and work experience are important elements to improve the quality of human resources in various countries, including in Indonesia. This human capital variable has been widely studied and has been proven as a major factor in influencing the increase in productivity and income of individuals, households on the economic growth of a region or country (Fahmy *et al.*, 2016; Magdalyn, 2013; Olaniyan and Okemakinde, 2008). Therefore, policies to improve the quality of human resources through improving the quality of education have become one of the main agendas of SDG in various countries. Consequently, the Indonesian government is always trying to promote education, increase participation and quality of job training and encourage formal workers to have employment contracts. By doing that, they can work more proficiently and productively in the long run. This effort has been reflected in the government's commitment in education budget policies, providing training at the Vocational Training Center (Badan Pusat Statistik, 2017), as well as revisions made to labor laws.

Hagan *et al.* (2014), sugges that education originally emphasizes the formation of basic quality and competitiveness of workers. Meanwhile, job training is intended to develop workforce skills. In addition to these two aspects, human capital also increasingly accumulates in a worker during a certain work period which is shown by his experience in working. Mincer (1974), argues that experience in the world of work can increase worker productivity up to a certain work period before finally experiencing a decline. Optimization in the achievement of education, participation in job training and years of service are important policies that require clear and strong cooperation among government, private sector, educational and training institutions in improving the quality and competitiveness of the workforce.

Indonesia is the largest archipelago country in the world and has very high social and geographical diversity. In general, diversity in Indonesia both socially and geographically can be categorized into several groups. However, the government since the drafting of the 1993 GBHN has formed two distinct development areas, namely the West Indonesia Region (WIR) consisting of Sumatra, Java, Bali and Kalimantan; and the Eastern Indonesia Region (EIR) consisting of Sulawesi, West Nusa Tenggara, East Nusa Tenggara, Maluku and Papua. However, until now the

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development of these two regions has not been able to run in a balanced manner and the problem of socio-economic inequality between WIR and EIR is still often raised in various discussions. For 30 years (1982-2012) the contribution of GRDP in the Western Region of Indonesia was around 80 percent of Indonesia's GDP, while the rest was donated by the Eastern Region (Bappenas, RPJMN 2015-2019).

This research was conducted to examine the factors that affect the income of workers in two main regions of Indonesia, namely the Western Indonesian Region (WIR) and Eastern Indonesian Region (EIR). This research was conducted using the human capital theory approach to examine the effect of education, participation in training and experience at three median (quintile) income. This study was also conducted to consider the effect of interactions between (1) vocational education background and length of study, (2) participation in certified training and length of study, and (3) experience and participation in certified training. The results of this research are expected to help in offering policy recommendations for the government to improve the quality and the development of human resources in both regions.

2. Literature Review

The cornerstone of human capital theory is developed by the trio, they are Schultz (1961), Becker (1962) and Mincer (1974). They state that there is a strong relationship between the quality of human capital and wage received by workers. Schultz (1961), and Becker (1962) suggest that education and training are investment activities that can increase the potential of individuals to become more productive and competitive in the labor market. Mean, achievement of education and participation in job training can affect the productivity and income of a worker. Meanwhile, Mincer (1974), argues that the income model is compensative. It illustrates that the income of workers can increase and decrease in the range of work periods or at certain work experience. Therefore, the length of work period is also a factor that influences the quality of human capital and worker income as an addition to education and training.

The role of education in Indonesia has been shown to have a positive effect on workers' income, both regionally and nationally. This has been stated in many previous studies, such as studies conducted by Magdalyn (2013), Fahmy *et al.* (2016), Purnastuti and Wahyuni (2015), Megasari (2016), and Wahyuni and Monika (2016). Magdalyn (2013), for example, suggests that the variable of education for male who have residential in urban areas and with merried status have a positive and significant effect on workers' income in Indonesia. Meanwhile, research conducted by Fahmy *et al.* (2016) found that the work education and training variables had a positive effect on the income of Indonesian workers from the Province of West Sumatra who worked in Malaysia.

Research conducted by Purnastuti and Wahyuni (2015) and Megasari (2016) were also in line with the study conducted by Magdalyn (2013) and Fahmy *et al.* (2016). These two researchers found that there was a positive and significant influence of education to the income received by workers in the provinces of Yogyakarta Special Region and West Java Province. It could be concluded that the rate of return on education for male workers according to Megasari (2016) was far higher than female workers.

In addition to above agumentations, Wahyuni and Monika (2016) also found that the education had a positive effect on workers' income in 6 (six) provincies of Indonesia. Those six provincies were the provinces in Sumatra, Java, Kalimantan, Lesser Sunda, Sulawesi, and Maluku, and Papua. Besides the positive and significant influence of education to income, it was also found that the increasing of educational attainment of female workers could reduce the income gap between male and female workers in those six regions studied.

The effect of education on workers' income can also be observed from the type of workers' educational level. Adrimas (2004), for example, in his study suggested that in countries or regions in the early stages of their industrial development process, the demand for workers for vocational education backgrounds was increased because they had higher productivity and more competitive. The increasing in productivity and competitiveness has led to the vocational graduates to earn higher income. In addition, it was also stated that a person who had a vocational education background was more independent to build his own business sinced he already had a better work skill than graduates who had general education. Therefore, it could be concluded that these two things are the caused of vocational education had higher return on income than general education.

Even though vocational education graduates have a relatively high return on income, vocational education cannot always increase workers' income of in the long run. A study conducted by Golsteyn and Stenberg (2017) for example, found that vocational education provides a superior advantage in a shorter period compared to general education, both for male and female workers. Meanwhile a study conducted by Brunello and Rocco (2015) found that graduates of vocational education at the secondary level, tended to be less interested in continuing further education and job training than general education graduates. As a result, in certain periods of work the advantages of the income of vocational education graduates could decline in longer time.

Becker (1992), has suggested that both general and specific work training can increase the income of workers and buid the emotional engagement between companies and workers. Subsequent studies found that the effectiveness of job training in increasing income was also influenced by work experience. Schiller in Smith (2001) found that workers with minimal work experience or even no work experience at all both men and women tended to experience a decrease in wages after being given job training. Lynch (1992), found that workers with higher school attainments would tend to have higher income during the work training period and vice versa. Meanwhile, Smith (2001) found that young workers inclined to change jobs more often so that the influence of specific job training did not have much impact and was not even related to the increase in income of young workers.

3. Methodology

Source of data for this study was from National Labor Survey in 2016 (SAKERNAS) conducted by the Indonesian Central Bureau of Statistics (BPS). This raw data from SAKERNAS contained 51,210 workers who earned income, either in the form of money or goods in August 2016. The respondents for this study were workers/employees, self-employed, and casual workers. Total samples, in detail, they were from Western Indonesian Region (WIR) amounted to 38,716 workers and from Eastern Indonesia Region (EIR) there were 12,494 workers.

The effect of the variables of education, job training and length of work as a proxy for work experience - on the workers' income at WIR and EIR were analyzed using cross tabulation and multiple regression analysis. Cross tabulation analysis was used for the purpose of seeing the number and percentage of a variable grouped into certain categories, such as the education category which affects wages or income partially. While regression analysis was used to see the effect of all human capital variables on wages or income. Furthermore, in cross-tabulation analysis, the variable of wages or income was categorized based on Provincial Minimum Wages (PMW). Meanwhile, in the regression analysis, the wages or income variable was categorized into 3 (three) main parts, namely the low median income category (Q1 = 0.25), middle median income (Q2 = 0.5) and high median income (Q3 = 0, 75).

