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REGIONAL SKILL DIFFERENTIALS: A STUDY OF THE INDONESIAN LABOR MARKET

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This study investigates the patterns and trends in the returns to skill in the Indonesian labor market over the period 2007 to 2013, a period of rising earnings and income inequality. The study takes into account the labor demand and supply across regional development regions and over time. It presents evidence on the returns to skill related to structural changes in the economy through the growth of modern services and the resource boom. It confirms that skill premiums varied across regional development areas. The composition of industries across regions, female labor participation, the proportion of casual workers, 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 and minimum wages policy in reducing the skill premium.

Keywords: Skill premium; supply of labor; demand of labor; regional development area; Indonesia; human capital.

Subject Classification Codes: I24 (Education and Inequality), J01 (Labor Economics), J24 (Human Capital; Skills), J31 (Wage Structure, Wage Differentials)

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1. Introduction

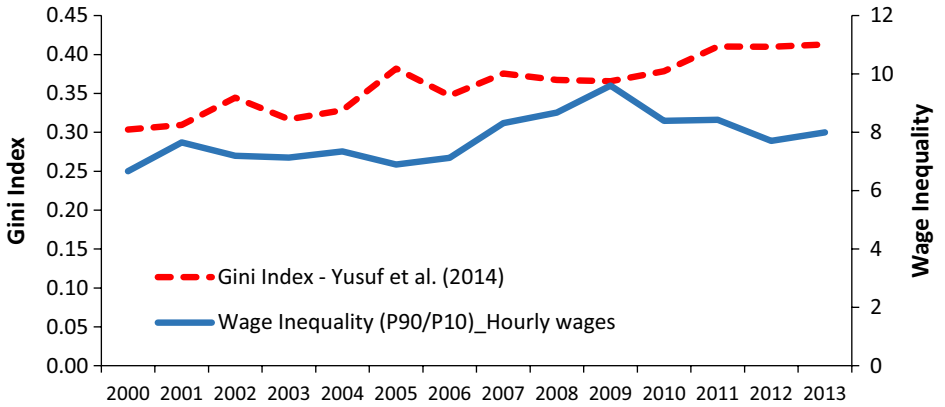
Earnings differentials, including differences between workers by level of education and training, gender, ethnicity and migrant status, have been the subject of extensive research by labor economists. All these variables are important indicators of conditions in the labor market and how particular groups of workers are faring. They can be used to measure the returns to education and training or discrimination in the labor market. This paper focusses on one important differential, the determinants of earnings differentials between Indonesian workers with different levels of education. This relationship is examined in 12 broad, development regions of Indonesia, distinguished according to the economic characteristics of each region.

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 labor market indicator of interest for a number of reasons. First, it reflects the supply and demand for labor with different levels of human capital. Technological change increases the demand for skilled workers that leads to higher skill premium. Further, on the supply side, the demographic change and increase educational opportunities have altered the composition of labor supply. Indonesia is one of these countries experiencing a doubling in the number of university graduates in recent decades making the returns to higher education an interesting policy issue. Further, there is some evidence that these changes have been associated with rising income inequality (discussed subsequently).

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 labor 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 in which higher levels of human capital are required. A study examining the Lewis turning point in the Indonesian labor 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 (Manning



Source: Yusuf *et al.* (2014) and Sakernas Data 2000–2013, published by BPS.

Figure 1. Income and Wages Inequality in Indonesia Between 2007 and 2013

and Miranti, 2015; Miranti *et al.*, 2014; Yusuf *et al.*, 2014). This has provoked widespread concern among the public and policy makers.

Reducing the level of income inequality in the country has thus become a key policy focus and was been included in the latest Medium-Term Development Plan (RPJM) 2015–2019. The plan has set a very ambitious target to reduce the Gini coefficient from 0.41 to 0.36 by the end of 2019. The World Bank (2016) indicated some policy options to reduce inequality and these include policy in the education sector, particularly by improving access to education for the poor through social protection programs (such as the use of Indonesia Smart Cards (Kartu Indonesia Pintar), Conditional Cash Transfers and education subsidies). In addition, increased expenditure on education in general and improving educational outcomes are priorities 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 are dispersed across the larger but less populated regions 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. Investigating this issue at the regional level is also important as regional disparity has been one of the key drivers of increasing inequality in this country (Miranti *et al.*, 2013; Organisation for Economic Cooperation and Development, 2011; Yusuf *et al.*, 2014).

The Indonesian labor market as a whole has become more integrated over time and 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 toward the national average as workers moved to the areas where they could expect the highest returns to their labor. However, migration is not

costless, in a such culturally and ethnically diverse archipelago. In some regions, the traditional agricultural sector remains of major importance, whereas in other areas, notably Greater Jakarta, the presence of a modern service sector is much 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 rural-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.1).

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 regimen 1998. Many government functions were decentralized, particularly to the district level, following the passing of the Decentralization Laws No. 22/1999 and 25/1999. For example, minimum wage regulations were 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 three research questions: What are the determinants of the skill premium in Indonesia and particularly has it been affected by the expansion of tertiary education? Second, do regional factors play a role in determining the skill differential? Finally, did the resources boom which Indonesia experienced in the first decade of the 2000s affect skill differential?

The outline of the paper is as follows. Following the introduction, the paper 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.

2. Literature Review

2.1. *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 areas; the poorest and richest and lowest and between the worst and best 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) show that the share of GDP invested in higher education in Indonesia was 0.7% in 2010, much lower than those of neighboring countries including Malaysia at 1.7%, Thailand at 1.1% and Vietnam at 2.4%.

In terms of enrollment in tertiary level education (defined here as those enrolling in bachelor degree or above), the latest UNESCO data show that Indonesia has been improving its performance by more than doubling its gross enrolment ratio (GER) from only 14.2% in 2001 to 31.3% in 2013, an average of 21.4% during 2001–2013. Nevertheless, this figure is still below those of Malaysia at 32.8%, the Philippines at 29.7% and Thailand at 46.8% during the same period.

2.2. *The skill premium and its determinants*

These improvements 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 *et al.* (2013, p. 231) concludes that the return to education for senior high school graduates declined between 1993 and 2007–2008 but rose for those with a university degree. The unemployment rate among labor with tertiary education also fell significantly, signaling an increase in demand for their labor (International Labour Organization, 2013).

Katz and Murphy (1991) developed a supply and demand framework to assess the role of supply and demand shift of labor in changes of wage differentials. According to Katz and Murphy (1991), the competitive relative wages are determined by the supply and demand interaction. The model assumes that the supply is inelastic in the short run, so if the demand for skilled labor is constant, the relative wages of skilled workers will be lowered. Meanwhile, the shifting of demand for skilled labor due to technological change or the shifting of demand for product from a more skill-intensive sector will increase the premium for skilled workers.

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 side of the labor market. Autor (2014) summarized the literature on the roles of supply and demand for workers in explaining an increased skill premium particularly in developed countries. In the U.S., for example, the gap in earnings between college and high school graduates increased in the 1960s and reached 55%. This figure fell slightly in the 1970s to 45%, as rising demand for skilled workers was followed by a rapid increase of their supply. The skill premium further widened from 1982 to 2012 and reached a highest point in 2005 at 97%. These data show that the premium for college graduates at high school level increased from 1.5 times in 1982 (premium of 55%) to double by 2005 (premium of 97%).

The education race model of Goldin and Katz (2008) is frequently cited to explain the increase in the skill premiums. The model states that the premium will be wider if the supply of educated labor does not keep up with an increase in demand for skilled workers. The model was employed to explain a persistent increase in the skill premium in the U.S. after the 1980s. The yearly wage premium is regressed on two factors: (i) the supply of

college graduates and (ii) a time trend to proxy the rising demand for college graduates. The study concluded that the shortage in supply of educated workers contributed to an increase in the wage premium.

Specifically, demographic change and increased educational opportunities have altered the composition of labor 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 *et al.*, 2004). One of the most well-documented supply-side changes took place in the US labor market in the 1970s when the return to university education fell following the entry of the large baby boomer cohort into the labor 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 female participation into the labor force may also contribute to widen the earnings differentials. A study by Mandel and Semyonov (2005) shows that compared to male workers, female workers are more likely to be employed in low-wage jobs and occupations. Thus, an increase of female participation put pressure to the supply of male workers, particularly the unskilled ones that further depressed their wage. Their study further examines whether the lower earnings differentials between male and female workers is determined by the egalitarian wage structures or the family policy. They find that the egalitarian wage structure of centralized wage system was essential to lower the earnings differentials.

Further, some studies suggested that an increase in the skill premium is influenced by an increase in the demand for skilled labor. Lee and Wie (2015) have investigated the existence of a skill premium in the Indonesian labor market. Based on the National Labour Force Survey (SAKERNAS) data, the share of educated workers and their wage premium in the Indonesian labor market increased significantly over the period 2003–2009. Consistent with Purnastuti *et al.* (2013), the study finds high returns to a university degree and that this was a source of rising wage inequality. Lee and Wie (2015) showed that the skill premium fell in the 1990s during the period of more rapid export-oriented growth in Indonesia, so the gain in higher wage was enjoyed by the least skilled group.

