

Electronic version of an article published as:

Citation:

MULYANINGSIH, T., MIRANTI, R., DALY, A., & Manning, C. (2019). Regional Skill Differentials: A Study of the Indonesian Labor Market. Singapore Economic Review, 1-22.

<https://doi.org/10.1142/S0217590819500371>

This file was downloaded from:

<https://researchprofiles.canberra.edu.au/en/publications/regional-skill-differentials-a-study-of-the-indonesian-labor-mark>

Copyright:

©2019 World Scientific Publishing Company.

Version:

This article was published in The Singapore Economic Review.

Journal URL: <https://www.worldscientific.com/worldscinet/ser>.

Changes resulting from the publishing process, such as editing, corrections, structural formatting, and other quality control mechanisms may not be reflected in this document.

Regional Skill Differentials: A Study of the Indonesian Labour¹

Tri Mulyaningsih

Universitas Sebelas Maret, Surakarta

Riyana Miranti

Institute of Governance and Policy Analysis, University of Canberra, Canberra

Anne Daly

University of Canberra, Canberra

Chris Manning

Australian National University, Canberra

Abstract

This study investigates the patterns and trends in the returns to skill in the Indonesian labour market over the period 2007 to 2013, a period of rising earnings and income inequality. The study takes into account the labour demand and supply across regional development regions and over time in order to document the evidence on the returns to skill related to structural changes in the economy through the growth of modern services and the resources boom. This study confirms that skill premiums are varied across regional development areas. The composition of industries across regions, the supply of tertiary-educated workers and factors unique to each region are all determinants of the regional skill premiums. The results support the policy focus on developing human capital in Indonesia to meet the rising demand for skilled workers and show the role of the manufacturing sector in reducing the skill premium.

Keywords : skill premium, supply and demand of labour, regional development area

JEL : I24 (Education and inequality), J01 (Labour Economics); J24 (Human capital; skills), J31 (Wage level and structure, wage differentials)

¹ We would like to extend an appreciation for support from the Indonesia Project Research Grant 2015/ 2016 of the Australian National University and all participants at the Workshop on Education, the Labour Market and Wage Inequality in Indonesia at the Institute for Governance and Policy Analysis (IGPA), University of Canberra and Indonesia Study Group, Australia National University organised at February 2016.

Regional Skill Differentials: A Study of the Indonesian Labour

INTRODUCTION

Earnings differentials, including differences between workers by level of education and training, gender, ethnicity and migrant status, have been the subject of extensive research by Labour Economists because they are important indicators of conditions in the labour market and how particular groups of workers are faring. They can be used to measure the returns to education and training or discrimination in the labour market. This paper focuses on one important differential, the determinants of earnings differentials between Indonesian workers with different levels of education in twelve broad regions of Indonesia classified by the economic characteristics of these regions.

The skill differential, that is the premium that workers with higher levels of education receive compared with those with low levels of education, is a labour market indicator of interest for a number of reasons. Firstly, it reflects the supply and demand for labour with different levels of human capital. On the demand side, there have been significant changes in the types of skills required by the workforce in industries where there has been a high level of technical change requiring knowledge of new technologies or computerisation and related to trade openness, globalisation and technological transfer from overseas (Acemoglu 2002, 2003, He 2012, He and Liu 2008, Krussell et al. 2000, Piketty 2015, Pavcnik 2000, Gindling and Robbins 2001) The influence of skill-biased technical change on the rising demand for skilled workers and the increasing returns to skill have been widely analysed with the discussion focusing on the importance of particular sectors and shifts within and between sectors (Haskel and Slaughter 2002). Features of an industry, for example the level of capital intensity, technical sophistication and the health risks may be reflected in workers' pay (Krueger and Summer 1986). Piketty (2015) also proposes that segregation of workers with different skills within the same industry (primary and secondary firms) contributes to the skill premium.

On the supply side, demographic change and increased educational opportunities have altered the composition of labour supply. Increasing years of schooling with the expansion of higher education, the changing age structure of the working population and levels of working experience have all impacted on the skill premium (Blau and Kahn 1996, He 2012, Leuven, Oosterbeek, and Van Ophem 2004). One of the most well documented supply-side changes took place in the US labour market in the 1970s when the return to university education fell

following the entry of the large baby boomer cohort to the labour market (Freeman 1976). Given the continuing growth in the number of university graduates over the past 30 years in many countries, the return to higher education might have been expected to fall if there were no offsetting changes in demand.

The skill differential is therefore an indicator of underlying demand and supply conditions for different types of skills. It will also reflect the institutional environment in which earnings are determined, for example, a binding minimum wage is likely to compress the earnings differential between skilled and unskilled workers. The skill differential provides important information for governments about the state of the labour market and the potential social benefits of further investment in education and for private individuals who are deciding whether or not to continue with further education.

The skill differential can also be used as an indicator of the level of economic development as workers move out of the traditional agricultural sector into the modern sector where higher levels of human capital are required. A study examining the Lewis turning point in the Indonesian labour market suggests that there was movement of workers from the traditional agriculture sector over a long period accompanied by an increase in agricultural wages (Manning and Purnagunawan 2016). In addition, there was an increase of workers employed in the formal sector especially in urban areas.

The size of the skill differential is expected to have an important effect on earnings inequality and therefore income inequality (Piketty 2014). In common with many other countries, Indonesia experienced rising earnings inequality over the period 2000-2013. In 2000, earnings at the 90th percentile of the wage distribution were 6.7 times those at the 10th percentile reaching a peak of 9.6 times in 2009 at the time of the Global Financial Crisis before falling back to eight times in 2013. As indicated in Figure 1, Indonesia has experienced rising wage and income inequality as measured by the Gini index (Miranti, Duncan, and Cassells 2014, Yusuf, Sumner, and Rum 2014, Manning and Miranti 2015), and this has provoked widespread concern among the public and policy makers. Increased expenditure on education has been one policy response and improving educational outcomes is a priority for the current government. Most analysis of earnings inequality and the skill differential has been undertaken at the national level. An innovation of this paper is the presentation of results on a regional basis. Indonesia is a geographically dispersed and culturally diverse country. Averages for the country as a whole hide wide variations in outcomes in individual geographical areas. The modern service sector, including the central government, and manufacturing have been concentrated in Java while mining, gas and oil,

and commercial cropping activities have been concentrated in Sumatera and Kalimantan. In the areas where traditional agriculture still dominates, there have been limited job opportunities and out migration to the more prosperous regions.