The effect of human capital and other variables such as education (length time in school), participation in certified job training, length of employment in the current job – to income or wages of workers were analyzed together by using the wage function that developed by Mincer (1974), where the dependent variable of this model was the log value (ln) of monthly income or wages received by workers based on 3 (three) median income categories as stated above.

The estimation of wage function model by Mincer (1974) in this study was as follows:

$$\ln E = c + \alpha_1 Sch + \alpha_2 (dVoc \times Sch) + \beta_1 dTrai + \beta_2 (dTrai \times Sch) + \beta_3 (dTrai \times dLowExp) + \gamma_1 Exp + \gamma_2 Exp^2 + \lambda_1 Age + \lambda_2 Age^2 + \varepsilon$$

Where:

$\ln E$: Monthly income (rupiah)

Sch : Length of schooling in formal school (year) [1]

$dVoc \times Sch$: The interaction between the vocational education background *dummy* (nominated 1 if graduating from vocational school and 0 for others) and the length time of schooling

$dTrai$: Variable *dummy* was participation in certified job training (nominated 1 if you have participated and 0 for others)

$dTrai \times Sch$: Interaction between participation in certified job training *dummy* and length time of schooling

$dTrai \times dLowExp$: Interaction between work experience *dummy* (nominated 1 if working 1 year or less in the current field of work, and 0 for others) and participation in certified job training *dummy*

Exp : Length time of work in the current job (year)

Age : Age of worker (year)

ε : *Error term*

The estimations were carried out using quantile regression analysis technique to test the effect of explanatory variables on some medians' income. Wahyuni and Monika (2016), in addition argued that the advantages of quantile regression technique for predicting various median income that this technique did not require data to follow a certain distribution and it was robust to outliers. Means the results of estimation equation do not need to fulfill the classical assumptions requirement as stated in the OLS (Ordinary Least Square) analysis technique commonly used at this time. Therefore, it could be stated that quantile regression was considered more appropriate to be applied in this study as an instrument for heterogeneous income predictors and follows a random sample distribution.

Based on arguments put forwarded by Saidah (2017) and Wahyuni and Monika (2016) above, then a quantile regression equation in -τ quantil was in the form of:

$$y_i = \mathbf{x}_i^T \beta_\tau + \mu_i, \quad i = 1, 2, \ldots, n$$

The estimation value $\hat{\beta}_\tau$ in quantile regression could be written as follows:

$$\hat{\beta}_\tau = \underset{\beta_\tau}{\operatorname{argmin}} \sum_{i \in \{i | y_i \geq \hat{y}_i\}} \tau |y_i - \mathbf{x}_i^T \beta_\tau| + \underset{\beta_\tau}{\operatorname{argmin}} \sum_{i \in \{i | y_i < \hat{y}_i\}} (\tau - 1) |y_i - \mathbf{x}_i^T \beta_\tau|$$

or

$$\hat{\beta}_\tau = \underset{\beta_\tau}{\operatorname{argmin}} \sum_{i=1}^{n} \rho_\tau (y_i - \hat{y}_i)$$

with $\rho_\tau(\cdot)$ was an asymmetric loss function of error term, namely:

$$\rho_\tau(\mu) = \begin{cases} \tau\mu, & \mu \geq 0 \\ (1-\tau)\mu, & \mu < 0 \end{cases}$$

Therefore, the quantile regression equation could be written:

$$\hat{Y} = \alpha_\tau + X\hat{\beta}_\tau + \varepsilon$$

[1] Length of study or school level assumptions as follows: not attending school or not completing elementary school = 0, elementary or equivalent = 6, junior high school or equivalent = 9, high school or equivalent = 12, DI / DII = 14, DIII = 15, DIV / S1 = 16, S2 = 18, S3 = 22

Koenker and Machado (1999), suggested that the main goodness of this quantile regression was that the value of Pseudo-R^2 analogous to R^2 of the OLS technique. It could be calculated using the following formula:

$$R^1(\tau) = 1 - \frac{\sum_{i\in\{i|y_i\geq\hat{y}_i\}}\tau|y_i-\hat{y}_i| + \sum_{i\in\{i|y_i<\hat{y}_i\}}(\tau-1)|y_i-\hat{y}_i|}{\sum_{i\in\{i|y_i\geq\tilde{y}\}}\tau|y_i-\tilde{y}| + \sum_{i\in\{i|y_i<\tilde{y}\}}(\tau-1)|y_i-\tilde{y}|}$$

Furthermore, the operational definitions of the dependent variable and the independent variables used in this study as described in Table-1 below:

Table-1. Name of Variables, Operational Definitions and Indicators Used

No	Variable Name	Definition	Indicator
Dependent Variabel			
1.	Log Earning (LnE)	The total income of workers in the form of money or goods (nominated) in July 2016 was transformed with natural logs. *Data source: 2016 SAKERNAS Questionnaire Block V.D Detail 26*	Value of natural log nominal income (numeric)
Independent Variabel			
1.	Length of Schooling (Sch)	Number of years of schooling based on a diploma *Source of data: 2016 SAKERNAS questionnaire Block V.A Details 1.a*	No school/Not graduated elementary school = 0 Elementary School or equivalent = 6 Junior high school or equivalent = 9 Senior high school or equivalent = 12 D I = 13 D II = 14 D III = 15 D IV / S1 = 16 S 2 = 18 S 3 = 22
2.	Interaction of Vocational Education and Length Time of Schooling	Worker's educational background, nominated 1 if graduated from vocational school and 0 for others *Source of data: 2016 SAKERNAS questionnaire Block V.A Detail 1.b*	Length time of schooling & graduated vocational school = 12 Others = 0
4.	Participation in training $(dummy)(dTrai)$	Employee participation in certified job training. *Source of data: 2016 SAKERNAS questionnaire Block V.A Details 1.C.*	Participation in training = 1 Others = 0
5.	Interaction of work training and education participation $(dTrai \times Sch)$	The value multiplication of length time of schooling to participation in certified job training *dummy*. *Source of data: 2016 SAKERNAS questionnaire Block V.A Details 1.C and Block V.A Details 1.a*	Length time of schooling & participated in certified training = 1 Others = 0
6.	Interaction of work training participation and minimal work experience $(dTrai \times dLowExp)$	The value multiplication of participation in certified training *dummy* to less work experience *dummy*. If length time of work experience less than 1 year, it was assumed as minimal work experienced *Source of data: 2016 SAKERNAS questionnaire Block V.A Details 1.C and Block V.D Detail 21*	Participated in training & work experience less than 1 year = 1 Others = 0
7.	Period of work in current job (*tenure*) (Exp)	Length time of work experience in current job. *Data source: 2016 SAKERNAS questionnaire Block V.D Detail 21*	Number of years experience (numerik)
8.	Period of work at the current job is squared(Exp^2)	Length time of work in current job is squared *Data source: 2016 SAKERNAS questionnaire Block V.D Detail 21*	Number of years of current job is aquared (numeric)
9.	Age (Age)	The worker's age in Agustus 2016 *Source of data: 2016 SAKERNAS questionnaire Block IV*	Age in years (numeric)
10.	Age square (Age^2)	The worker's age in Agustus 2016 is squared *Source of data: 2016 SAKERNAS questionnaire Block IV*	Age in years (numeric)

4. Results of Findings and Discussion

4.1. Profile of Respondents

Table-2 shows the distribution of workers by region in Indonesia. There are 51,210 total samples interviewed in August 2016, mostly from WIR (75.6% of respondents). Of the total samples, there are 17,387 workers have income on the national average or above and 33,823 workers have income below the national average. The average value of national income calculated from all workers in Indonesia is Rp. 2,108,000 / month.