Subsequently, the premium started to increase after 2003, both in urban and rural areas. Applying the supply–demand framework of Katz and Murphy (1991), Lee and Wie (2015) suggest that the existence of skill premium for the period 1990–2010 in the Indonesian labor market can be explained by major shifts in the demand for labor. Specifically, the increase of the premium for skilled workers was contributed by skill-biased technological change that shifted demand into skilled workers both within and between industries. Technological change is driven by the increase in foreign direct investment and a larger share of imported goods.

According to the literature, 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. These often require knowledge of new technologies or computerization and related to trade openness, globalization and technological transfer from overseas (Acemoglu,

2002, 2003; Gindling and Robbins, 2001; He, 2012; He and Liu, 2008; Krussell *et al.*, 2000; Pavcnik, 2000; Piketty, 2015). The influence of skill-biased technical change on the rising demand for skilled workers and the increasing returns to skill have been widely analyzed with the discussion focussing 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.

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.

In addition to supply and demand characteristics, literature suggests that changes of labor market institutions such as minimum wage determine the skill premium. Mandel and Semyonov (2005) argue that a more egalitarian wage structure contributes to lower earnings differentials between men and women in developed countries because it provides protection for low wage workers. The egalitarian wage structure is characterized by centralized collective bargaining, strong trade unions and high degree of coordination and industrial relation. Further, Fernández and Messina (2017) find that a significant increase of minimum wage in three Latin American countries of Brazil, Argentina and Chile in the 2000s increased the wages of low-skilled workers and lowered the earnings differential. However, the study by Lee and Wie (2015) of Indonesian labor market argued that the minimum had no substantial role in determining the skill premium between 2003 and 2009. Lee and Wie (2015) argued that the number and composition of workers and their skill levels in the formal sector were quite constant after 2003, so the increases in skill premiums from 2003 and 2009 could not be attributed to compositional changes.

3. Patterns and Trends in the Skill Premium

This paper aims to examine the role of supply and demand characteristics on the skill premium for labor across regional development areas. The dependent variable is the skill premium measured by the ratio of the wages of more educated workers to less educated workers as suggested by the literature (Autor, 2014). Indonesia has been focussing on human capital investment by increasing access to tertiary education (Purnastuti and Izzaty, 2015). Specifically, two measures of the skill premium are used. Premium 1 is the ratio of the median earnings of tertiary graduates (Diploma III and above) to those with primary education. Premium 2 is the ratio of the median earnings of tertiary to that of high school graduates. Figure 2 shows the national average for each of the premia over the period. For premium 1, on average, tertiary educated workers earned 3.32 times that of unskilled ones between 2007 and 2013. For premium 2, tertiary educated workers received returns 2.25 times workers with higher-secondary education.

The regressions focus on the correlations between chosen demand and supply characteristics in the regional labor markets rather than attempting to identify a full demand and supply model. The characteristics of supply of labor are the proportion of workers with a tertiary degree (tertiary), the proportion of female workers (female) and the proportion of casual workers (casual). The proportion of casual workers is a proxy for job insecurity in each region, where casual workers are non-permanent workers who worked for more than one employer in the last one month (see Appendix Table A.2). Further, the characteristics of demand for labor are represented by the proportion of workers employed in the manufacturing sector (manufacture), the mining sector (mining) and those with managerial positions (managerial).

This study makes a special contribution to the literature on skill premiums by capturing the characteristics of each region using a regional fixed effects model. Previous literature underlines the importance of taking regional diversity into the model, bearing mind that Indonesia has a geographically dispersed economic structure as discussed earlier. Studies in Indonesia have discussed ways to classify regions 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 labor supply and demand.

In this paper, we go further than the previous literature by classifying 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 labor market. 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% of employment in agriculture. There are three regions classified as rural: rural Java, rural Sumatera and other (Table 1).

The second group of regions is those where the proportion of workers working in the mining sector is higher than 1% and mining contributes substantially to regional income (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 labor is not as strong as in agriculture and the manufacturing sector.

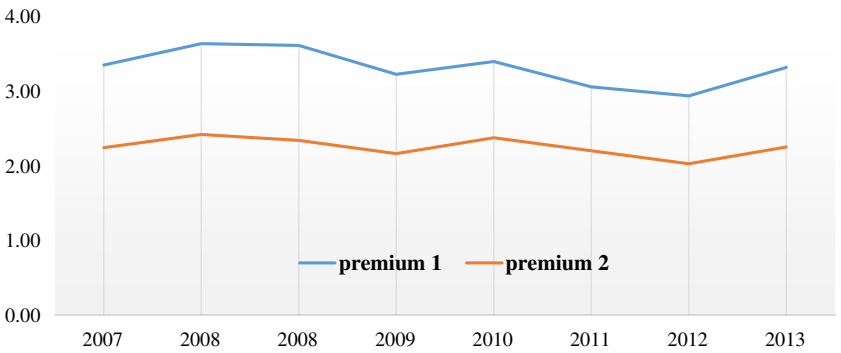
The third group is the modern-based economy that covers regions such as Greater Jakarta, Greater Bandung, Greater Semarang, Greater Surabaya, (others) Java urban, Medan and Batam and Greater Makassar. Table 1 shows that there has been a shift in these regions away from agriculture to the modern economy where manufacturing and services play more significant roles, accounting for more than 20% of employment. The proportion of paid workers in the manufacturing sector in the modern-based economy was more than 20% 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, (others) Java urban and Greater Makassar with more than 15% 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
Indonesia	37.82	1.19	12.94	9.82	0.48	0.94	8.40

*Modern sector covers manufacturing and modern services.
**High-skilled service 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 agricultural sector, for example, Greater Semarang with 34%, Greater Makassar 24% and Greater Bandung 16%. Further, the emergence of high-skilled services is also observed in the mining-based regions. In areas of Pekanbaru, Dumai and Natuna, coded under



Source: Indonesia Labour Force Survey, various years.
Notes: Premium 1 is the ratio of median wages of workers with tertiary degree (DIII/S1/S2/S3) to workers with primary school and below. Premium 2 is the ratio of median wages of workers with tertiary degree (DIII/S1/S2/S3) to workers with senior high school/DI/DII.

Figure 2. Skill Premium in National Level 2007–2013

Figure 3. Regional Development Map

Table 2. The Demographic Data across Regional Development Area

Regional Development Area		Population			Proportion		
Code	Area	Male	Female	Total	Male	Female	Total
1	Greater Jakarta	10,437,734	10,096,045	20,533,779	8.72%	8.56%	8.64%
2	Greater Bandung	6,769,092	6,480,238	13,249,330	5.66%	5.49%	5.58%
3	Greater Semarang	2,936,014	2,985,617	5,921,631	2.45%	2.53%	2.49%
4	Greater Surabaya	2,927,243	2,956,783	5,884,026	2.45%	2.51%	2.48%
5	Java Urban	1,791,325	1,841,285	3,632,610	1.50%	1.56%	1.53%
6	Java Rural	43,659,256	43,729,958	87,389,214	36.49%	37.06%	36.77%
7	Medan and Batam	1,521,793	1,520,102	3,041,895	1.27%	1.29%	1.28%
8	Sumateran Mining	623,591	596,982	1,220,573	0.52%	0.51%	0.51%
9	Sumateran Rural	23,509,243	22,859,220	46,368,463	19.65%	19.37%	19.51%
10	Balikpapan Samarinda	666,130	618,949	1,285,079	0.56%	0.52%	0.54%
11	Greater Makassar	1,268,366	1,311,843	2,580,209	1.06%	1.11%	1.09%
12	Others	23,521,126	23,013,391	46,534,517	19.66%	19.50%	19.58%
	Total (Indonesia)	119,630,913	118,010,413	237,641,326	100.00%	100.00%	100.00%

Sumateran mining, the proportion of paid workers employed in high-skilled services is close to 20%. The rich resource regions in East Kalimantan such as Balikpapan and Samarinda also have a high proportion of workers employed in high-skilled services.

Figure 3 shows a map which provides a visual picture of the regional classification discussed above and Table 2 describes the demographic data of population of male and female across areas.

4. Data and Methodology

This study is based on data from the National Labour Survey (SAKERNAS) published by the Indonesian Bureau of Statistics (BPS) for the period 2007–2013. BPS increased the size of the SAKERNAS sample in 2007 so the data are representative at the district level. Wage and salary employment, both full-time employees and casual workers, covering around 40% from the total workforce are included here. The self-employed are excluded from the dataset because their labor income is unobserved (Mehta and Mohr, 2012). We use regional development areas as our spatial unit of analysis. Thus, we have panel data for regional development areas, covering an eight-year period, and examine the determinants of the skill premium in Indonesia across regions between 2007 and 2013.

For the theoretical model and empirical estimation of the skill wage premium, we draw on the debates between Peri (2010) and Borjas (2015) in the context of the influx of immigrants into the US economy. Peri (2010) argued that when the supply of unskilled immigrant workers increased, wages would fall for the jobs they took. Declining wages for existing jobs then nudged the native-born into up-skilling and moving to better paid jobs. So, while the average wages for these particular jobs declined, the wages of native-born workers would unexpectedly rise and the gap of earnings between the immigrant and the

native-born would be increased. This is in contrast to Borjas (2015), who argued that immigration has hampered the growth in wages of native-born. Borjas (2015) argued that wage will decline substantially as the supply of immigrant workers lowered the wage of those native-born workers also, and this has contributed to the decline in the skill premium between these two groups.[1]

These mixed findings in terms of the associations between the supply of particular types of workers and the skill premium have motivated us to use the supply of tertiary educated workers (as a proportion to total workers) as a proxy for skilled workers as one of the determinants of the skill premium. We also followed Whalley and Xing (2014) who estimated the drivers of regional skill premium in China and also included the share of skilled labor in the labor force as one of the explanatory variables.