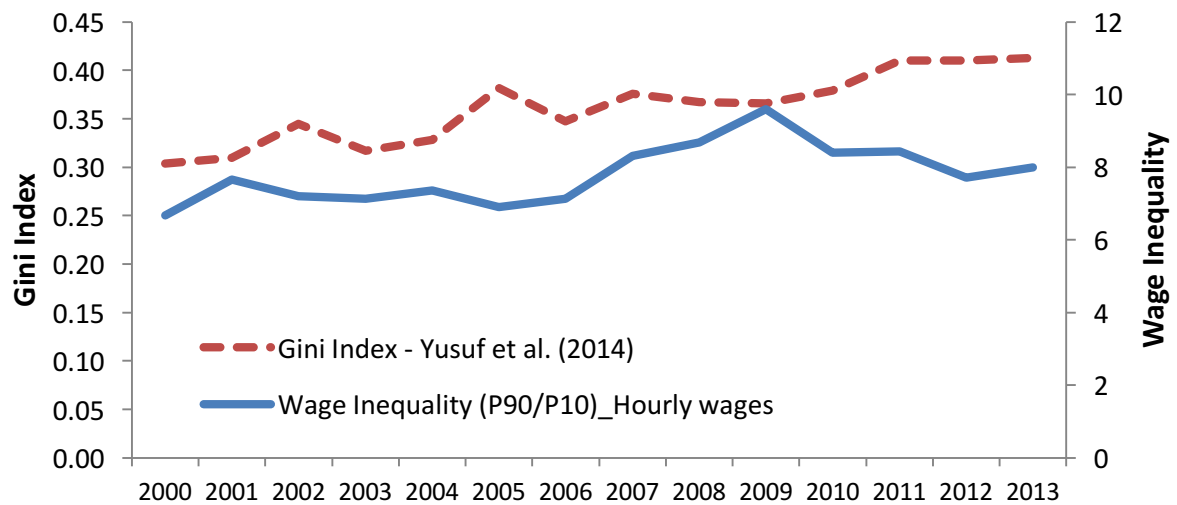


Figure 1. Income and Wages Inequality in Indonesia between 2007 and 2013
 Source: Yusuf, Sumner, and Rum (2014) and Sakernas Data 2000 – 2013, published by BPS.

While the Indonesian labour market as a whole has become more integrated over time, the degree to which the skill differential diverges between regional areas is a measure of the extent of this integration. In a world of costless migration, the skill differential would be expected to converge across regions towards the national average as workers moved to the areas where they could expect the highest returns to their labour. However, migration is not costless and the Indonesian archipelago is culturally and ethnically diverse. In some regions, the traditional agricultural sector remains of major importance while in other areas, notably Greater Jakarta, the presence of a modern service sector is more pronounced. In this paper therefore, modifying Manning (1998), a geographical classification based on the structure of regional product and employment is used. The classification divides the country into 12 regional development areas in three broad categories: modern-based, resource-based and traditional-based, aggregated from district level data.

Based on our classification, Indonesia is comprised of seven modern-based regions which are Greater Jakarta, Greater Bandung, Greater Semarang, Greater Surabaya, Java urban, Medan and Batam, and Greater Makasar; two resource-based regions; Sumatera mining, and Balikpapan and Samarinda in Kalimantan; and three traditional-based economies

in Java rural, Sumatera rural and the Other provinces of Indonesia (a full listing of the districts included in each Regional Development Area is presented in Appendix Table A).

While regional economies have become more integrated into the national economy over time, there have been some important increases in local autonomy following the demise of the Suharto regime. Many government functions have now been decentralised, particularly to the district level, following the passing of the Decentralisation Laws No. 22/1999 and 25/1999. For example, minimum wage regulations are now set at the district level. Other significant regionally-based factors likely to affect the skill differential include the expansion of the mining sector in particular areas.

Utilising SAKERNAS (the National Labour Force Survey data), this study uses panel data on the regional skill differential to address two research questions: What are the determinants of the skill premium in Indonesia? Second, do regional factors play a role in determining the skill differential?

The outline of the article is as follows. Following the Introduction, the article discusses some literature and background to the issue of regional skill differentials in Indonesia. The third section examines patterns of skill premium across different regional areas. Finally, the fourth section investigates empirically the determinants of the skill premium. The paper concludes with the discussion of the lessons learned and policy implications.

BACKGROUND TO THE SKILL DIFFERENTIAL IN INDONESIA

Indonesia has been successful in increasing access to primary education and lower-secondary education and there has been a substantial expansion of funding for education. The government subsidises fees for children enrolled in primary and lower-secondary school. Increased completion rates for lower-secondary education have been achieved in most regions in Indonesia, narrowing the gaps in lower secondary completion rates between urban and rural; the poorest and richest; and lowest and highest performing regions (Tobias et al. 2014). However, the budget allocation for higher education is still behind other countries in Southeast Asia. Data from the World Bank (2013) shows that the share of GDP invested in higher education in Indonesia was 0.73 per cent in 2010, much lower than those of neighbouring countries including Malaysia at 1.73 per cent, Thailand at 1.07 per cent, and Vietnam at 2.4 per cent.

In terms of enrolment in tertiary level education (defined here as those enrolling in bachelor degree or above), the latest UNESCO data shows that Indonesia has been improving

its performance by more than doubling its Gross Enrolment Ratio (GER) from only 14.2 per cent in 2001 to 31.3 per cent in 2013, an average of 21.4 per cent during 2001-2013. Nevertheless, this figure is still below those of Malaysia at 32.8 per cent, the Philippines at 29.7 per cent and Thailand at 46.8 per cent during the same period.

THE SKILL PREMIUM AND ITS DETERMINANTS

These changes in the average educational levels of the workforce might be expected to change the returns to education. A study of returns to education in Indonesia conducted by Purnastuti, Miller, and Salim (2013, 231) concludes that the return to education for senior high school graduates declined between 1993 and 2007-2008 but that for a university degree rose. The unemployment rate among labour with tertiary education also lowered significantly signalling an increase in demand for their labour (International Labour Organization 2013).