In terms of the amount of income received, workers in WIR are the workers with the highest income above the average and below the national average. However, in terms of proportion, the comparison between the two groups is almost the same in both the WIR and the EIR, the ratio is 1:2. Nevertheless, this indication shows that the high diversity of income is in WIB. One of the factors that can cause the high diversity of income is the considerable difference in the Provincial Minimum Wage (PMW) value between Java and other provinces in western region.

Table-2. Indonesia: Distribution of workers by Region and Average Income

Origin of Worker's Region	Monthly Income				Total	
	Above Average of Provincial Minimum Wages		Below Average of Provincial Minimum Wages			
	Frek.	%	Frek.	%	Frek.	%
WIR	12989	74.70	25727	76.06	38716	75.60
EIR	4398	25.30	8096	23.94	12494	24.40
Total	17387	100	33823	100	51210	100

Source: research data, 2018
Description: Pearson chi-square test = 11,488 (1 df, p-value = 0.000700456)

Table-3 shows that most of workers in WIR completed junior high school or equivalent they are about 54.39%, and other groups of workers who did not go to school or did not complete elementary school are about 12.72%. This group of low-educated workers is noted to have income below the national average. Meanwhile, the portion of workers in WIR with higher education (senior high school/equivalent up to doctorate degree) is 45.60% and generally earns income that meets the national average or more.

Table-3. Distribution of Workers in the Western Region of Indonesia according to Education and Income

Level of Education	Monthly of Income				Total	
	Above Average of Provincial Minimum Wages		Under Average of Provincial Minimum Wages			
	Freg.	%	Freg.	%	Freg.	%
Not Graduate Elementary School (ES)	568	4.37	4357	16.94	4925	12.72
Package A	10	0.08	46	0.18	56	0.14
ES for Disabilities	8	0.06	59	0.23	67	0.17
ES/Islamic ES	1722	13.26	7435	28.90	9157	23.65
Package B	15	0.12	62	0.24	77	0.20
Junior high school (JHS) for Dissabilities	7	0.05	31	0.12	38	0.10
JHS/Islamic JHS	1662	12.80	5081	19.75	6743	17.42
Package C	64	0.49	128	0.50	192	0.50
Senior high school (SHS) for Dissabilities	0	0.00	1	0.00	1	0.00
SHS/Islamic SHS	2944	22.67	4010	15.59	6954	17.96
Vocational School (VS) /Islamic VS	1797	13.83	2539	9.87	4336	11.20
Diploma I/II	201	1.55	142	0.55	343	0.89
Diploma III	641	4.93	422	1.64	1063	2.75
Diploma IV/Strata 1	2985	22.98	1387	5.39	4372	11.29
Strara 2 (Master's degree)	342	2.63	27	0.10	369	0.95
Strata 3 (Doctoral degree)	23	0.18	0	0.00	23	0.06
Total	12989	100	25727	100	38716	100

Source: research data, 2018
Description: Pearson chi-square test = 6023.83 (15 df, p-value = 0)

Distribution of workers according to educational level in EIR appears to be the opposite of the conditions in the WIR. Table-4 shows that most of workers in the EIR have higher education, namely high school / equivalent and

above (51.24%). The rest is 48.76% with junior high school/equivalent and below. Nonetheless, the characteristics of income according to education in WIR and EIR show a similarity where generally low-educated workers get income below the national average and vice versa.

These data indicate that educational attainment is one of the factors that have a positive effect on the income of workers in both the Western Indonesia Region (WIR) and in the Eastern Indonesia Region (EIR). Therefore, the role of government in the form of educational curriculum development, recruitment of qualified teaching staff and the construction of facilities that can meet the demands of technological development, development and labor market needs - are important in addition to individual and community investment in formal education.

Table-4. Distribution of Workers in Eastern Indonesia Region according to Education and Income

Level of Education	Monthly of Income Earning				Total	
	Above Average of Provincial Minimum Wages		Under Average of Provincial Minimum Wages			
	Freq.	%	Freq	%	Freq.	%
Not Graduate Elementary School (ES)	230	5.23	1544	19.07	1774	14.20
Package A (equivalent to ES)	1	0.02	9	0.11	10	0.08
ES for Disabilities	2	0.05	17	0.21	19	0.15
ES/Islamic ES	480	10.91	2047	25.28	2527	20.23
Package B (equivalent to JHS)	2	0.05	21	0.26	23	0.18
Junior high school (JHS) for Dissabilities	4	0.09	9	0.11	13	0.10
JHS/Islamic JHS	451	10.25	1275	15.75	1726	13.81
Package C (equivalent to SHS)	25	0.57	74	0.91	99	0.79
Senior high school (SHS) for Dissabilities	0	0.00	1	0.01	1	0.01
SHS/Islamic SHS	1038	23.60	1593	19.68	2631	21.06
Vocational School (VS) /Islamic VS	406	9.23	593	7.32	999	8.00
Diploma I/II	99	2.25	71	0.88	170	1.36
Diploma III	206	4.68	170	2.10	376	3.01
Diploma IV/Strata 1	1289	29.31	659	8.14	1948	15.59
Strara 2 (Master's degree)	149	3.39	11	0.14	160	1.28
Strata 3 (Doctoral degree)	16	0.36	2	0.02	18	0.14
Total	4398	100	8096	100	12494	100

Source: Research data, 2018
Description: Pearson chi-square test = 1971.44 (15 df, p-value = 0)

Table-5 shows that certified job training has a positive impact on the income of workers in both the WIR and EIR where trained workers in the two regions earn more than the national average. Nevertheless, the percentage of trained workers is still much smaller than untrained workers in the total national workers. The national participation of certified job training is relatively low, presumably due to the lack of training opportunities for informal workers. Therefore, the government needs to expand the opportunities for workers especially for informal ones to get certified job training by subsidizing training costs and utilizing technology as one of the supporting media for training.

Table-5. Distribution of Workers in the Western and Eastern Regions of Indonesia according to Participation in Certified Training and Income

Training Participation	Monthly Income				Total	
	Above Average of Provincial Minimum Wages		Below Average of Provincial Minimum Wages			
	Frek.	%	Frek.	%	Frek.	%
A. WIR	4398	100	8096	100	12494	100
Trained	1786	40.61	845	10.44	2631	21.06
Not Trained	2612	59.39	7251	89.56	9863	78.94
B. EIR	12989	100	25727	100	38716	100
Trained	4224	32.52	2119	8.24	6343	16.38
Not Trained	8765	67.48	23608	91.76	32373	83.62

Source: Research data, 2018
Note: KBI, Pearson chi-square test = 3715.31 (1 df, p-value = 0)
KTI, Pearson chi-square test = 1560.66 (1 df, p-value = 0)

Table-6 shows that the working period is one of the factors that have a positive effect on the income of workers both at WIR and in EIR. Workers who work in a relatively short period of time (one year and below) earn income less than workers who have worked longer than one year. This data also indicates that if formal workers do not have a guaranteed income through the employment contract and there is a tendency to change jobs in a short period of time, it will have a negative impact on their welfare.