As in Whalley and Xing (2014), we also incorporated regional fixed effects. 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 minimize the multicollinearity problem if there is one (see Appendix Table A.3).

As discussed earlier, we also included other supply and demand variables, in the estimation, that can be seen in Table A.2. We initially included time fixed effects to capture yearly omitted variables, but we dropped them as they were highly correlated with the other time-varying explanatory variables. 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 *et al.*, 1993). Estimation of each measure of the skill premium is conducted separately using the same subset of explanatory variables. Three variants of estimations are conducted: first applying a least square dummy variable (LSDV) where we estimated regional fixed effects. For this type of estimation, regional fixed effects 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 rural-based economies. Second estimation is employing the first differencing where the regional fixed effects are canceled out by first-order differencing.

For a robustness test, we also ran (i) estimations by using a different regional classification, that is, Hill's (1989) regional classification, and examined the determinants of the skill premium by using the LSDV approach, taking into account Hill's classification as the regional fixed effects and (ii) estimations that use first differencing. The estimation result is available in Table A.4 in Appendix A.

Thirdly, we also acknowledged that there is a risk of reversed causality especially between education and the skill premium where highly educated workers have a tendency to move to regions with a higher skill premium such as 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 and still taking into account regional fixed effects

[1] Nevertheless, we should point out that Borjas (2015) was criticized on his methodology.

(the 2SLS Fixed Effects). Following Reed (2014), this study employs the lag of its endogenous variable (tertiary education) as an instrumental variable. Results show that a lag of four years for tertiary is an appropriate instrument for tertiary.[2] The instrument is credible because it might take years to the labor market to respond to the change in the fraction of the individuals with tertiary degree. For example, if wages are bargained by unions of firms and workers do not evert this straight away, so that an increase in the fraction of individuals with tertiary degree could take time before appearing in the actual earnings. Finally, this study includes the minimum wage in the estimation. We would expect a high regional minimum wage to compress the skill differentials.

Normally, in the case of individual estimations, there exists a self-selection issue that needs to be addressed, for example, in the case of women participation in the labor market or not, or self-selection of workers into different sectors. Our model uses data at the regional level not at the individual level where the selection correction is usually applied. Therefore, the self-selection issue cannot be addressed. The final equation to be estimated is shown in Equation (1)

$$\begin{aligned}\text{Premium1, 2}_{it} = {} & \beta_0 + \beta_1 \cdot \text{Tertiary}_{it} + \beta_2 \cdot \text{Female}_{it} + \beta_3 \cdot \text{Managerial}_{it} + \beta_4 \cdot \text{Manufacture}_{it} \\ & + \beta_5 \cdot \text{Mining}_{it} + \beta_6 \cdot \text{Casual}_{it} + \beta_7 \cdot \text{Minimum wage}_{it} + \lambda_i + \varepsilon_{it}. \qquad (1)\end{aligned}$$

The operational definition of variables is available in Table 3. As reported in Table 4, there are substantial differences between regions in the composition of the workforce as measured by the explanatory variables.

Table 3. Definition of the Variables

Variable	Definition
Premium 1	The ratio of median wages of workers with tertiary degree (DIII/S1/S2/S3) 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 senior high school/DI/DII.
Tertiary	The proportion of workers with tertiary education to total workers
Female	The proportion of females workers to total workers
Managerial	The proportion of workers with managerial level to total workers
Manufacture	The proportion of workers in the manufacturing sector to total workers
Mining	The proportion of workers in the mining sector to total workers
Casual	The proportion of casual workers to total workers
Minimum wages	The yearly average minimum wages in constant value using 2007 as base year of the regions in the development area classification
λ_i	Unobserved regional-specific effects
i	Regional development area
t	Year

[2] The instrument is tested using the first-stage regression. The adjusted R^2 is 0.8165 and the F-test is 8.92641 with df (1,66) and this is statistically significant using the 99% confidence interval.

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

Variable	Obs.	Mean	Std. Dev.	Min	Max
Premium 1	84	3.32	0.64	2.10	4.73
Premium 2	84	2.25	0.34	1.59	3.07
Tertiary	84	0.10	0.04	0.03	0.19
Female	84	0.37	0.04	0.30	0.44
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
Casual	84	0.07	0.04	0.02	0.17
Minimum wage (in thousand IDR)	84	804.07	158.26	572	1,543

Source: Authors' estimations.

5. Analysis and Discussion

Table 5 summarizes 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, 16–18% of workers had a tertiary degree, DIII and above. In contrast, in six areas, the share of these skilled workers was below 10%: 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% of the workforce in Java Rural, Greater Makassar and Others.[3]

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 6 presents the mean value of the two skill premia by region. The variation in premium 1 between tertiary and primary educated workers was the largest, ranging from 4.14 in Greater Bandung to 2.52 in Greater Surabaya.

[3] The result for Greater Makassar may be explained by the migration of low skilled workers from the outer islands into the area.

Table 5. 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 1	2013 2	2007 3	2013 4	2007 5	2013 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 and 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.

Table 6. Means of Skill Premium across Regional Development Area 2007–2013

Regional Development Area	Premium 1	Premium 2
Modern-based economy		
Greater Jakarta	3.85	2.13
Greater Bandung	4.14	2.42
Greater Semarang	3.17	2.29
Greater Surabaya	2.52	1.91
Urban Java	3.84	2.72
Medan and Batam	2.82	2.05
Greater Makassar	3.48	2.50
Mining-based economy		
Sumateran Mining	3.09	2.32
Balikpapan and Samarinda	2.67	1.87

Table 6. (*Continued*)

Regional Development Area	Premium 1	Premium 2
Rural-based economy		
Java Rural	4.02	2.68
Sumatera Rural	2.88	2.11
Others	3.31	2.02
Total	3.32	2.25

Source: Indonesia Labour Force Survey, various years.

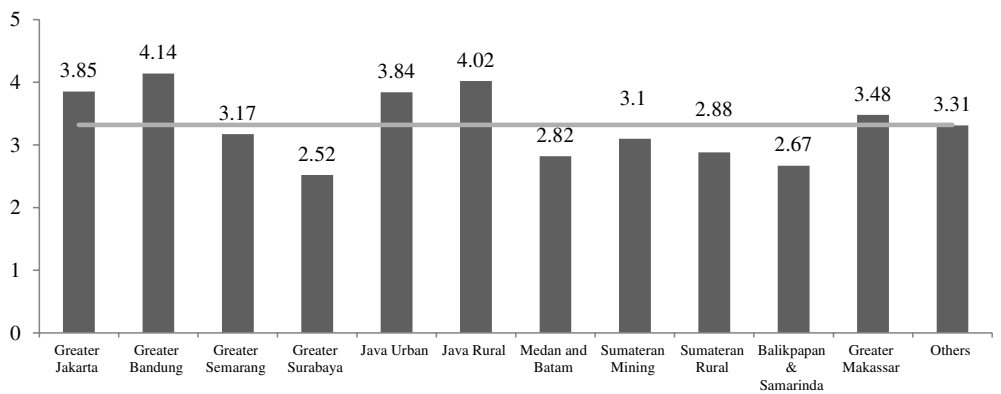
Table 7. Estimations of the Determinants of Skill Premium, 2007–2013

	Premium 1			Premium 2		
	Least Square Dummy Variable (LSDV) Coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.	Least Square Dummy Variable (LSDV) Coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.
Tertiary	−2.34	−2.06	−14.51	0.10	−0.59	−10.97
	(1.83)	(2.01)	(9.83)	(0.95)	(1.21)	(7.74)
Female	4.15	5.55	6.39	3.80	4.30*	5.83**
	(4.41)	(3.57)	(4.63)	(2.33)	(2.24)	(2.73)
Managerial	2.93	3.75	4.10	0.95	−1.10	2.01
	(2.36)	(2.97)	(3.00)	(1.31)	(1.95)	(2.02)
Manufacture	−3.83	−2.88	−5.25	−2.03*	−2.97*	−3.33
	(2.71)	(3.71)	(3.25)	(1.17)	(1.68)	(2.23)
Mining	7.39	8.18	19.14	5.12	5.54	15.82**
	(9.78)	(17.79)	(13.38)	(4.50)	(7.88)	(7.71)
Casual	1.34	6.71	2.35	2.58*	5.59**	3.48
	(3.02)	(4.50)	(3.64)	(1.38)	(2.31)	(2.80)
Minimum wage	−0.0014***	−0.0008	−0.00038	−0.00095***	−0.0012***	−0.00004
	(0.0004)	(0.0004)	(0.0009)	(0.0002)	(0.00028)	(0.0006)
_cons	4.52**	−0.046	4.56	1.96**	0.0033	1.99
	(1.83)	(0.064)	(1.73)	(0.92)	(0.033)	(1.01)
Regional development area (Greater Jakarta as a base)						
Greater Bandung	0.2197		−0.56	0.20		−0.51
	(0.51)		(0.78)	(0.20)		(0.58)
Greater Semarang	−1.94***		−2.76***	−0.76***		−1.51***
	(0.50)		(0.74)	(0.25)		(0.57)
Greater Surabaya	−1.53***		−1.77***	−0.41***		−0.63***
	(0.32)		(0.35)	(0.13)		(0.21)
Java urban	−0.98***		−0.85**	−0.13		−0.005
	(0.33)		(0.35)	(0.19)		(0.22)
Java rural	−1.15**		−2.37**	−0.41*		−1.52*
	(0.53)		(1.03)	(0.23)		(0.84)