Lee and Wie (2013) have also investigated the existence of a skill premium in the Indonesian labour market. Based on the National Labour Force Survey (SAKERNAS) data, the share of educated workers and their wage premium in the Indonesian labour market increased significantly over the period 2003-2009. Consistent with Purnastuti, Miller, and Salim (2013), the study finds high returns to a university degree and that this was a source of rising wage inequality. Applying the supply-demand framework of Katz and Murphy (1991), Lee and Wie (2013) suggest that the existence of income inequalities for the period 1998 – 2005 in the Indonesian labour market have been explained by major shifts in the demand for labour and the trend of increasing supply of labour with tertiary qualifications.

These results are similar to those estimated in a large World Bank study of the returns to schooling in 139 countries by Montenegro and Patrinos (2014). The authors also note the negative impact of increasing levels of education on the returns to education. More specifically for Indonesia, they estimate the private return to an additional year of secondary schooling fell from 11.1 per cent to 10 percent between 1998 and 2010 and for tertiary education from 13.4 per cent to 11.5 per cent. These results for tertiary education therefore differ from the Indonesia-specific studies reported above, perhaps reflecting the use of different time periods in the studies.

There is an extensive literature examining returns to additional schooling and reasons why they have changed over time in a wide range of countries. It reflects conditions on both the demand and supply sides of the labour market. Results show that there has been an

increase in the relative demand for skilled labour which has accompanied the growth in the supply of skilled labour.

Although still limited, previous studies have also discussed the issue of regional disparities in the skill premium (Whalley and Xing 2014). Whalley and Xing (2014) have found that in the case of China, the degree of openness of the region and the size of the public sector from the demand side and working experience from the supply side explained the existence of varying skill premia in China.

INDONESIAN REGIONAL ECONOMIES

Previous literature has discussed ways to classify regions in Indonesia to take into account the diversity in regional economies. The simplest way is to classify regions in Indonesia into West and East Indonesia. Hill (1989) proposed a more sophisticated method in classifying regions (here provinces) according to geographical location, natural resource endowment and population density of the provinces. Further, Manning's (1998) grouping of the areas (provinces) is a combination of factors relevant to both labour supply and demand. Both Hill (1989) and Manning (1998) classified regions based on the provincial levels. In this paper, we go further than the previous literature to classify districts into three broad groups mainly based on their natural resource endowment and the dominant sector of employment in that district in order to focus on the labour market.

As outlined earlier, regions are classified into three broad groups of rural-based, mining-based and modern-based economies. Rural-based regions relied on the agricultural sector with at least 40 percent of employment in agriculture. There are three regions classified as rural; rural Java, rural Sumatera, and Other (see Table 1).

The second group of regions is those where the proportion of workers working in the mining sector is higher than 1 percent and mining contributes substantially to regional income (see Table 1); Pekanbaru, Natuna, Dumai (in Sumatera) and Balikpapan and Samarinda (in East Kalimantan). Mining is a relatively capital intensive industry, thus the capacity to absorb labour is not as strong as in agriculture and the manufacturing sector.

The third group is the modern-based economy that covers regions such as Greater Jakarta, Greater Bandung, Greater Semarang, Greater Surabaya, Java urban, Medan and Batam, and Greater Makassar. Table 1 shows that there has been a shift in these regions away from agriculture to the modern economy where manufacturing and services play more significant roles, accounting for more than 20 per cent of employment. The proportion of paid

workers in the manufacturing sector in the modern-based economy was more than 20 percent except for Greater Semarang and Greater Makassar. In addition, the contribution of high-skilled services such as communication, finance and professional in the modern based economy has been substantial (Buera and Kaboski 2012). The more prominent role of high-skilled services is apparent for Greater Jakarta, Java urban and Greater Makassar with more than 15 percent workers in these regions employed in these services.

Table 1. The Distribution of Workers across Sectors

Regional Development Area	Agriculture (%)	Mining (%)	Manufacturing (%)	High-skilled services** (%)	Communication (%)	Finance (%)	Professional*** (%)
Modern based economy*							
Greater Jakarta	2.85	0.37	21.85	15.63	1.37	2.86	11.41
Greater Bandung	15.69	0.12	26.09	9.83	0.83	0.88	8.12
Greater Semarang	33.80	0.32	15.23	8.87	0.47	1.23	7.17
Greater Surabaya	7.28	0.19	25.85	11.87	0.95	1.70	9.22
Java urban	5.11	0.17	18.43	15.99	1.03	2.01	12.96
Medan and Batam	4.23	0.31	20.73	13.67	1.03	2.26	10.38
Greater Makassar	24.37	0.62	8.01	16.23	0.91	1.60	13.72
Mining based economy							
Sumateran Mining	9.38	1.11	7.61	19.55	1.02	2.24	16.29
Balikpapan and Samarinda	7.12	6.40	9.10	16.05	1.06	1.86	13.13
Rural based economy							
Java rural	40.29	0.80	14.58	7.26	0.32	0.58	6.36
Sumateran Rural	51.83	1.45	6.33	9.62	0.30	0.54	8.78
Others (rest of Indonesia)	52.30	0.23	6.39	10.59	0.27	0.72	9.60

* Modern sector covers manufacturing and modern services

** High-skilled services is the sum of the final three columns; communication, finance and professional

*** Professional includes computer consulting, research and development, legal and accounting consulting, advertising, public servant, foreign affairs, defence and security, education, health, media and international agency.

The classification of regions into the three groups is not always clear cut. Some areas classified as modern-based regions still have quite a large proportion of workers in the agriculture sector, for example Greater Semarang with 33.8 percent, Greater Makassar, 24 percent and Greater Bandung 15.7 percent. Further, the emergence of high-skilled services is also observed in the mining-based regions. In areas of Pekanbaru, Dumai and Natuna, coded under Sumateran mining, the proportion of paid-workers employed in high-skilled -services is close to 20 percent. The rich resource regions in East Kalimantan such as Balikpapan and

Samarinda also have a high proportion of workers employed in high-skilled services.