Table-6. Distribution of Workers in the Western and Eastern Regions of Indonesia according to Work Period and Income

Working Period	Monthly Income				Total	
	Above Average of Provincial Minimum Wages		Below Average of Provincial Minimum Wages			
	Frek.	%	Frek.	%	Frek.	%
A. Western Region of Indonesia	12989	100	25727	100	38716	100
≤ 1 year	912	7.02	3685	14.32	4597	11.87
> 1 year	12077	92,98	22042	85.68	34119	88.13
B. Eastern Region of Indonesia	4398	100	8096	100	12494	100
≤ 1 year	350	7.96	1411	17.43	1761	14.09
> 1 year	4048	92.04	6685	82.57	10733	85.91

Source: Research data, 2018
Note: KBI, Pearson chi-square test = 439,831 (1 df, p-value = 1.1782e-97)
KTI, Pearson chi-square test = 211,089 (1 df, p-value = 7.95004e-48)

4.2. Tourist Guard

Table-7 shows the results of estimation of the factors that affect the income of workers in WIR and EIR. The estimation of worker log value in quantile regression in both regions shows that the independent variables involved in each model have significant effect on almost all dependent variables. Certain variables appear to be moderated by other variables such as the variable participation in certified job training (dTrai) which has a negative effect if the year of schooling variable (sch) is involved in the calculation, and vice versa has a positive effect if the year of schooling variable is not involved. This shows that educational achievement is a moderator which is sensitive to the effectiveness of job training as stated by Lynch (1992).

Table-7. Estimated Results of Factors affecting Employees' Income at KBI and KTI

Variable	WRI			ERI		
	Q1	Q2	Q3	Q1	Q2	Q3
Const	12,233	12,639	13,173	11,807	12,380	13,067
	(0.050)***	(0.038)***	(0,038)***	(0,112)***	(0,068)***	(0,068)***
Sch	0,054	0,064	0,057	0,050	0,058	0,049
	(0,001)***	(0,001)***	(0,001)***	(0,003)***	(0,002)***	(0,002)***
dVoc×sch	0,009	n/a	n/a	n/a	n/a	n/a
	(0,001)***					
DTrai	-0,326	0,322	0,325	-0,440	0,362	0,291
	(0,068)***	(0,013)***	(0,013)***	(0,138)***	(0,022)***	(0,022)***
dTrai×sch	0,058	n/a	n/a	0,074	n/a	n/a
	(0,005)***			(0,010)***		
dTrai×dLowExp	-0,425	-0,190	-0,194	-0,585	-0,272	-0,207
	(0,049)***	(0,038)***	(0,037)***	(0,105)***	(0,063)***	(0,064)***
Exp	0,035	0,028	0,024	0,026	0,027	0,023
	(0,002)***	(0,001)***	(0,001)***	(0,004)***	(0,002)***	(0,002)***
exp2	-0,001	-0,0004	-0,0004	-0,0003	-0,0003	-0,0002
	(0,000)***	(0,000)***	(0,000)***	(0,000)***	(0,000)***	(0,000)***
Age	0,044	0,046	0,041	0,064	0,059	0,050
	(0,002)***	(0,002)***	(0,002)***	(0,006)***	(0,003)***	(0,003)***
age2	-0,001	-0,001	0,0005	-0,001	-0,001	-0,001
	(0,000)***	(0,000)***	(0,000)***	(0,000)***	(0,000)***	(0,000)***
R^1 (pseudo-R^2)	0,10334	0,13612	0,17105	0,10751	0,14605	0,16397

Source: research data processed, 2018
Description: n / a, not in the model; ***: significant at the level of 1%, **, significant at level of 5%, *, a significance level of 10%

Meanwhile, in all the observation quantities, the variable work period under one year shows a negative influence on the success of job training. These results corroborate to Smith (2001) findings. Furthermore, work experience squared, and age squared are also negatively affect the income of workers. Therefore, the profile of income versus experience, and income versus age, in the two regions is in the form of an inverted U curve as stated in the theory of human capital.

The length of school (*sch*) is recorded to have a positive and significant effect on the income of workers in all quintiles both at WIR and EIR. Compared to quintiles, workers who have a median worth of income opportunities, Q2 (Rp. 1,500,000), seem to benefit from higher educational attainment. While other workers who earn below or above the median have lower returns to education. However, if compared between regions, workers at WIR are noted to have a higher rate of return on education than workers in EIR. An additional one year of schooling at the

level of general education (non vocational) can increase income by 5.9% - 11.8% for workers at WIR and by 5.1% - 13.2% for workers in EIR (see APPENDIX 7). From this result, it can be concluded that the educational attainment calculated in the length of school years is a variable that positively influences the income of workers in these two regions of Indonesia, especially in the median income group of workers.

Moderation of vocational education (dVoc) to the income of workers is only recorded in the first quintile in WIR. This shows that the variation in income of low-income workers in WIR can be explained by the vocational education they have. The moderation of vocational education in Q1 in WIR is positive in this group, where vocational school-licensed workers can earn around 0.9% more income than high school workers. In the remaining quintile in WIR and the whole quintile in EIR, vocational education is no longer able to explain the variation in income of workers (see ANNEX 7). Overall these results indicate that the effect of vocational education on the income of workers in Indonesia can be positive and can be negative. Whereas if the effect is positive, it only occurs in the low-income group of workers in the WIR and even then, the value is small.

Participation in certified job training along with several moderator variables show a more distinctive and detailed effect on the income of workers in both regions with the presence of two moderating effects by length of schooling and years of service in job. In the low-income group (Q1) in both regions, job training participation had a negative and significant effect on the income of workers who had never attended school or were very low educated. If job training is given to a group of low-educated workers, there will be inefficiencies where workers can get a decrease in income of around 28% in WIR and 36% in EIR. However, if the educational achievements are improved, the negative influences can turn around to be positive, especially in Eastern Indonesia. Well-trained high school/equivalent workers can get a surplus of 44% in Western Indonesia and 56% in Eastern Indonesia. In the group of Q1 workers who have worked for more than a year, training inefficiency will occur if workers do not attend school at all. Meanwhile, for groups of workers who have worked for a year or less in their fields, training inefficiencies occur if workers have a high school education/equivalent down (see APPENDIX 8).

The estimation results show several findings as follows: *First*, the rate of return of certified job training participation increases with increasing educational attainment and years of service in job. *Second*, the composition of the rate of return of certified job training participation according to educational attainment was only observed in low-income workers (Q1) in both the WIR and in the EIR. *Third*, by attending certified job training and achieving higher education, the income of Q1 workers in Eastern Indonesia has increased more than Q1 workers in WIR. *Fourth*, in Q2 and Q3, workers in WIR generally have a greater increase in income compared to workers in Eastern Indonesia after they have received certified job training.