Table 7. (*Continued*)

	Premium 1			Premium 2		
	Least Square Dummy Variable (LSDV) Coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.	Least Square Dummy Variable (LSDV) Coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.
Medan Batam	−1.42***		−1.35***	−0.35***		−0.29**
	(0.22)		(0.26)	(0.08)		(0.13)
Sumateran Mining	−1.72***		−1.86***	−0.37*		−0.50
	(0.44)		(0.48)	(0.20)		(0.31)
Sumateran Rural	−2.38***		−3.64***	−0.81***		−1.96**
	(0.51)		(1.12)	(0.23)		(0.84)
Balikpapan and Samarinda	−2.35***		−3.15***	−0.90**		−1.63***
	(0.67)		(0.99)	(0.35)		(0.60)
Greater Makassar	−1.43***		−1.75***	−0.25		−0.54
	(0.44)		(0.49)	(0.21)		(0.34)
Others	−2.23***		−3.61***	−1.06***		−2.32**
	(0.58)		(1.26)	(0.28)		(0.91)
Observation	84	72	84	84	72	84
R^2	0.77	0.14	0.68	0.76	0.14	0.49

Source: Authors' estimations.
Note: ***is significant at 1%; **is significant at 5% and *is significant at 10%.



Source: Indonesia Labour Force Survey, various years.
Notes: Premium 1 is the ratio of median wages of workers with tertiary degree (DIII/S1/S2/S3) to workers with primary school and below. The grey line is the national average of skill Premium 1 between 2007 and 2013. The mean value is 3.32.

Figure 4. Skill Premium 1 across Regional Development Areas 2007–2013

As a further illustration of the regional differences, Figure 4 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.

6. Estimation Results

Table 5 presents our main results. The significant robust results are shown for Premium 2 in the case of LSDV and first difference estimations for manufacturing, casual and minimum wage variables. The results show that industrial composition of regional economies had implication for the skill differential. The size of the manufacturing sector had a significant role in dampening wage differentials between tertiary graduates and primary and high school graduates. The proportion of casual workers contributes positively to the skill premium, as casual workers are likely to exist among the unskilled labor. The negative association between minimum wage and skill premium is expected as the minimum wage raised the wage of the unskilled workers.

Nevertheless, when the endogeneity is taken into account, the 2SLS results show that both the coefficients of female and mining are significant. Regarding supply characteristics, the significance of female coefficient with its positive association to skill premium may confirm the literature that female workers are a close substitute of unskilled male workers. Therefore, a higher proportion of female workers contributes to widen the skill differentials.

The proportion of tertiary-educated labor as a measure of the relative supply of skilled workers in each region has the expected negative correlation with skill Premium 1 and 2, although the coefficients are not statistically significant. It is interesting that the coefficient of tertiary becomes not statistically significant while we controlled for the minimum wages (please also Table A.3 in Appendix A in which the estimations excluded the minimum wage). Similar results are also found in Whalley and Xing (2014) when they found that the coefficient of the supply of skilled labor was not significant. Other variables, the proportion of managerial and casual workers, have a positive influence on the skill premium; however, only casual is statistically significant in LSDV and first difference estimations for Premium 2.

From the demand side, the estimations reveal that a higher proportion of workers employed in the manufacturing sector lowers the two skill premia, although the coefficients are only statistically significant in the LSDV and first difference estimations in the case of Premium 2. This may be due to the fact that we have also controlled for the minimum wage in the estimations. The minimum wage is expected to have greater effect on wages in the manufacturing industry, particularly in the modern-based regions, which had a negative

association with the skill premium. In other words, it seems to have had a significant influence on wages of less educated workers. The coefficients have the expected signs, but they are only significant in the LSDV in the case of Premium 1 and LSDV and first difference estimations in the case of Premium 2.

The Indonesian mining sector has positive and significant association with skill Premium 2 in the 2SLS. The mining sector is a technology-intensive industry so it demands skilled labor to work with the investment in specific technology or technology imported from overseas. The demand characteristics are also substantial in understanding the skill premium across regional development areas in Indonesia. Once all explanatory variables have been taken into account, the results show that the skill differential was largest in Greater Jakarta (all the regional dummies have negative coefficients). Holding everything else constant, the largest negative regional coefficients in both Premium 1 and 2 in 2SLS FE model (Table 5, col. 2) were for the other rural regions, rural regions of Sumatera, the mining region of Balikpapan and Samarinda. This means that these regions provided the smallest skill premium (in contrast to Greater Jakarta). It is interesting to see that the coefficients for Greater Bandung are not statistically significant in Premium 1 and 2 estimations which may indicate that this region offered a skill premium which does not differ from Jakarta. A similar case was found for the coefficients of Sumateran mining and Greater Makassar in the Premium 2 estimation.

7. Conclusion and Policy Implication

This study has focussed 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 labor markets in Indonesia using the most recent data. The second is the development and inclusion of characteristics of regional labor markets as the factors influencing the skill premium. These results show that there were significantly different regional effects on differentials holding everything else constant.

Our results show that both supply and demand factors have significant impacts on the skill premium. Taking into account the endogeneity issue, on the supply side, the proportion of females in the workforce in each region was associated with a larger skill differential, although this was only significant for Premium 2. This indicates that female workers are a close substitute of unskilled male workers. Despite the findings show that the supply of tertiary-educated workers was negatively but not statistically significantly associated with the size of the skill premium, this does not mean expansion nor access to tertiary education is not important. Human capital investment is also required to shift female workers from undertaking unskilled jobs to skilled jobs and to reduce the earning gap between unskilled and skilled workers.

On the other side, the demand side factor also matters. The size of the mining sector had a significant and positive correlation with the skill differential between tertiary and high school graduates, which also implies the earning advantage for those skilled workers. Some other results also show that manufacturing sector and minimum wage contributed to reduce skill premium.

In terms of regional differentials, most of the regional coefficients were negative compared with Greater Jakarta, although the coefficients were not always statistically significant. These results suggest that Indonesia does not function as one labor market but that there are some differences in the returns to skill between regions with rural regions offer the smallest skill premium while some urban areas like Greater Bandung and Makassar does not significantly provide different skill premium than Jakarta. What are the policy implications of these findings? In the past, the policy was based on comparative advantage principle by facilitating the manufacturing industry, particularly the labour-intensive ones to establish the business and export their products overseas. The policy aimed to increase jobs and produces a more equitable outcome. Moreover, the minimum wages policy in Indonesia provides protection for low skilled workers, particularly in the labor-intensive manufacturing industry. Nevertheless, the literature shows evidence that Indonesia is started to reach the Lewis turning point where more labor works in the formal sector and non-agricultural sector and so the inequality started to rise. Therefore, a policy should be directed to facilitate the skills upgrading to enable the workers keep up with the technological change.

Nevertheless, the current policy agenda has focussed 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). Fiscal policy should focus on higher education sector more. Human capital investment and widening access to higher education, which is needed through more effective and productive social spending in the area of education, is important. It is also important potentially through partnerships between educational institutions and regional industry.

The variety of skill premium offered by regional development area suggests a role for local governments and other stakeholders to participate actively in the development of local education or training program. A national agenda to promote a more balanced regional development and equitable access to higher education particularly in the less developed regions is also required.

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Appendix A

Table A.1. 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 A.2. Partial-Correlation Across Explanatory Variables

Variables	Tertiary	Female	Casual	Agriculture	Mining	Manufacture	High-Skilled Services	Managerial
Tertiary	1							
Female	−0.14	1						
Casual	−0.69***	0.15	1					
Agriculture	−0.79***	0.23**	0.56***	1				
Mining	0.079	−0.48***	−0.17	0.021	1			
Manufacture	0.13	0.084	0.018	−0.56***	−0.43***	1		
High-skilled services^{+}	0.83***	−0.26**	−0.69***	−0.64***	0.17	−0.15	1	
Managerial	0.24**	−0.17	−0.44***	0.16	0.42***	−0.72***	0.55***	1
Minimum wages	0.45***	−0.43***	−0.28***	−0.38***	0.1106	0.2843***	0.31***	−0.03

Source: Authors' estimations.
Notes: ***is significant at 1%; **is significant at 5% and ***is significant at 10%.
$^{+}$High skilled services include communication, finance and professional.
Source: Sakernas Data 2000–2013, published by BPS.