Table 2 summarises a key variable for this study, the changing educational composition of the workforce aged above 15 years old in each of the Regional Development Areas. Following previous literature in this area (Becker 1975), skill is measured here by education background, assuming that higher education corresponds with higher skill and unskilled workers are defined as those with a basic education of primary school or below. The intermediate group includes workers with higher-secondary education (Senior High School), Diploma I and Diploma II. The most skilled workers are those with tertiary education, defined to have at least a Diploma III. It shows that in all the Areas the share of workers with Higher-Secondary, DI or DII (cols 3 and 4) and a tertiary degree, DIII and above (cols 5 and 6) increased between 2007 and 2013. In five areas in 2013, Greater Jakarta, Java Urban, Medan and Batam, Sumateran Mining and Balikpapan and Samarinda, 16 to 18 per cent of workers had a tertiary degree, DIII and above. In contrast, in six areas the share of these skilled workers was below ten per cent; Greater Bandung, Greater Semarang, Java Rural, Sumateran Rural, Greater Makassar and Others. At the other end of the educational spectrum, while the share of workers who had only completed Primary School or below fell in all areas except Greater Makassar, it remained above 50 per cent of the workforce in Java Rural, Greater Makassar and Others. The result for Greater Makassar may be explained by the migration of low skilled workers from the outer islands into the area.

Table 2. The Educational Background of Workers across Regional Development Areas in 2007 and 2013 (%)

Proportion of workers based on their educational background	Primary School and below		Higher-Secondary/ DI/ DII		Tertiary degree DIII and above	
	2007	2013	2007	2013	2007	2013
	1	2	3	4	5	6
Modern based economy						
Greater Jakarta	32.25%	21.42%	35.38%	43.90%	11.97%	17.14%
Greater Bandung	49.47%	47.51%	23.55%	25.01%	7.15%	6.32%
Greater Semarang	57.26%	46.32%	18.79%	25.37%	6.03%	8.16%
Greater Surabaya	35.25%	22.95%	34.25%	44.00%	9.89%	14.32%
Java Urban	37.66%	26.90%	31.55%	38.77%	12.51%	16.05%
Medan and Batam	24.34%	15.05%	44.59%	51.37%	11.34%	18.51%
Greater Makassar	39.75%	52.41%	33.23%	23.78%	9.69%	9.05%
Mining based economy						
Sumateran Mining	28.24%	21.78%	40.35%	43.79%	11.93%	18.26%
Balikpapan & Samarinda	27.32%	19.86%	43.60%	46.27%	10.04%	17.59%
Rural based economy						
Java Rural	66.63%	58.55%	13.25%	18.43%	3.02%	4.82%
Sumateran Rural	52.78%	42.14%	21.46%	28.19%	4.05%	8.15%
Others	58.67%	50.92%	19.11%	24.23%	3.92%	9.01%
Indonesia (Total)	56.53%	47.09%	19.82%	26.09%	4.90%	8.41%

Note: Workers are those who worked in the past one week.

Source: Indonesia Labour Force Survey, various years

MEASUREMENT OF THE SKILL PREMIUM AND ITS PATTERNS ACROSS REGIONAL DEVELOPMENT AREAS

This study is based on data from the National Labour Survey (SAKERNAS) published by the Indonesian Bureau of Statistics (BPS) for the period 2007 to 2013. BPS increased the size of the SAKERNAS sample in 2007 so the data is representative at the district level. Wage and salary employment, both full time employees and casual workers covering around 40 per cent from the total workforce are included here. The self-employed are excluded from the dataset because their labour income is unobserved (Mehta and Mohr 2012).

Three measures of the skill premium are used. Premium 1 compares the median earnings of those who have completed high school with those with primary education

Premium 2 is the ratio of the median earnings of tertiary graduates (Diploma III and above) to those with primary education. Finally, Premium 3 is the ratio of the median earnings of tertiary and high school graduates.

Figure 1 below shows the national average for each of the premia over the period. Premium 2 is the highest compared to premium 1 and premium 3. On average, between 2007 and 2013, tertiary educated workers earned 3.32 times that of unskilled ones. Moreover, tertiary educated workers received returns 2.25 times more than workers with higher-secondary education. There was a small and constant premium of 1.47 for completing high school compared to primary school.

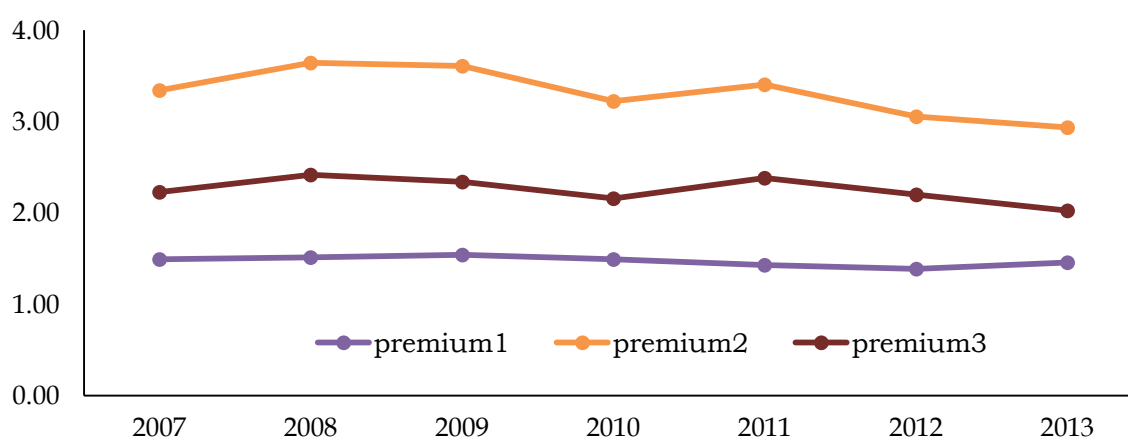


Figure 1. Skill Premium in National Level 2007 – 2013

Source: Indonesia Labour Force Survey, various years

Note: Premium1 is the ratio of median wages of workers with Senior High School/DI/DII to workers with Primary school and below. Premium2 is the ratio of median wages of workers with Tertiary degree (DIII/S1/S2/S3) to workers with Primary school and below. Premium3 is the ratio of median wages of workers with Tertiary degree (DIII/S1/S2/S3) to workers with Senior High School/DI/DII.

As discussed earlier, we have developed a geographical classification based on the characteristics of the regions at the district level which then are aggregated into 12 regional areas. Table 3 presents the mean value of the three skill premia by region. It shows that premium 1 had the lowest variation between regions from a minimum of 1.32 in Greater Surabaya to a maximum of 1.81 in Greater Jakarta. The variation in premium 2 between tertiary and primary educated workers was the largest, ranging from 4.14 in Greater Bandung to 2.52 in Greater Surabaya.