The working period (exp) is calculated to have a negative and significant effect on the increasing income of workers at WIR and EIR. This result is shown by the value of all positive *exp* variable coefficients and negative exp2 variables. It means, the longer of workers' time of service in their job, the smaller their income will be. Therefore, the income versus employment curve for all quintiles in WIR and EIR are in the form of U-shaped reversed (see ANNEX 9). The estimation results also show that workers at Western Indonesia reach peak earnings in the 29 to 32 years of working period, while workers in Eastern Indonesia reach peak earnings in the 42 to 48 years service period.

Furthermore, the age of workers (*age*) also has negative and significant effect on the increaseing income of workers at WIR and EIR. This means that the older the workers, the more their income decreases. Therefore, it can also be concluded that the income versus age curve of workers is also U-shaped **reversed** (see Appendix 10). Workers at WIR and EIR reach a peak of income at an age that is not much different, which is around 40 years in Quintile 1 (Q1), age 41 in Quintile 2 (Q2) and age 42-43 in Quintile 3 (Q3).

5. Conclusions and Suggestions

The effect of human capital to income shows a varied influence on the workers in WIR and EIR. The results of the research conducted show that on one hand there are similarities in the pattern or influence of education on income at a very low level of education. If job training is given to this group of low-educated workers, there will be inefficiency in investing in education, where workers can obtain a decrease in income of around 28% in WIR and 36% in EIR. On the other hand, if the educational achievements are improved, the negative influences can turn around to be positive, especially in Eastern Indonesia. Well-trained high school/equivalent workers can get a surplus of 44% in Western and 56% in Eastern Regions. In the Quantile 1 (Q1) group of workers who have worked for more than a year, training inefficiencies will occur if workers do not attend school at all. Meanwhile, for groups of workers who have worked for a year or less in their current job, training inefficiencies will occur if workers have a high school education/equivalent or lower.

Some policy recommendations that can be put forward from this study are as follow: *First*, Indonesia must achieve a 12-year compulsory education program because it is critical to improve the basic competency and welfare of workers in both western and eastern regions. To strengthen industrial input throughout Indonesia, prospective workers at WIR should be facilitated and encouraged to be more vocational education oriented particularly on the field technological development which in line to technological industries that have been widely built in the western part of Indonesia. Whereas workers in Eastern Indonesia need to be prepared with vocational education oriented which focused on the development of the primary processing sectors and tourism industries. Therefore, the government needs to implement an equal distribution of education development policies, including educational facilities, infrastructure and the distribution of teaching staff (teachers and lecturers) as well as the increasing in the educational budget.

Second, increasing partnerships between the government and the private sector in developing potential vocational education in WIR and EIR as one step to ease the burden on the government in building high-cost

vocational education. At the same time, it can relieve the private sector in obtaining highly qualified workers' inputs. In addition, the government can increase the attractiveness of private investment with private tax mitigation policies by playing a role in partnerships and work apprenticeship programs for students in the areas of potential industries.

Third, certified job training is an income booster for educated workers at both WIR and EIR. Unfortunately, this is less applied to informal sector workers. Therefore, the government needs to expand the opportunities of the people in both regions to take part in training through subsidies and provide training programs with more diverse material are needed as well as training media by utilizing information technology.

Fourth, the labor law is one of the keys to increase work period, productivity and minimize inefficiencies in work training. Workers who are legally protected will be able to work in a clear career path and are interested in investing to improve their human capital in various ways. In addition, the productive working period in WIR is found to be relatively shorter than EIR. In other words, workers in WIR have income decreasing faster than workers in Eastern Indonesia. Therefore, workers in WIR are need more legal protection as triggered by the dynamics of moving jobs because they do not get suitable employment contracts and clear career paths.

Fifth, the results of research related to the age on optimum workers' income are not much different between WIR and EIR which is at the age of 40. At this stage, workers need facilities support to obtain long-term productivity, especially those related to long life expectancy, physical and mental health. Then certainly, it can lead to economic problem which goes hand in hand with the problem of unemployment among the youth population. Concequently, this policy will be related to the productive age employment and it can be very broad ranging from the development of the health sector to the increasing of duration for formal employment.

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Attachment 1

Estimated quantile 0.25 at WIR
Model 1: Quantile estimates, using observations 1-38716
Dependent variable: lnPend
tau = 0.25
Asymptotic standard errors assuming IID errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	*Sig.*
const	12.2331	0.0495825	246.7	<0.0001	***
sch	0.0537146	0.00144480	37.18	<0.0001	***
dVocXsch	0.00851639	0.00149592	5.693	<0.0001	***
dTrai	−0.326035	0.0676505	−4.819	<0.0001	***
dTraiXsch	0.0576259	0.00488317	11.80	<0.0001	***
dTraiXdLowExp	−0.424668	0.0492609	−8.621	<0.0001	***
exp	0.0354248	0.00175945	20.13	<0.0001	***
exp2	−0.000619127	4.82736e-05	−12.83	<0.0001	***
age	0.0437877	0.00248818	17.60	<0.0001	***
age2	−0.000560453	2.90791e-05	−19.27	<0.0001	***

Median depend. var	14.22098	S.D. dependent var	0.869627
Sum absolute resid	27808.73	Sum squared resid	29722.66
Log-likelihood	−50708.66	Akaike criterion	101437.3
Schwarz criterion	101523.0	Hannan-Quinn	101464.5

Appendix 2

Estimated 0.5 quintile in WIR
Model 2: Quantile estimates, using observations 1-38716
Dependent variable: lnPend
tau = 0.5
Asymptotic standard errors assuming IID errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	*Sig.*
const	12.6686	0.0380968	332.5	<0.0001	***
sch	0.0610040	0.00111012	54.95	<0.0001	***
dVocXsch	0.00233247	0.00114940	2.029	0.0424	**
dTrai	−0.0373685	0.0519794	−0.7189	0.4722	
dTraiXsch	0.0264192	0.00375200	7.041	<0.0001	***
dTraiXdLowExp	−0.174246	0.0378497	−4.604	<0.0001	***
exp	0.0283980	0.00135188	21.01	<0.0001	***
exp2	−0.000442828	3.70912e-05	−11.94	<0.0001	***
age	0.0452986	0.00191180	23.69	<0.0001	***
age2	−0.000551446	2.23430e-05	−24.68	<0.0001	***

Median depend. var	14.22098	S.D. dependent var	0.869627
Sum absolute resid	22457.77	Sum squared resid	23341.40
Log-likelihood	−44466.53	Akaike criterion	88953.05
Schwarz criterion	89038.69	Hannan-Quinn	88980.20

Model 3: Quantile estimates, using observations 1-38716
Dependent variable: lnPend
tau = 0.5
Asymptotic standard errors assuming IID errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	12.6753	0.0390377	324.7	<0.0001	***
sch	0.0615213	0.00111364	55.24	<0.0001	***
dTrai	−0.0129256	0.0524153	−0.2466	0.8052	
dTraiXsch	0.0245160	0.00377937	6.487	<0.0001	***
dTraiXdLowExp	−0.183092	0.0388635	−4.711	<0.0001	***
exp	0.0283313	0.00138878	20.40	<0.0001	***
exp2	−0.000438587	3.81040e-05	−11.51	<0.0001	***
age	0.0449771	0.00195798	22.97	<0.0001	***
age2	−0.000548491	2.28987e-05	−23.95	<0.0001	***

Median depend. var	14.22098	S.D. dependent var	0.869627
Sum absolute resid	22459.39	Sum squared resid	23356.45
Log-likelihood	−44469.32	Akaike criterion	88956.63
Schwarz criterion	89033.71	Hannan-Quinn	88981.07

Test on Model 2:
Null hypothesis: the regression parameter is zero for dVocXsch
Test statistic: F(1, 38706) = 4.11804, p-value 0.0424349
Omitting variables improved 1 of 3 information criteria.