Table A.3. Estimations of the Determinants of Skill Premium, 2007–2013

	Premium 1			Premium 2		
	Least Square Dummy Variable (LSDV) coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.	Least Square Dummy Variable (LSDV) Coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.
Tertiary	−5.97**	−1.99	−16.71***	−2.40	−0.49	−11.21***
	(2.39)	(2.07)	(5.72)	(1.51)	(1.31)	(4.30)
Female	3.74	6.37*	6.59	3.52	5.54**	5.86**
	(4.65)	(3.70)	(4.61)	(2.57)	(2.24)	(2.64)
Managerial	3.99	4.13	4.44	1.68	−0.53	2.05
	(2.57)	(2.93)	(2.94)	(1.41)	(2.00)	(1.90)
Manufacture	−5.54*	−2.12	−5.74**	−3.22**	−1.81	−3.38**
	(2.94)	(3.73)	(2.86)	(1.35)	(1.73)	(1.82)
Mining	5.05	9.14	20.20	3.51	6.99	15.94**
	(10.06)	(17.89)	(12.31)	(5.27)	(8.46)	(6.82)
Casual	−0.46	5.66	2.15	1.31	3.99	3.45
	(3.31)	(4.36)	(3.96)	(1.67)	(2.54)	(2.89)
_cons	4.08**	−0.087	4.48***	1.66*	−0.059	2.13***
	(1.78)	(0.053)	(1.76)	(0.97)	(0.027)	(0.91)

Table A.3. (*Continued*)

	Premium 1			Premium 2		
	Least Square Dummy Variable (LSDV) coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.	Least Square Dummy Variable (LSDV) Coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.
	Regional development area (Greater Jakarta as a base)					
Greater Bandung	0.37		−0.64	0.3		0.53
	(0.48)		(0.76)	(0.21)		(0.52)
Greater Semarang	−1.61***		−2.80***	−0.54*		−1.52***
	(0.57)		(0.71)	(0.31)		(0.54)
Greater Surabaya	−1.33***		−1.76***	−0.28*		−0.63***
	(0.32)		(0.37)	(0.14)		(0.22)
Java urban	−0.51		−0.75**	0.20		0.006
	(0.35)		(0.33)	(0.21)		(0.22)
Java rural	−0.84		−2.47***	−0.19		−1.53**
	(0.59)		(0.95)	(0.32)		(0.73)
Medan Batam	−1.17***		−1.30***	−0.18*		−0.28**
	(0.48)		(0.24)	(0.09)		(0.12)
Sumateran mining	−1.69***		−1.88***	−0.35		−0.50
	(0.48)		(0.49)	(0.22)		(0.31)
Sumateran rural	−2.53***		−3.83***	−0.91***		−1.98***
	(0.62)		(0.83)	(0.32)		(0.59)
Balikpapan and Samarinda	−2.28***		−3.24***	−0.85**		−1.64***
	(0.75)		(0.91)	(0.40)		(0.52)
Greater Makassar	−1.44***		−1.79***	−0.25		−0.54*
	(0.49)		(0.48)	(0.24)		(0.30)
Others	−2.34***		−3.81***	−1.14***		−2.34***
	(0.71)		(0.95)	(0.38)		(0.64)
Observation	84	84	84	84	84	84
R^2	0.73	0.12	0.67	0.64	0.18	0.48

Source: Authors' estimations.
Note: ***is significant at 1%; **is significant at 5% and *is significant at 10%.

Table A.4. Estimations of the Determinants of Skill Premium, 2007–2013 Using the Hills' Classification

	Least Square Dummy Variable (LSDV)	
	Premium 1 Coef.	Premium 2 Coef.
Tertiary	−11.45**	2.99
	(4.23)	(1.80)
Female	9.67	−1.92
	(12.55)	(5.35)

Table A.4. (*Continued*)

	Least Square Dummy Variable (LSDV)	
	Premium 1 Coef.	Premium 2 Coef.
Managerial	−2.82	2.65
	(5.45)	(2.32)
Manufacture	−2.05	−1.09
	(5.79)	(2.47)
Mining	−0.69	−2.84
	(8.80)	(3.75)
Casual	−1.67	9.74*
	(11.70)	(4.99)
_cons	1.20	1.49
	(4.81)	(2.05)
Regional development area (resource−rich province as a base)		
Densely populated provinces	0.37	0.066
	(0.48)	(0.60)
Isolated provinces	−1.61***	−0.41
	(0.57)	(0.57)
Settled outer island provinces	−1.33***	0.11
	(0.32)	(0.27)
Sparsely populated provinces	−0.51	0.088
	(0.35)	(0.24)
Observation	35	85
R^2	0.84	0.2651

Note: Note that the results presented in Table A.4 are not directly comparable with the LSDV results presented in Table A.3, as the base category for the regional development area is different (as the regional classification is different, then we are not able to apply Greater Jakarta as a base category in Table A.4).

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REGIONAL SKILL DIFFERENTIALS: A STUDY OF THE INDONESIAN LABOR MARKET

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This study investigates the patterns and trends in the returns to skill in the Indonesian labor market over the period 2007 to 2013, a period of rising earnings and income inequality. The study takes into account the labor demand and supply across regional development regions and over time. It presents evidence on the returns to skill related to structural changes in the economy through the growth of modern services and the resource boom. It confirms that skill premiums varied across regional development areas. The composition of industries across regions, female labor participation, the proportion of casual workers, 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 and minimum wages policy in reducing the skill premium.

Keywords: Skill premium; supply of labor; demand of labor; regional development area; Indonesia; human capital.

Subject Classification Codes: I24 (Education and Inequality), J01 (Labor Economics), J24 (Human Capital; Skills), J31 (Wage Structure, Wage Differentials)

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1. Introduction

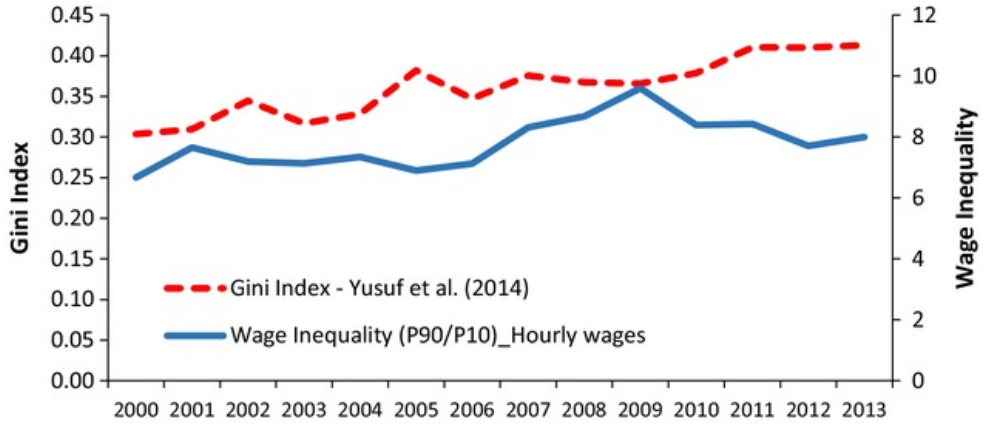
Earnings differentials, including differences between workers by level of education and training, gender, ethnicity and migrant status, have been the subject of extensive research by labor economists. All these variables are important indicators of conditions in the labor market and how particular groups of workers are faring. They can be used to measure the returns to education and training or discrimination in the labor market. This paper focusses on one important differential, the determinants of earnings differentials between Indonesian workers with different levels of education. This relationship is examined in 12 broad, development regions of Indonesia, distinguished according to the economic characteristics of each region.

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 labor market indicator of interest for a number of reasons. First, it reflects the supply and demand for labor with different levels of human capital. Technological change increases the demand for skilled workers that leads to higher skill premium. Further, on the supply side, the demographic change and increase educational opportunities have altered the composition of labor supply. Indonesia is one of these countries experiencing a doubling in the number of university graduates in recent decades making the returns to higher education an interesting policy issue. Further, there is some evidence that these changes have been associated with rising income inequality (discussed subsequently).

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 labor 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 in which higher levels of human capital are required. A study examining the Lewis turning point in the Indonesian labor 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 (Manning



Source: Yusuf *et al.* (2014) and Sakernas Data 2000–2013, published by BPS.

Figure 1. Income and Wages Inequality in Indonesia Between 2007 and 2013

and Miranti, 2015; Miranti *et al.*, 2014; Yusuf *et al.*, 2014). This has provoked widespread concern among the public and policy makers.

Reducing the level of income inequality in the country has thus become a key policy focus and was been included in the latest Medium Term Development Plan (RPJM) 2015–2019. The plan has set a very ambitious target to reduce the Gini coefficient from 0.41 to 0.36 by the end of 2019. The World Bank (2016) indicated some policy options to reduce inequality and these include policy in the education sector, particularly by improving access to education for the poor through social protection programs (such as the use of Indonesia Smart Cards (Kartu Indonesia Pintar), Conditional Cash Transfers and education subsidies). In addition, increased expenditure on education in general and improving educational outcomes are priorities 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 are dispersed across the larger but less populated regions 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. Investigating this issue at the regional level is also important as regional disparity has been one of the key drivers of increasing inequality in this country (Miranti *et al.*, 2013; Organisation for Economic Cooperation and Development, 2011; Yusuf *et al.*, 2014).

The Indonesian labor market as a whole has become more integrated over time and 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 toward the national average as workers moved to the areas where they could expect the highest returns to their labor. However, migration is not

costless, in a such culturally and ethnically diverse archipelago. In some regions, the traditional agricultural sector remains of major importance, whereas in other areas, notably Greater Jakarta, the presence of a modern service sector is much 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 rural-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.1).