Table 3. Means of Skill Premium across Regional Development Area 2007 – 2013

Regional Development Area	Premium 1	Premium 2	Premium 3
Modern based economy			
Greater Jakarta	1.81	3.85	2.13
Greater Bandung	1.71	4.14	2.42
Greater Semarang	1.38	3.17	2.29
Greater Surabaya	1.32	2.52	1.91
Urban Java	1.42	3.84	2.72
Medan and Batam	1.38	2.82	2.05
Greater Makassar	1.39	3.48	2.50
Mining based economy			
Sumateran Mining	1.33	3.09	2.32
Balikpapan and Samarinda	1.43	2.67	1.87
Rural based economy			
Java Rural	1.50	4.02	2.68
Sumatera Rural	1.36	2.88	2.11
Others	1.65	3.31	2.02
Total	1.47	3.32	2.25

Source: Indonesia Labour Force Survey, various years

As a further illustration of the regional differences, Figure 2 presents the skill premium by region for the most skilled compared with the unskilled. Greater Jakarta, Greater Bandung, rural and urban Java, Greater Makassar and Other had premia above the national average for skilled workers with tertiary education. This group included both modern-based and rural regions.

Meanwhile, skilled workers in Greater Surabaya, Medan and Batam, Sumateran Rural and resource-based areas in Kalimantan such as Balikpapan and Samarinda enjoyed lower premia than the national figures. It is interesting that modern-based regions such as Greater Surabaya, Medan and Batam offered lower premia for skilled-workers than the national level.

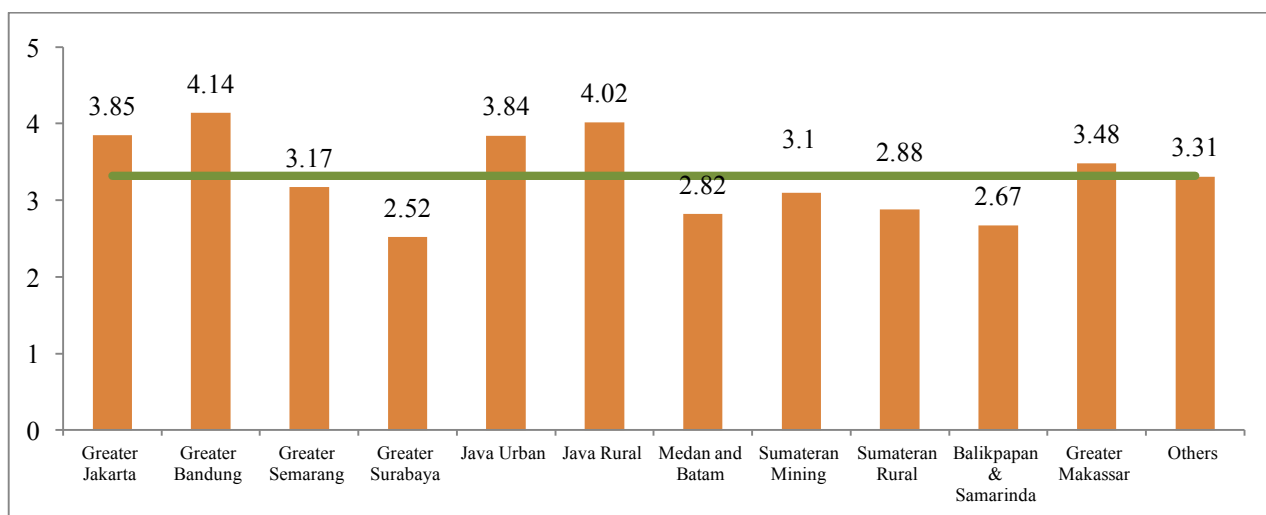


Figure 2. Skill Premium 2 across Regional Development Areas 2007 – 2013

Source: Indonesia Labour Force Survey, various years

Note: *Premium2* is the ratio of median wages of workers with Tertiary degree (DIII/S1/S2/S3) to workers with Primary school and below. The green line is the national average of skill premium 2 between 2007 and 2013. The means is 3.32.

DETERMINANTS OF THE SKILL PREMIUM

This paper aims to examine the role of supply and demand characteristics for labour across regional development areas on skill premium. The characteristics of supply of labour are the proportion of workers with tertiary degree (tertiary), the proportion of workers with basic education of primary school and lower (primary), the proportion of female workers (female) and the proportion of casual workers (casual). The proportion of casual workers representing job insecurity in each region where casual workers are non-permanent workers that worked for more than one employer in the last one month (see Appendix Table B).

Further, the characteristics of demand for labour are represented by the proportion of workers employed in the manufacturing sector (manufacture), the mining sector (mining) and those with managerial positions (managerial). In addition, the characteristics of each region is captured by regional fixed effects which refer to the 12 regional development areas as discussed earlier.

The first set of results reported here looks at the determinants of the skill premium in Indonesia across regions between 2007 and 2013 using the fixed-effect approach for panel data. This method is preferred because fixed-effects take into account the different characteristics of each regional development area in Indonesia. When other determinants are included, panel data estimation should also minimise the multicollinearity problem where there is

one (see Appendix Table C). As there is a high correlation between the variables Tertiary and High-skilled services, the latter variable has not been included in the regressions based on the rule-of-thumb that where the correlation exceeds 0.8 one variable should be omitted (Griffiths, Hill, and Judge 1993). Estimation of each measure of the skill premium is conducted separately using the same subset of explanatory variables. Regional differences are captured by the constants in the equation. Therefore, the model is capable of absorbing the heterogeneity across regional development areas whether they are modern-based; resource-based or traditional-based economies.

$$Premium1_{it} = \beta_0 + \beta_1 \cdot Primary_{it} + \beta_2 \cdot Female_{it} + \beta_3 \cdot Managerial_{it} + \beta_4 \cdot Manufacture_{it} + \beta_5 \cdot Mining_{it} + \beta_6 \cdot Casual_{it} + \varepsilon_{it} \quad \text{Equation 1}$$

$$Premium2,3_{it} = \beta_0 + \beta_1 \cdot Tertiary_{it} + \beta_2 \cdot Female_{it} + \beta_3 \cdot Managerial_{it} + \beta_4 \cdot Manufacture_{it} + \beta_5 \cdot Mining_{it} + \beta_6 \cdot Casual_{it} + \varepsilon_{it} \quad \text{Equation 2}$$

Please see again Table B on the definition of the Variables in the Appendix

As reported in Table 4, there are substantial differences between regions in the composition of the workforce as measured by the explanatory variables.