Model 4: Quantile estimates, using observations 1-38716
Dependent variable: lnPend
tau = 0.5
Asymptotic standard errors assuming IID errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	12.6390	0.0380373	332.3	<0.0001	***
sch	0.0637388	0.00104247	61.14	<0.0001	***
dTrai	0.322480	0.0132246	24.38	<0.0001	***
dTraiXdLowExp	−0.190291	0.0378455	−5.028	<0.0001	***
exp	0.0283446	0.00135826	20.87	<0.0001	***
exp2	−0.000437379	3.72750e-05	−11.73	<0.0001	***
age	0.0456063	0.00191539	23.81	<0.0001	***
age2	−0.000552396	2.23987e-05	−24.66	<0.0001	***

Median depend. var	14.22098	S.D. dependent var	0.869627
Sum absolute resid	22480.03	Sum squared resid	23417.86
Log-likelihood	−44504.87	Akaike criterion	89025.75
Schwarz criterion	89094.26	Hannan-Quinn	89047.47

Test on Model 2:
Null hypothesis: the regression parameters are zero for the variables
dVocXsch, dTraiXsch
Test statistic: F(2, 38706) = 25.0066, p-value 1.40208e-11
Omitting variables improved 0 of 3 information criteria.

Appendix 3

Estimated quantile 0.75 in WIR
Model 5: Quantile estimates, using observations 1-38716
Dependent variable: lnPend
tau = 0.75
Asymptotic standard errors assuming IID errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	*Sig.*
const	13.1915	0.0378535	348.5	<0.0001	***
sch	0.0550026	0.00110303	49.87	<0.0001	***
dVocXsch	0.000888529	0.00114206	0.7780	0.4366	
dTrai	−0.0362450	0.0516475	−0.7018	0.4828	
dTraiXsch	0.0264011	0.00372804	7.082	<0.0001	***
dTraiXdLowExp	−0.146898	0.0376080	−3.906	<0.0001	***
exp	0.0236611	0.00134325	17.61	<0.0001	***
exp2	−0.000377459	3.68543e-05	−10.24	<0.0001	***
age	0.0418936	0.00189959	22.05	<0.0001	***
age2	−0.000488276	2.22003e-05	−21.99	<0.0001	***

Median depend. var	14.22098	S.D. dependent var	0.869627
Sum absolute resid	26430.52	Sum squared resid	32995.55
Log-likelihood	−43828.79	Akaike criterion	87677.59
Schwarz criterion	87763.23	Hannan-Quinn	87704.74

Model 6: Quantile estimates, using observations 1-38716
Dependent variable: lnPend
tau = 0.75
Asymptotic standard errors assuming IID errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	13.1730	0.0375813	350.5	<0.0001	***
sch	0.0574525	0.00102998	55.78	<0.0001	***
dTrai	0.325126	0.0130660	24.88	<0.0001	***
dTraiXdLowExp	−0.193849	0.0373918	−5.184	<0.0001	***
exp	0.0239050	0.00134198	17.81	<0.0001	***
exp2	−0.000382643	3.68281e-05	−10.39	<0.0001	***
age	0.0414610	0.00189242	21.91	<0.0001	***
age2	−0.000479673	2.21301e-05	−21.68	<0.0001	***

Median depend. var	14.22098	S.D. dependent var	0.869627
Sum absolute resid	26459.14	Sum squared resid	33067.43
Log-likelihood	−43869.32	Akaike criterion	87754.64
Schwarz criterion	87823.15	Hannan-Quinn	87776.36

Test on Model 5:
Null hypothesis: the regression parameters are zero for the variables
dVocXsch, dTraiXsch
Test statistic: F(2, 38706) = 25.2721, p-value 1.07553e-11
Omitting variables improved 0 of 3 information criteria.

APPENDIX 4

Estimated 0.25 quintile in EIR
Model 7: Quantile estimates, using observations 1-12494
Dependent variable: lnPend
tau = 0.25
Asymptotic standard errors assuming IID errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	11.8129	0.113061	104.5	<0.0001	***
sch	0.0495283	0.00304105	16.29	<0.0001	***
dVocXsch	0.00344718	0.00389349	0.8854	0.3760	
dTrai	−0.460582	0.141638	−3.252	0.0011	***
dTraiXsch	0.0750202	0.0100446	7.469	<0.0001	***
dTraiXdLowExp	−0.572451	0.105639	−5.419	<0.0001	***
exp	0.0259395	0.00394468	6.576	<0.0001	***
exp2	−0.000306327	0.000106932	−2.865	0.0042	***
age	0.0635086	0.00572178	11.10	<0.0001	***
age2	−0.000793302	6.70028e-05	−11.84	<0.0001	***

Median depend. var	14.22098	S.D. dependent var	0.946427
Sum absolute resid	9821.416	Sum squared resid	11415.89
Log-likelihood	−17586.05	Akaike criterion	35192.11
Schwarz criterion	35266.44	Hannan-Quinn	35216.99

Model 8: Quantile estimates, using observations 1-12494
Dependent variable: lnPend
tau = 0.25
Asymptotic standard errors assuming IID errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	11.8066	0.112434	105.0	<0.0001	***
sch	0.0499543	0.00298761	16.72	<0.0001	***
dTrai	−0.439907	0.138475	−3.177	0.0015	***
dTraiXsch	0.0736030	0.00981639	7.498	<0.0001	***
dTraiXdLowExp	−0.585060	0.105147	−5.564	<0.0001	***
exp	0.0260009	0.00392644	6.622	<0.0001	***
exp2	−0.000308535	0.000106438	−2.899	0.0038	***
age	0.0636610	0.00568939	11.19	<0.0001	***
age2	−0.000793673	6.66427e-05	−11.91	<0.0001	***

Median depend. var	14.22098	S.D. dependent var	0.946427
Sum absolute resid	9822.415	Sum squared resid	11421.63
Log-likelihood	−17586.86	Akaike criterion	35191.72
Schwarz criterion	35258.61	Hannan-Quinn	35214.11

Test on Model 7:
Null hypothesis: the regression parameter is zero for dVocXsch
Test statistic: F(1, 12484) = 0.783881, p-value 0.375974
Omitting variables improved 3 of 3 information criteria.