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 regimen 1998. Many government functions were decentralized, particularly to the district level, following the passing of the Decentralization Laws No. 22/1999 and 25/1999. For example, minimum wage regulations were 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 three research questions: What are the determinants of the skill premium in Indonesia and particularly has it been affected by the expansion of tertiary education? Second, do regional factors play a role in determining the skill differential? Finally, did the resources boom which Indonesia experienced in the first decade of the 2000s affect skill differential?

The outline of the paper is as follows. Following the introduction, the paper 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.

2. Literature Review

2.1. *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 areas; the poorest and richest and lowest and between the worst and best 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) show that the share of GDP invested in higher education in Indonesia was 0.7% in 2010, much lower than those of neighboring countries including Malaysia at 1.7%, Thailand at 1.1% and Vietnam at 2.4%.

In terms of enrollment in tertiary level education (defined here as those enrolling in bachelor degree or above), the latest UNESCO data show that Indonesia has been improving its performance by more than doubling its gross enrolment ratio (GER) from only 14.2% in 2001 to 31.3% in 2013, an average of 21.4% during 2001–2013. Nevertheless, this figure is still below those of Malaysia at 32.8%, the Philippines at 29.7% and Thailand at 46.8% during the same period.

2.2. *The skill premium and its determinants*

These improvements 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 *et al.* (2013, p. 231) concludes that the return to education for senior high school graduates declined between 1993 and 2007–2008 but rose for those with a university degree. The unemployment rate among labor with tertiary education also fell significantly, signaling an increase in demand for their labor (International Labour Organization, 2013).

Katz and Murphy (1991) developed a supply and demand framework to assess the role of supply and demand shift of labor in changes of wage differentials. According to Katz and Murphy (1991), the competitive relative wages are determined by the supply and demand interaction. The model assumes that the supply is inelastic in the short run, so if the demand for skilled labor is constant, the relative wages of skilled workers will be lowered. Meanwhile, the shifting of demand for skilled labor due to technological change or the shifting of demand for product from a more skill-intensive sector will increase the premium for skilled workers.

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 side of the labor market. Autor (2014) summarized the literature on the roles of supply and demand for workers in explaining an increased skill premium particularly in developed countries. In the U.S., for example, the gap in earnings between college and high school graduates increased in the 1960s and reached 55%. This figure fell slightly in the 1970s to 45%, as rising demand for skilled workers was followed by a rapid increase of their supply. The skill premium further widened from 1982 to 2012 and reached a highest point in 2005 at 97%. These data show that the premium for college graduates at high school level increased from 1.5 times in 1982 (premium of 55%) to double by 2005 (premium of 97%).

The education race model of Goldin and Katz (2008) is frequently cited to explain the increase in the skill premiums. The model states that the premium will be wider if the supply of educated labor does not keep up with an increase in demand for skilled workers. The model was employed to explain a persistent increase in the skill premium in the U.S. after the 1980s. The yearly wage premium is regressed on two factors: (i) the supply of

college graduates and (ii) a time trend to proxy the rising demand for college graduates. The study concluded that the shortage in supply of educated workers contributed to an increase in the wage premium.

Specifically, demographic change and increased educational opportunities have altered the composition of labor 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 *et al.*, 2004). One of the most well-documented supply-side changes took place in the US labor market in the 1970s when the return to university education fell following the entry of the large baby boomer cohort into the labor 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 female participation into the labor force may also contribute to widen the earnings differentials. A study by Mandel and Semyonov (2005) shows that compared to male workers, female workers are more likely to be employed in low-wage jobs and occupations. Thus, an increase of female participation put pressure to the supply of male workers, particularly the unskilled ones that further depressed their wage. Their study further examines whether the lower earnings differentials between male and female workers is determined by the egalitarian wage structures or the family policy. They find that the egalitarian wage structure of centralized wage system was essential to lower the earnings differentials.

Further, some studies suggested that an increase in the skill premium is influenced by an increase in the demand for skilled labor. Lee and Wie (2015) have investigated the existence of a skill premium in the Indonesian labor market. Based on the National Labour Force Survey (SAKERNAS) data, the share of educated workers and their wage premium in the Indonesian labor market increased significantly over the period 2003–2009. Consistent with Purnastuti *et al.* (2013), the study finds high returns to a university degree and that this was a source of rising wage inequality. Lee and Wie (2015) showed that the skill premium fell in the 1990s during the period of more rapid export-oriented growth in Indonesia, so the gain in higher wage was enjoyed by the less skilled group.

Subsequently, the premium started to increase after 2003, both in urban and rural areas. Applying the supply–demand framework of Katz and Murphy (1991), Lee and Wie (2015) suggest that the existence of skill premium for the period 1990–2010 in the Indonesian labor market can be explained by major shifts in the demand for labor. Specifically, the increase of the premium for skilled workers was contributed by skill-biased technological change that shifted demand into skilled workers both within and between industries. Technological change is driven by the increase in foreign direct investment and a larger share of imported goods.

According to the literature, 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. These often require knowledge of new technologies or computerization and related to trade openness, globalization and technological transfer from overseas (Acemoglu,

2002, 2003; Gindling and Robbins, 2001; He, 2012; He and Liu, 2008; Krussell *et al.*, 2000; Pavcnik, 2000; Piketty, 2015). The influence of skill-biased technical change on the rising demand for skilled workers and the increasing returns to skill have been widely analyzed with the discussion focussing 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.

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.

In addition to supply and demand characteristics, literature suggests that changes of labor market institutions such as minimum wage determine the skill premium. Mandel and Semyonov (2005) argue that a more egalitarian wage structure contributes to lower earnings differentials between men and women in developed countries because it provides protection for low wage workers. The egalitarian wage structure is characterized by centralized collective bargaining, strong trade unions and high degree of coordination and industrial relation. Further, Fernández and Messina (2017) find that a significant increase of minimum wage in three Latin American countries of Brazil, Argentina and Chile in the 2000s increased the wages of low-skilled workers and lowered the earnings differential. However, the study by Lee and Wie (2015) of Indonesian labor market argued that the minimum had no substantial role in determining the skill premium between 2003 and 2009. Lee and Wie (2015) argued that the number and composition of workers and their skill levels in the formal sector were quite constant after 2003, so the increases in skill premiums from 2003 and 2009 could not be attributed to compositional changes.

3. Patterns and Trends in the Skill Premium

This paper aims to examine the role of supply and demand characteristics on the skill premium for labor across regional development areas. The dependent variable is the skill premium measured by the ratio of the wages of more educated workers to less educated workers as suggested by the literature (Autor, 2014). Indonesia has been focussing on human capital investment by increasing access to tertiary education (Purnastuti and Izzaty, 2015). Specifically, two measures of the skill premium are used. Premium 1 is the ratio of the median earnings of tertiary graduates (Diploma III and above) to those with primary education. Premium 2 is the ratio of the median earnings of tertiary to that of high school graduates. Figure 2 shows the national average for each of the premia over the period. For premium 1, on average, tertiary educated workers earned 3.32 times that of unskilled ones between 2007 and 2013. For premium 2, tertiary educated workers received returns 2.25 times workers with higher-secondary education.

The regressions focus on the correlations between chosen demand and supply characteristics in the regional labor markets rather than attempting to identify a full demand and supply model. The characteristics of supply of labor are the proportion of workers with a tertiary degree (tertiary), the proportion of female workers (female) and the proportion of casual workers (casual). The proportion of casual workers is a proxy for job insecurity in each region, where casual workers are non-permanent workers who worked for more than one employer in the last one month (see Appendix Table A.2). Further, the characteristics of demand for labor are represented by the proportion of workers employed in the manufacturing sector (manufacture), the mining sector (mining) and those with managerial positions (managerial).

This study makes a special contribution to the literature on skill premiums by capturing the characteristics of each region using a regional fixed effects model. Previous literature underlines the importance of taking regional diversity into the model, bearing mind that Indonesia has a geographically dispersed economic structure as discussed earlier. Studies in Indonesia have discussed ways to classify regions 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 labor supply and demand.

In this paper, we go further than the previous literature by classifying 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 labor market. 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% of employment in agriculture. There are three regions classified as rural: rural Java, rural Sumatera and other (Table 1).

The second group of regions is those where the proportion of workers working in the mining sector is higher than 1% and mining contributes substantially to regional income (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 labor is not as strong as in agriculture and the manufacturing sector.