Table 4. Descriptive Statistics of Skill Premium and the Determinants of Skill Premium

Variable	Obs.	Mean	Std. Dev.	Min	Max
Premium1	84	1.47	0.20	1.17	2.00
Premium2	84	3.32	0.64	2.10	4.73
Premium3	84	2.25	0.34	1.59	3.07
Female	84	0.37	0.04	0.30	0.44
Primary	84	0.38	0.15	0.14	0.67
Tertiary	84	0.10	0.04	0.03	0.19
Casual	84	0.07	0.04	0.02	0.17
Managerial	84	0.14	0.034	0.08	0.22
Manufacture	84	0.15	0.074	0.058	0.29
Mining	84	0.012	0.017	0.0006	0.081

Source: Authors' estimations

There is a risk of reverse causality especially between education and the skill premium where highly educated workers have a tendency to move to regions with a higher skill premium for example Greater Jakarta. In addition, the endogeneity issue may arise due to omitted variables explaining the skill premium. This study manages the endogeneity issue by

incorporating the two stage least squares method using the instrumental variable approach. As we also include the regional development areas as the regional fixed effects, we use 2SLS Fixed Effects (FE). Following Reed (2014), this study employs the lag of its endogenous variable of tertiary as an instrumental variable. Results show lag four of tertiary is an appropriate instrument for tertiary². Meanwhile, primary is an exogenous variable as shown by the endogeneity test.

Table 5 presents the results and the discussion will focus on the 2SLS FE results. Regarding supply characteristics, the proportion of tertiary-educated labour as a measure of the relative supply of skilled workers in each region has a negative and statistically significant influence on skill premium 2 and 3. This is consistent with the literature that an increased supply of skilled labour contributes to a lower premium for tertiary educated workers. All estimations confirmed that a higher proportion of female workers contributes to a higher skill premium but is only statistically significant in 2SLS FE estimation of skill premium 3. Other characteristics of the proportion of managerial and casual workers have a positive influence on the skill premium however they are not statistically significant.

The demand characteristics are substantial in understanding the skill premium across regional development areas in Indonesia. The estimations reveal that a higher proportion of workers employed in the manufacture sector lowers skill premium 2 and 3. The Indonesian manufacturing sector is dominated by labour-intensive industries such as textile and garments, footwear, and food and beverages. The results suggest that the significant numbers of unskilled workers in the manufacturing industry are paid a premium over workers outside the sector, perhaps in compliance with minimum wages regulations. Meanwhile, the estimations show that the mining sector contributes to the skill premium positively but is only significant for premium 3. The mining sector is a technology intensive industry so it demands skilled labour to work with the investment in specific technology or technology transfer from overseas. Once these factors have been taken into account, the results show that the skill differential was largest in Jakarta (all the regional dummies have negative coefficients). Holding everything else constant, the largest negative regional coefficients in the Premium 2 2SLS FE model (Table 3 Col. 4) were for the modern region Greater Semarang, the mining region of Balikpapan and Samarinda and the rural regions of Java Rural and Others. There is therefore not a general result that the differentials were largest in one type of region compared to the other two types.

² The complete results of endogeneity test is available upon request to the authors.

Table 5. Estimations of the Determinants of Skill Premium,2007-2013

	Premium 1		Premium 2		Premium 3	
	Fixed- Effect (FE) Coef.	Two stage	Fixed- Effect (FE) Coef.	Two stage	Fixed- Effect (FE) Coef.	Two stage
		Least Square (2SLS FE) Coef.		Least Square (2SLS FE) Coef.		Least Square (2SLS FE) Coef.
Primary/ Tertiary ³	0.46 (0.30)	1.80 (1.75)	-5.97** (2.39)	-16.71*** (5.72)	-2.40 (1.51)	-11.21*** (4.30)
Female	-0.55 (1.24)	0.26 (1.82)	3.74 (4.65)	6.59 (4.61)	3.52 (2.57)	5.86** (2.64)
Managerial	0.61 (0.94)	0.61 (0.91)	3.99 (2.57)	4.44 (2.94)	1.68 (1.41)	2.05 (1.90)
Manufacture	0.25 (1.11)	1.15 (1.52)	-5.54* (2.94)	-5.74** (2.86)	-3.22** (1.35)	-3.38** (1.82)
Mining	-0.33 (4.16)	2.95 (5.25)	5.05 (10.06)	20.20 (12.31)	3.51 (5.27)	15.94** (6.82)
Casual	-1.04 (1.10)	-0.61 (1.17)	-0.46 (3.31)	2.15 (3.96)	1.31 (1.67)	3.45 (2.89)
_cons	1.79*** (0.52)	0.94 (1.33)	4.08** (1.78)	4.48*** (1.76)	1.66* (0.97)	2.13*** (0.91)
Regional Development Area (Greater Jakarta as a base)						
Greater Bandung	-0.11 (0.21)	-0.45 (0.45)	0.37 (0.48)	-0.64 (0.76)	0.30 (0.21)	0.53 (0.52)
Greater Semarang	-0.39** (0.16)	-0.77 (0.50)	-1.61*** (0.57)	-2.80*** (0.71)	-0.54* (0.31)	-1.52*** (0.54)
Greater Surabaya	-0.46*** (0.11)	-0.56*** (0.16)	-1.33*** (0.32)	-1.76*** (0.37)	-0.28* (0.14)	-0.63*** (0.22)
Java urban	-0.37*** (0.09)	-0.46*** (0.15)	-0.51 (0.35)	-0.75** (0.33)	0.20 (0.21)	0.006 (0.22)
Java rural	-0.29 (0.21)	-0.81 (0.68)	-0.84 (0.59)	-2.47*** (0.95)	-0.19 (0.32)	-1.53** (0.73)
Medan Batam	-0.37** (0.08)	-0.26 (0.18)	-1.17*** (0.48)	-1.30*** (0.24)	-0.18* (0.09)	-0.28** (0.12)
Sumateran Mining	-0.45** (0.18)	-0.36* (0.22)	-1.69*** (0.48)	-1.88*** (0.49)	-0.35 (0.22)	-0.50 (0.31)
Sumateran Rural	-0.46** (0.20)	-0.68* (0.32)	-2.53*** (0.62)	-3.83*** (0.83)	-0.91*** (0.32)	-1.98*** (0.59)
Balikpapan and Samarinda	-0.36 (0.27)	-0.38 (0.24)	-2.28*** (0.75)	-3.24*** (0.91)	-0.85** (0.40)	-1.64*** (0.52)
Greater Makassar	-0.44** (0.17)	-0.53*** (0.18)	-1.44*** (0.49)	-1.79*** (0.48)	-0.25 (0.24)	-0.54* (0.30)
Others	-0.24 (0.22)	-0.60 (0.50)	-2.34*** (0.71)	-3.81*** (0.95)	-1.14*** (0.38)	-2.34*** (0.64)
Observation	84	84	84	84	84	84
R ²	0.63	0.57	0.73	0.67	0.64	0.48

Source: Authors' estimations

Note: *** is significant at 1%; ** is significant at 5% and * is significant at 10%

³Primary is employed as one of explanatory variables to estimate the determinants of skill premium 1. Meanwhile, the tertiary is chosen to be one of explanatory variable to estimate the determinants of skill premium 2 and 3.