Appendix 5

Estimated 0.5 quintile in EIR
Model 17: Quantile estimates, using observations 1-12494
Dependent variable: lnPend
tau = 0.5
Asymptotic standard errors assuming IID errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	12.4306	0.0702201	177.0	<0.0001	***
sch	0.0549610	0.00188874	29.10	<0.0001	***
dVocXsch	0.00464436	0.00241818	1.921	0.0548	*
dTrai	0.0143301	0.0879687	0.1629	0.8706	
dTraiXsch	0.0250818	0.00623854	4.020	<0.0001	***
dTraiXdLowExp	−0.287346	0.0656104	−4.380	<0.0001	***
exp	0.0269105	0.00244997	10.98	<0.0001	***
exp2	−0.000323363	6.64136e-05	−4.869	<0.0001	***
age	0.0577020	0.00355369	16.24	<0.0001	***
age2	−0.000705387	4.16142e-05	−16.95	<0.0001	***

Median depend. var	14.22098	S.D. dependent var	0.946427
Sum absolute resid	7923.010	Sum squared resid	8976.191
Log-likelihood	−15463.45	Akaike criterion	30946.89
Schwarz criterion	31021.22	Hannan-Quinn	30971.78

Model 20: Quantile estimates, using observations 1-12494
Dependent variable: lnPend
tau = 0.5
Asymptotic standard errors assuming IID errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	12.3797	0.0675421	183.3	<0.0001	***
sch	0.0583347	0.00172047	33.91	<0.0001	***
dTrai	0.361820	0.0216526	16.71	<0.0001	***
dTraiXdLowExp	−0.271773	0.0629948	−4.314	<0.0001	***
exp	0.0273075	0.00236620	11.54	<0.0001	***
exp2	−0.000319582	6.41721e-05	−4.980	<0.0001	***
age	0.0587791	0.00343037	17.13	<0.0001	***
age2	−0.000716679	4.01821e-05	−17.84	<0.0001	***

Median depend. var	14.22098	S.D. dependent var	0.946427
Sum absolute resid	7929.496	Sum squared resid	9019.785
Log-likelihood	−15473.67	Akaike criterion	30963.34
Schwarz criterion	31022.81	Hannan-Quinn	30983.25

Test on Model 17:
Null hypothesis: the regression parameters are zero for the variables
dVocXsch, dTraiXsch
Test statistic: F(2, 12484) = 8.77678, p-value 0.000155228
Omitting variables improved 0 of 3 information criteria.

Appendix 6

Estimated quintile of 0.75 in Eastern Indonesia
Model 24: Quantile estimates, using observations 1-12494
Dependent variable: lnPend
tau = 0.75
Asymptotic standard errors assuming IID errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	13.0934	0.0647645	202.2	<0.0001	***
sch	0.0472372	0.00174200	27.12	<0.0001	***
dVocXsch	0.00232080	0.00223030	1.041	0.2981	
dTrai	−0.0927377	0.0811342	−1.143	0.2531	
dTraiXsch	0.0277188	0.00575385	4.817	<0.0001	***
dTraiXdLowExp	−0.148334	0.0605130	−2.451	0.0142	**
exp	0.0221356	0.00225963	9.796	<0.0001	***
exp2	−0.000220473	6.12538e-05	−3.599	0.0003	***
age	0.0500321	0.00327760	15.26	<0.0001	***
age2	−0.000590135	3.83811e-05	−15.38	<0.0001	***

Median depend. var	14.22098	S.D. dependent var	0.946427
Sum absolute resid	9309.858	Sum squared resid	12669.97
Log-likelihood	−15280.68	Akaike criterion	30581.36
Schwarz criterion	30655.69	Hannan-Quinn	30606.25

Model 25: Quantile estimates, using observations 1-12494
Dependent variable: lnPend
tau = 0.75
Asymptotic standard errors assuming IID errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	13.0667	0.0681727	191.7	<0.0001	***
sch	0.0493521	0.00173653	28.42	<0.0001	***
dTrai	0.290702	0.0218547	13.30	<0.0001	***
dTraiXdLowExp	−0.207332	0.0635829	−3.261	0.0011	***
exp	0.0228730	0.00238829	9.577	<0.0001	***
exp2	−0.000239006	6.47713e-05	−3.690	0.0002	***
age	0.0504900	0.00346240	14.58	<0.0001	***
age2	−0.000596121	4.05572e-05	−14.70	<0.0001	***

Median depend. var	14.22098	S.D. dependent var	0.946427
Sum absolute resid	9319.338	Sum squared resid	12697.04
Log-likelihood	−15300.56	Akaike criterion	30617.12
Schwarz criterion	30676.58	Hannan-Quinn	30637.02

Test on Model 24:
Null hypothesis: the regression parameters are zero for the variables
dVocXsch, dTraiXsch
Test statistic: F(2, 12484) = 11.6121, p-value 9.15406e-06
Omitting variables improved 0 of 3 information criteria.

Appendix-7. Estimated percentage increase in income of workers due to an additional one year of schooling

School Type	**WIR**			**EIR**		
	Q1	**Q2**	**Q3**	**Q1**	**Q2**	**Q3**
General Education						
Trained	11,8	n.a	n.a	13,2	n.a	n.a
Untrained	5,5	6,6	5,9	5,1	6,0	5,1
Vocational Education						
Ttrained	12,7	n.a	n.a	n.a	n.a	n.a
Untrained	6,4	n.a	n.a	n.a	n.a	n.a

Source: research data processed (2018)
Information:
n.a: not observed in the model

Appendix-8. Estimated percentage of income difference of workers due to participation in job training a Group of workers with tenure ≤ 1 year

Length of Schooling (year)	WIR			EIR		
	Q1	Q2	Q3	Q1	Q2	Q3
0	-52,8%	14,1%	14,0%	-64,1%	9,4%	8,7%
6	-33,3%			-44,2%		
9	-20,7%			-30,4%		
12	-5,7%			-13,2%		
14	5,8%			0,5%		
15	12,0%			8,2%		
16	18,7%			16,5%		
18	33,2%			35,0%		
22	67,7%			81,2%		

Source: research data processed, 2018
Information: A gray background indicates an unspecified rate of return according to length of school

a. Group of workers with > 1 year work period

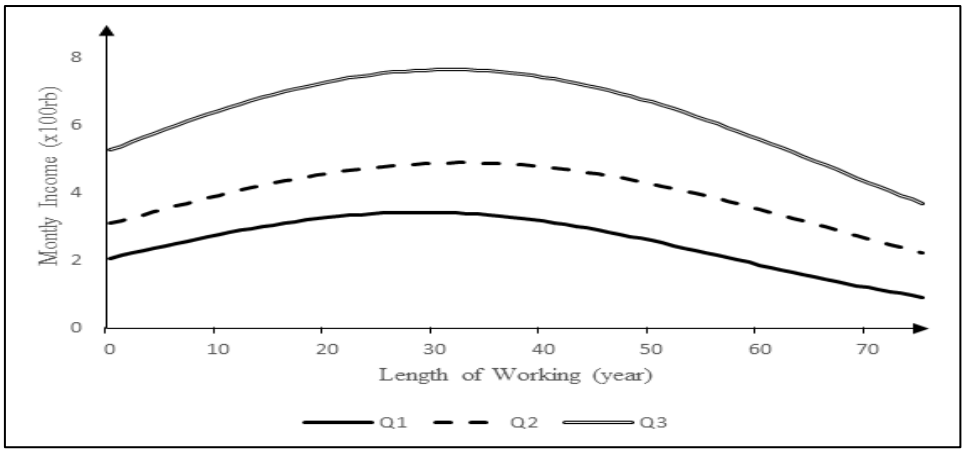
Length of Schooling (year)	WIR			EIR		
	Q1	Q2	Q3	Q1	Q2	Q3
0	-27,8%	38,1%	38,4%	-35,6%	43,6%	33,7%
6	2,0%			0,2%		
9	21,2%			24,9%		
12	44,1%			55,8%		
14	61,7%			80,5%		
15	71,3%			94,3%		
16	81,5%			109,1%		
18	103,6%			142,3%		
22	156,4%			225,2%		