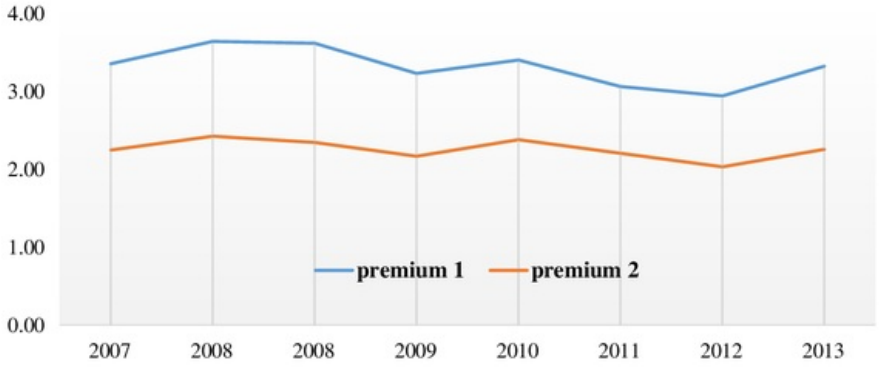
The third group is the modern-based economy that covers regions such as Greater Jakarta, Greater Bandung, Greater Semarang, Greater Surabaya, (others) Java urban, Medan and Batam and Greater Makassar. Table 1 shows that there has been a shift in these regions away from agriculture to the modern economy where manufacturing and services play more significant roles, accounting for more than 20% of employment. The proportion of paid workers in the manufacturing sector in the modern-based economy was more than 20% 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, (others) Java urban and Greater Makassar with more than 15% 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
Indonesia	37.82	1.19	12.94	9.82	0.48	0.94	8.40

*Modern sector covers manufacturing and modern services.
**High-skilled service 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 agricultural sector, for example, Greater Semarang with 34%, Greater Makassar 24% and Greater Bandung 16%. Further, the emergence of high-skilled services is also observed in the mining-based regions. In areas of Pekanbaru, Dumai and Natuna, coded under



Source: Indonesia Labour Force Survey, various years.
Notes: Premium 1 is the ratio of median wages of workers with tertiary degree (DIII/S1/S2/S3) to workers with primary school and below. Premium 2 is the ratio of median wages of workers with tertiary degree (DIII/S1/S2/S3) to workers with senior high school/DI/DII.

Figure 2. Skill Premium in National Level 2007–2013

Figure 3. Regional Development Map

Table 2. The Demographic Data across Regional Development Area

Regional Development Area		Population			Proportion		
Code	Area	Male	Female	Total	Male	Female	Total
1	Greater Jakarta	10,437,734	10,096,045	20,533,779	8.72%	8.56%	8.64%
2	Greater Bandung	6,769,092	6,480,238	13,249,330	5.66%	5.49%	5.58%
3	Greater Semarang	2,936,014	2,985,617	5,921,631	2.45%	2.53%	2.49%
4	Greater Surabaya	2,927,243	2,956,783	5,884,026	2.45%	2.51%	2.48%
5	Java Urban	1,791,325	1,841,285	3,632,610	1.50%	1.56%	1.53%
6	Java Rural	43,659,256	43,729,958	87,389,214	36.49%	37.06%	36.77%
7	Medan and Batam	1,521,793	1,520,102	3,041,895	1.27%	1.29%	1.28%
8	Sumateran Mining	623,591	596,982	1,220,573	0.52%	0.51%	0.51%
9	Sumateran Rural	23,509,243	22,859,220	46,368,463	19.65%	19.37%	19.51%
10	Balikpapan Samarinda	666,130	618,949	1,285,079	0.56%	0.52%	0.54%
11	Greater Makassar	1,268,366	1,311,843	2,580,209	1.06%	1.11%	1.09%
12	Others	23,521,126	23,013,391	46,534,517	19.66%	19.50%	19.58%
	Total (Indonesia)	119,630,913	118,010,413	237,641,326	100.00%	100.00%	100.00%

Sumateran mining, the proportion of paid workers employed in high-skilled services is close to 20%. The rich resource regions in East Kalimantan such as Balikpapan and Samarinda also have a high proportion of workers employed in high-skilled services.

Figure 3 shows a map which provides a visual picture of the regional classification discussed above and Table 2 describes the demographic data of population of male and female across areas.

4. Data and Methodology

This study is based on data from the National Labour Survey (SAKERNAS) published by the Indonesian Bureau of Statistics (BPS) for the period 2007–2013. BPS increased the size of the SAKERNAS sample in 2007 so the data are representative at the district level. Wage and salary employment, both full-time employees and casual workers, covering around 40% from the total workforce are included here. The self-employed are excluded from the dataset because their labor income is unobserved (Mehta and Mohr, 2012). We use regional development areas as our spatial unit of analysis. Thus, we have panel data for regional development areas, covering an eight-year period, and examine the determinants of the skill premium in Indonesia across regions between 2007 and 2013.

For the theoretical model and empirical estimation of the skill wage premium, we draw on the debates between Peri (2010) and Borjas (2015) in the context of the influx of immigrants into the US economy. Peri (2010) argued that when the supply of unskilled immigrant workers increased, wages would fall for the jobs they took. Declining wages for existing jobs then nudged the native-born into up-skilling and moving to better paid jobs. So, while the average wages for these particular jobs declined, the wages of native-born workers would unexpectedly rise and the gap of earnings between the immigrant and the

native-born would be increased. This is in contrast to Borjas (2015), who argued that immigration has hampered the growth in wages of native-born. Borjas (2015) argued that wage will decline substantially as the supply of immigrant workers lowered the wage of those native-born workers also, and this has contributed to the decline in the skill premium between these two groups.[1]

These mixed findings in terms of the associations between the supply of particular types of workers and the skill premium have motivated us to use the supply of tertiary educated workers (as a proportion to total workers) as a proxy for skilled workers as one of the determinants of the skill premium. We also followed Whalley and Xing (2014) who estimated the drivers of regional skill premium in China and also included the share of skilled labor in the labor force as one of the explanatory variables.

As in Whalley and Xing (2014), we also incorporated regional fixed effects. 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 minimize the multicollinearity problem if there is one (see Appendix Table A.3).

As discussed earlier, we also included other supply and demand variables, in the estimation, that can be seen in Table A.2. We initially included time fixed effects to capture yearly omitted variables, but we dropped them as they were highly correlated with the other time-varying explanatory variables. 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 *et al.*, 1993). Estimation of each measure of the skill premium is conducted separately using the same subset of explanatory variables. Three variants of estimations are conducted: first applying a least square dummy variable (LSDV) where we estimated regional fixed effects. For this type of estimation, regional fixed effects 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 rural-based economies. Second estimation is employing the first differencing where the regional fixed effects are canceled out by first-order differencing.

For a robustness test, we also ran (i) estimations by using a different regional classification, that is, Hill's (1989) regional classification, and examined the determinants of the skill premium by using the LSDV approach, taking into account Hill's classification as the regional fixed effects and (ii) estimations that use first differencing. The estimation result is available in Table A.4 in Appendix A.

Thirdly, we also acknowledged that there is a risk of reversed causality especially between education and the skill premium where highly educated workers have a tendency to move to regions with a higher skill premium such as 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 and still taking into account regional fixed effects

[1] Nevertheless, we should point out that Borjas (2015) was criticized on his methodology.

(the 2SLS Fixed Effects). Following Reed (2014), this study employs the lag of its endogenous variable (tertiary education) as an instrumental variable. Results show that a lag of four years for tertiary is an appropriate instrument for tertiary.[2] The instrument is credible because it might take years to the labor market to respond to the change in the fraction of the individuals with tertiary degree. For example, if wages are bargained by unions of firms and workers do not evert this straight away, so that an increase in the fraction of individuals with tertiary degree could take time before appearing in the actual earnings. Finally, this study includes the minimum wage in the estimation. We would expect a high regional minimum wage to compress the skill differentials.

Normally, in the case of individual estimations, there exists a self-selection issue that needs to be addressed, for example, in the case of women participation in the labor market or not, or self-selection of workers into different sectors. Our model uses data at the regional level not at the individual level where the selection correction is usually applied. Therefore, the self-selection issue cannot be addressed. The final equation to be estimated is shown in Equation (1)

$$\begin{aligned}\text{Premium}1,2_{it} = {} & \beta_0 + \beta_1 \cdot \text{Tertiary}_{it} + \beta_2 \cdot \text{Female}_{it} + \beta_3 \cdot \text{Managerial}_{it} + \beta_4 \cdot \text{Manufacture}_{it} \\ & + \beta_5 \cdot \text{Mining}_{it} + \beta_6 \cdot \text{Casual}_{it} + \beta_7 \cdot \text{Minimum wage}_{it} + \lambda_i + \varepsilon_{it}. \qquad (1)\end{aligned}$$

The operational definition of variables is available in Table 3. As reported in Table 4, there are substantial differences between regions in the composition of the workforce as measured by the explanatory variables.

Table 3. Definition of the Variables

Variable	Definition
Premium 1	The ratio of median wages of workers with tertiary degree (DIII/S1/S2/S3) 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 senior high school/DI/DII.
Tertiary	The proportion of workers with tertiary education to total workers
Female	The proportion of females workers to total workers
Managerial	The proportion of workers with managerial level to total workers
Manufacture	The proportion of workers in the manufacturing sector to total workers
Mining	The proportion of workers in the mining sector to total workers
Casual	The proportion of casual workers to total workers
Minimum wages	The yearly average minimum wages in constant value using 2007 as base year of the regions in the development area classification
λ_i	Unobserved regional-specific effects
i	Regional development area
t	Year

[2] The instrument is tested using the first-stage regression. The adjusted R^2 is 0.8165 and the F-test is 8.92641 with df (1,66) and this is statistically significant using the 99% confidence interval.

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

Variable	Obs.	Mean	Std. Dev.	Min	Max
Premium 1	84	3.32	0.64	2.10	4.73
Premium 2	84	2.25	0.34	1.59	3.07
Tertiary	84	0.10	0.04	0.03	0.19
Female	84	0.37	0.04	0.30	0.44
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
Casual	84	0.07	0.04	0.02	0.17
Minimum wage (in thousand IDR)	84	804.07	158.26	572	1,543

Source: Authors' estimations.