CONCLUSION AND POLICY IMPLICATION

This study has focused on a component of the distribution of income; the distribution of earnings from employment using seven waves of National Labour Force Survey (SAKERNAS) data. It aims to examine the determinants of the skill premium during the recent period when earnings and income inequality have been increasing (2007-2013). There are two main contributions of this study to the previous literature. The first is to provide new up-to-date evidence on how people with different levels of qualifications are performing in regional labour markets in Indonesia using the most recent data. The second is the development and the inclusion of characteristics of regional labour markets as the factors influencing the skill premium. These results show that for each of the measures of the skill differential, there were significantly different regional effects on that differential holding everything else constant.

Our results show that both supply and demand factors have significant impacts on the skill premium. Focusing on the results of the skill premium between workers with the highest education level, i.e. for those workers with Tertiary degree (DIII and above) to workers with either primary education (premium 2) or high school education (premium 3), the findings show that the supply of tertiary educated workers was negatively and statistically significantly associated with the size of the skill premium. The size of the manufacturing sector had a significant role in dampening wider wage differentials between tertiary graduates and primary and high school graduates. The proportion of females in the workforce in each region was associated with a larger skill differential although this was only significant for premium 3. The size of the mining sector had a significant and positive correlation with the skill differential between tertiary and high school graduates.

In terms of regional differentials, most of regional coefficients were negative compared to Greater Jakarta, although the coefficients were not always statistically significant. The region for which there was no statistically significant difference to Jakarta for premiums 2 and 3 was the modern region of Greater Bandung and for premium 3, Java Urban (Modern) and Sumateran Mining (Mining).

What are the policy implications of these findings? The current policy agenda has focused much on lowering the level of income inequality particularly through fiscal policy (e.g. removal of inequitable subsidies and a strong push to achieve higher collection of tax revenue). Our study has provided evidence that policy should also look at the skill premium issue and the interplay between the labour market and the educational sector. There are

several policy implications. Human capital investment and widening access to higher education, not only through more effective and productive social spending in the area of education, is important, but also potentially by partnerships between educational institutions and regional industry. For the latter, in the context of decentralisation, initiatives to design a flexible higher education program to meet the needs of local industries could be useful. The results also point to the importance of the manufacturing sector in supplying job opportunities for people who have not completed tertiary education. The positive (though only significant in Premium 3) effect of female participation in the workforce also suggests that a further investigation of the role of women in the Indonesian labour force and the associated pay structure would be worthwhile.

REFERENCE

- Acemoglu, Daron. 2002. "Directed Technical Change." *Review of Economic Studies* 69:781-809.
- Acemoglu, Daron. 2003. "Patterns of Skill Premia." *Review of Economic Studies* 70:199-230.
- Becker, Gary S. 1975. "Investment in Human Capital: Effects on Earnings." In *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, edited by Gary S Becker. Cambridge: the National Bureau of Economic Research.
- Blau, Francine D., and Lawrence M. Kahn. 1996. "Wage Structure and Gender Earnings Differentials: An International Comparison." *Economica* 63 (250):S29-S62.
- Buera, Francisco J., and Josept P. Kaboski. 2012. "The Rise of the Service Economy." *American Economic Review* 102 (6):2540-2569.
- Freeman, Richard B. 1976. *The Overeducated American*. New York: Academic Press.
- Gindling, T. H., and Donald Robbins. 2001. "Patterns and Sources of Changing Wage Inequality in Chile and Costa Rica During Structural Adjustment." *World Development* 29 (4):725-745.
- Griffiths, W. E, R. Carter Hill, and George G. Judge. 1993. *Learning and Practicing Econometrics*. United States: Wiley.
- Haskel, Jonathan E., and Matthew J. Slaughter. 2002. "Does the Sector Bias of Skill-Biased Technical Change Explain Changing Skill Premia? ." *European Economic Review* 46:1757-1783.
- He, Hui. 2012. "What drives the skill premium: Technological change or demographic variation?" *European Economic Review* 56 (8):1546-1572. doi: <http://dx.doi.org/10.1016/j.eurocorev.2012.09.005>.
- He, Hui, and Zheng Liu. 2008. "Investment-Specific Technology Change, Skill Accumulation, and Wage Inequality." *Review of Economic Dynamics* 11:314-334.
- International Labour Organization. 2013. *Global Employment Trends for Youth 2013: A generation at risk*. Geneva: ILO.
- Katz, Lawrence F, and Kevin M Murphy. 1991. "Changes in Relative Wages, 1963-1987: Supply and Demand Factors." *NBER Working Papers Series* 3927.
- Krueger, Allan B., and Lawrence H. Summer. 1986. "Efficiency Wages and the Wage Structure." *NBER Working Papers Series* 1952.
- Krussell, Per, Lee E. Ohanian, Jose-Victor Rios-Rull, and Giovanni L. Violante. 2000. "Capital-Skill Complementarity and Inequality: A Macroeconomic Analysis." *Econometrica* 68 (5):1029-1053.
- Lee, Jong Wha, and Dainn Wie. 2013. *Technological Change, Skill Demand, and Wage Inequality in Indonesia*. In *ADB Economics Working Paper Series*. Manila: Asian Development Bank.
- Leuven, Edwin, Hessel Oosterbeek, and Hans Van Ophem. 2004. "Explaining International Differences in Male Skill Wage Differentials by Differences in Demand and Supply of Skill." *The Economic Journal* 114:466-486.
- Manning, Chris. 1998. *Indonesian Labour in Transition: An East Asian Success Story?* Cambridge: Cambridge University Press.
- Manning, Chris, and Riyana Miranti, eds. 2015. *The Yudhoyono Legacy on Jobs, Poverty and Income Distribution: A Mixed Record' in The Yudhoyono Years: An Assessment* Edited by E Aspinall, M Mietzner and D Tomsa. Singapore: Institute of Southeast Asian Studies.
- Manning, Chris, and Muhammad Purnagunawan. 2016. "Has Indonesia Passed the Lewis Turning Point and Does it Matter?" In *Managing Globalization in the Asian Century:*