Source: research data processed, 2018
Information: A gray background indicates an unspecified rate of return according to length of school

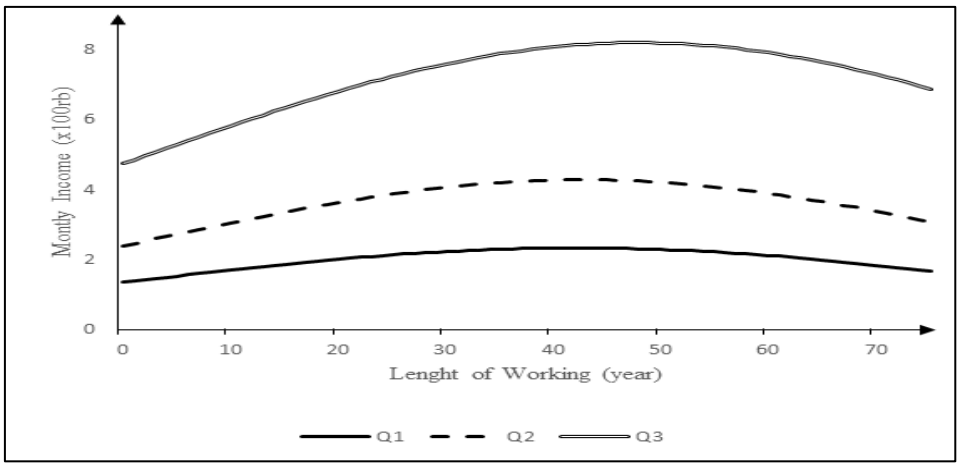
Appendix 9

Income curves versus years of service

a. WIR



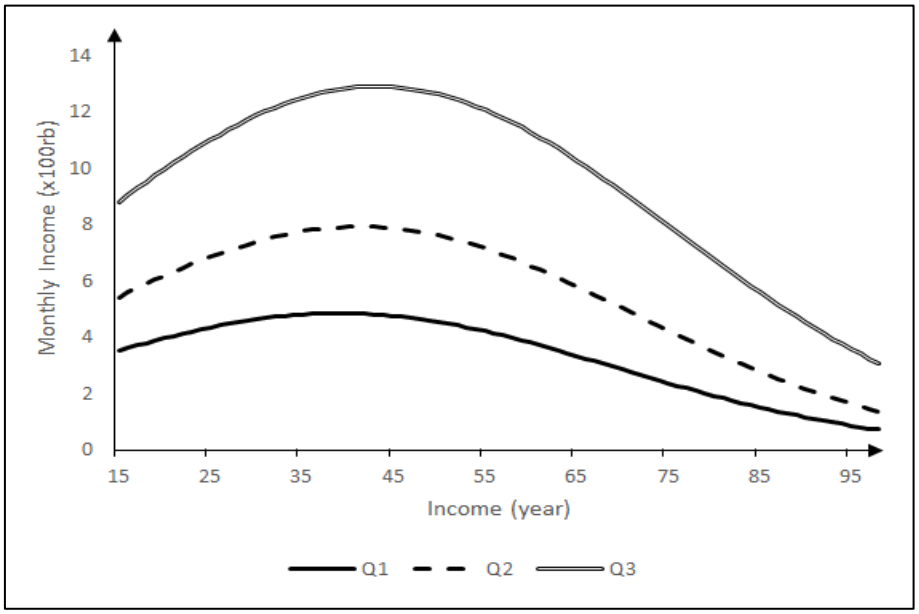
b. EIR



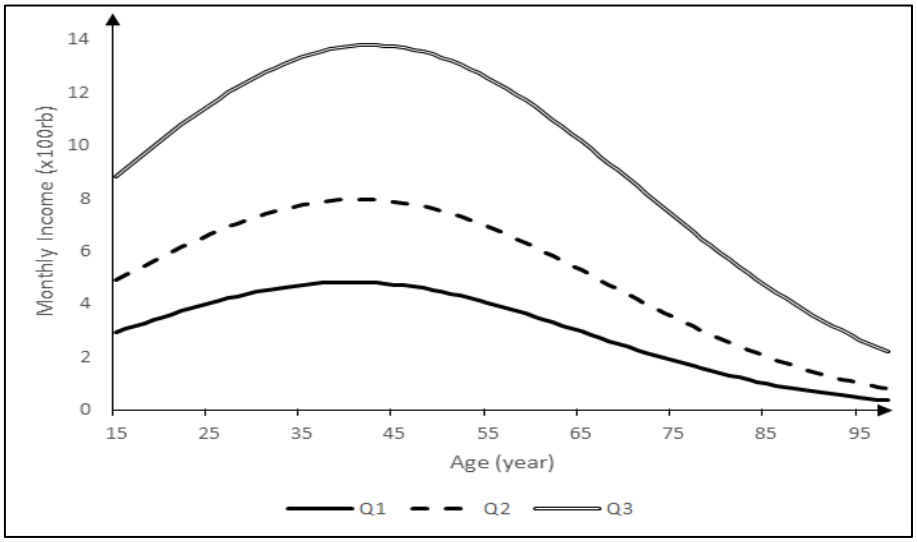
Appendix 10

Income curves versus age of workers

a. WIR



b. EIR



Appendix 11. Syntax R for calculating the value of Pseudo-R2 in each regression model

```
> library(readxl)
> kbi_kti <- read_excel("Artikel/kbi+kti.xlsx")
> attach(kbi_kti)
> x1kbi = cbind(sch,dVocXsch,dTrai,dTraiXsch,dTraiXdLowExp,
exp,exp2,age,age2)
> x2kbi = cbind(sch,dTrai,dTraiXdLowExp,exp,exp2,age,age2)
> x3kbi = x2kbi
> ykbi = cbind(lnPend)
> nilaiR2(ykbi,x1kbi,0.25)
[1] 0.1033432
> nilaiR2(ykbi,x2kbi,0.5)
[1] 0.1361168
> nilaiR2(ykbi,x3kbi,0.75)
[1] 0.1710498
> kti_kbi <- read_excel("Artikel/kti+kbi.xlsx")
> attach(kti_kbi)
> x1kti = cbind(sch,dTrai,dTraiXsch,dTraiXdLowExp,exp,exp2,age,age2)
> x2kti = cbind(sch,dTrai,dTraiXdLowExp,exp,exp2,age,age2)
> x3kti = x2kti
> ykti = cbind(lnPend)
> nilaiR2(ykti,x1kti,0.25)
```

```
[1] 0.1075132
> nilaiR2(ykti,x2kti,0.5)
[1] 0.1460449
> nilaiR2(ykti,x3kti,0.75)
[1] 0.1639689
```