- Essays in Honour of Prema-Chandra Athukorala*, edited by Hal Hill and Jayant Menon. Singapore: ISEAS-Yusof Ishak Institute.
- Mehta, A., and B. A. Mohr. 2012. "Economic Liberalization and Rising College Premiums in Mexico: A Reinterpretation." *World Development* 40:1908-1920. doi: 10.1016/j.worlddev.2012.04.007.
- Miranti, Riyana, Alan Duncan, and Rebecca Cassells. 2014. "Revisiting the impact of consumption growth and inequality on poverty in Indonesia during decentralisation." *Bulletin of Indonesian Economic Studies* 50 (3):461-82.
- Montenegro, Claudio E., and Harry Anthony Patrinos. 2014. Comparable estimates of returns to schooling around the world. *Policy Research working paper* WPS 7020.
- Pavcnik, N. 2000. "What explains skill upgrading in less developed countries?" *Journal of Development Economics* 71 (2):311-328.
- Piketty, Thomas. 2014. *Capital in the Twenty First-Century*. Cambridge: Harvard University Press.
- Piketty, Thomas. 2015. *The Economics of Inequality*. Cambridge: Harvard University Press.
- Purnastuti, Losina, Paul W. Miller, and Ruhul Salim. 2013. "Declining rates of return to education: evidence for Indonesia." *Bulletin of Indonesian Economic Studies* 49 (2):213-236. doi: 10.1080/00074918.2013.809842.
- Reed, W. Robert. 2014. "On the Practice of Lagging Variables to Avoid Simultaneity." *Working Paper of the Department of Economics and Finance, University of Canterbury* 18:1-14.
- Tobias, Julia, Joseph Wales, Ekki Syamsulhakim, and Suharti. 2014. *Towards Better Education Quality: Indonesia's Promising Path*. London: Overseas Development Institute.
- Whalley, John, and Chunbing Xing. 2014. "The regional distribution of skill premia in urban China: Implications for growth and inequality." *International Labour Review* 153 (3):395-419.
- World Bank. 2013. *Spending more or spending better: Improving education financing in Indonesia*. Jakarta: World Bank.
- Yusuf, Arief Anshory, Andy Sumner, and Irlan Adiyatma Rum. 2014. "Twenty years of expenditure inequality in Indonesia, 1993-2013." *Bulletin of Indonesian Economic Studies* 50 (2):243-54.

APPENDIX

Table A. Regional Development Area Classification

Code	Regional Development	Districts	Classification
1	Greater Jakarta	Central Jakarta, West Jakarta, East Jakarta, South Jakarta, North Jakarta, Bogor, Depok, Tangerang, Bekasi	Modern-based
2	Greater Bandung	Bandung Municipality, Bandung Regency, West Bandung Regency, Cimahi, East Bogor Regency and Purwarkarta Regency	Modern-based
3	Greater Semarang	Semarang Municipality and Semarang Regency, Salatiga, Kendal, Grobogan Regency, and Demak Regency	Modern-based
4	Greater Surabaya	Surabaya Municipality, Gresik Regency and Sidoarjo Regency	Modern-based
5	Java urban	Rest of Municipality in Java	Modern-based
6	Java rural	Rest of Regency in Java	Traditional-based
7	Medan and Batam	Medan and Batam	Modern-based
8	Sumateran mining	Pekanbaru, Natuna and Dumai	Resource-based
9	Sumateran Rural	Rest of Sumateran	Traditional-based
10	Balikpapan and Samarinda	Balikpapan and Samarinda	Resource-based
11	Greater Makassar	Makassar, Takalar Regency, Gowa Regency, Maros Regency of South Sulawesi	Modern-based
12	Others	Rest of regions that are not coded as 1-11	Traditional-based

Source: Authors calculation.

Table B. Definition of the Variables

Variable	Definition
Inequality	Wages inequality measured by ratio of P90/ P10
Premium 1	The ratio of median wages of workers with Senior High School/DI/DII to workers with Primary school and below
Premium 2	The ratio of median wages of workers with Tertiary degree (DIII/S1/S2/S3) to workers with Primary school and below
Premium 3	The ratio of median wages of workers with Tertiary degree (DIII/S1/S2/S3) to workers with Senior High School/DI/DII.
Female	The proportion of females workers to total workers
Tertiary	The proportion of workers with tertiary education to total workers
Casual	The proportion of casual workers to total workers
Managerial	The proportion of workers with managerial level to total workers
I	Regional development area
T	Year

Table C. Partial-Correlation across Explanatory Variables

Variables	Primary	Tertiary	Female	Casual	Agriculture	Mining	Manufacture	High-skilled services	Managerial
Tertiary	-0.88***	1							
Female	0.25**	-0.14	1						
Casual	0.77***	-0.69***	0.15	1					
Agriculture	0.85***	-0.79***	0.23**	0.56***	1				
Mining	-0.12	0.079	-0.48***	-0.17	0.021	1			
Manufacture	-0.28**	0.13	0.084	0.018	-0.56***	-0.43***	1		
High-skilled services +	-0.72***	0.83***	-0.26**	-0.69***	-0.64***	0.17	-0.15	1	
Managerial	-0.13	0.24**	-0.17	-0.44***	0.16	0.42***	-0.72***	0.55***	1
Premium 1	0.18	-0.16	-0.23	0.07	0.03	-0.00	0.22**	-0.14	-0.07
Premium 2	0.37***	-0.23**	0.02	0.39***	0.07	-0.27**	0.17	-0.15	-0.16
Premium 3	0.31***	-0.13	0.24**	0.42***	0.06	-0.35***	0.004	-0.05	-0.11

Source: Authors' estimations

Note: *** is significant at 1%; ** is significant at 5% and * is significant at 10%

+ High skilled services include communication, finance and professional.