5. Analysis and Discussion

Table 5 summarizes 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, 16–18% of workers had a tertiary degree, DIII and above. In contrast, in six areas, the share of these skilled workers was below 10%: 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% of the workforce in Java Rural, Greater Makassar and Others.[3]

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 6 presents the mean value of the two skill premia by region. The variation in premium 1 between tertiary and primary educated workers was the largest, ranging from 4.14 in Greater Bandung to 2.52 in Greater Surabaya.

[3]The result for Greater Makassar may be explained by the migration of low skilled workers from the outer islands into the area.

Table 5. 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 1	2013 2	2007 3	2013 4	2007 5	2013 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 and 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.

Table 6. Means of Skill Premium across Regional Development Area 2007–2013

Regional Development Area	Premium 1	Premium 2
Modern-based economy		
Greater Jakarta	3.85	2.13
Greater Bandung	4.14	2.42
Greater Semarang	3.17	2.29
Greater Surabaya	2.52	1.91
Urban Java	3.84	2.72
Medan and Batam	2.82	2.05
Greater Makassar	3.48	2.50
Mining-based economy		
Sumateran Mining	3.09	2.32
Balikpapan and Samarinda	2.67	1.87

Table 6. (*Continued*)

Regional Development Area	Premium 1	Premium 2
Rural-based economy		
Java Rural	4.02	2.68
Sumatera Rural	2.88	2.11
Others	3.31	2.02
Total	3.32	2.25

Source: Indonesia Labour Force Survey, various years.

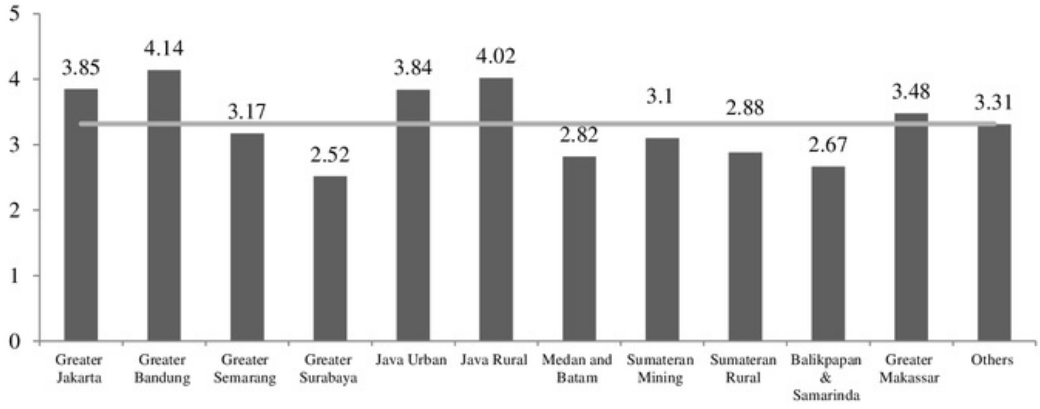
Table 7. Estimations of the Determinants of Skill Premium, 2007–2013

	Premium 1			Premium 2		
	Least Square Dummy Variable (LSDV) Coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.	Least Square Dummy Variable (LSDV) Coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.
Tertiary	−2.34	−2.06	−14.51	0.10	−0.59	−10.97
	(1.83)	(2.01)	(9.83)	(0.95)	(1.21)	(7.74)
Female	4.15	5.55	6.39	3.80	4.30*	5.83**
	(4.41)	(3.57)	(4.63)	(2.33)	(2.24)	(2.73)
Managerial	2.93	3.75	4.10	0.95	−1.10	2.01
	(2.36)	(2.97)	(3.00)	(1.31)	(1.95)	(2.02)
Manufacture	−3.83	−2.88	−5.25	−2.03*	−2.97*	−3.33
	(2.71)	(3.71)	(3.25)	(1.17)	(1.68)	(2.23)
Mining	7.39	8.18	19.14	5.12	5.54	15.82**
	(9.78)	(17.79)	(13.38)	(4.50)	(7.88)	(7.71)
Casual	1.34	6.71	2.35	2.58*	5.59**	3.48
	(3.02)	(4.50)	(3.64)	(1.38)	(2.31)	(2.80)
Minimum wage	−0.0014***	−0.0008	−0.00038	−0.00095***	−0.0012***	−0.00004
	(0.0004)	(0.0004)	(0.0009)	(0.0002)	(0.00028)	(0.0006)
_cons	4.52**	−0.046	4.56	1.96**	0.0033	1.99
	(1.83)	(0.064)	(1.73)	(0.92)	(0.033)	(1.01)
Regional development area (Greater Jakarta as a base)						
Greater Bandung	0.2197		−0.56	0.20		−0.51
	(0.51)		(0.78)	(0.20)		(0.58)
Greater Semarang	−1.94***		−2.76***	−0.76***		−1.51***
	(0.50)		(0.74)	(0.25)		(0.57)
Greater Surabaya	−1.53***		−1.77***	−0.41***		−0.63***
	(0.32)		(0.35)	(0.13)		(0.21)
Java urban	−0.98***		−0.85**	−0.13		−0.005
	(0.33)		(0.35)	(0.19)		(0.22)
Java rural	−1.15**		−2.37**	−0.41*		−1.52*
	(0.53)		(1.03)	(0.23)		(0.84)

Table 7. (*Continued*)

	Premium 1			Premium 2		
	Least Square Dummy Variable (LSDV) Coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.	Least Square Dummy Variable (LSDV) Coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.
Medan Batam	−1.42***		−1.35***	−0.35***		−0.29**
	(0.22)		(0.26)	(0.08)		(0.13)
Sumateran Mining	−1.72***		−1.86***	−0.37*		−0.50
	(0.44)		(0.48)	(0.20)		(0.31)
Sumateran Rural	−2.38***		−3.64***	−0.81***		−1.96**
	(0.51)		(1.12)	(0.23)		(0.84)
Balikpapan and Samarinda	−2.35***		−3.15***	−0.90**		−1.63***
	(0.67)		(0.99)	(0.35)		(0.60)
Greater Makassar	−1.43***		−1.75***	−0.25		−0.54
	(0.44)		(0.49)	(0.21)		(0.34)
Others	−2.23***		−3.61***	−1.06***		−2.32**
	(0.58)		(1.26)	(0.28)		(0.91)
Observation	84	72	84	84	72	84
R^2	0.77	0.14	0.68	0.76	0.14	0.49

Source: Authors' estimations.
Note: ***is significant at 1%; **is significant at 5% and *is significant at 10%.



Source: Indonesia Labour Force Survey, various years.
Notes: Premium 1 is the ratio of median wages of workers with tertiary degree (DIII/S1/S2/S3) to workers with primary school and below. The grey line is the national average of skill Premium 1 between 2007 and 2013. The mean value is 3.32.

Figure 4. Skill Premium 1 across Regional Development Areas 2007–2013

As a further illustration of the regional differences, Figure 4 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.

6. Estimation Results

Table 5 presents our main results. The significant robust results are shown for Premium 2 in the case of LSDV and first difference estimations for manufacturing, casual and minimum wage variables. The results show that industrial composition of regional economies had implication for the skill differential. The size of the manufacturing sector had a significant role in dampening wage differentials between tertiary graduates and primary and high school graduates. The proportion of casual workers contributes positively to the skill premium, as casual workers are likely to exist among the unskilled labor. The negative association between minimum wage and skill premium is expected as the minimum wage raised the wage of the unskilled workers.

Nevertheless, when the endogeneity is taken into account, the 2SLS results show that both the coefficients of female and mining are significant. Regarding supply characteristics, the significance of female coefficient with its positive association to skill premium may confirm the literature that female workers are a close substitute of unskilled male workers. Therefore, a higher proportion of female workers contributes to widen the skill differentials.

The proportion of tertiary-educated labor as a measure of the relative supply of skilled workers in each region has the expected negative correlation with skill Premium 1 and 2, although the coefficients are not statistically significant. It is interesting that the coefficient of tertiary becomes not statistically significant while we controlled for the minimum wages (please also Table A.3 in Appendix A in which the estimations excluded the minimum wage). Similar results are also found in Whalley and Xing (2014) when they found that the coefficient of the supply of skilled labor was not significant. Other variables, the proportion of managerial and casual workers, have a positive influence on the skill premium; however, only casual is statistically significant in LSDV and first difference estimations for Premium 2.

From the demand side, the estimations reveal that a higher proportion of workers employed in the manufacturing sector lowers the two skill premia, although the coefficients are only statistically significant in the LSDV and first difference estimations in the case of Premium 2. This may be due to the fact that we have also controlled for the minimum wage in the estimations. The minimum wage is expected to have greater effect on wages in the manufacturing industry, particularly in the modern-based regions, which had a negative

association with the skill premium. In other words, it seems to have had a significant influence on wages of less educated workers. The coefficients have the expected signs, but they are only significant in the LSDV in the case of Premium 1 and LSDV and first difference estimations in the case of Premium 2.

The Indonesian mining sector has positive and significant association with skill Premium 2 in the 2SLS. The mining sector is a technology-intensive industry so it demands skilled labor to work with the investment in specific technology or technology imported from overseas. The demand characteristics are also substantial in understanding the skill premium across regional development areas in Indonesia. Once all explanatory variables have been taken into account, the results show that the skill differential was largest in Greater Jakarta (all the regional dummies have negative coefficients). Holding everything else constant, the largest negative regional coefficients in both Premium 1 and 2 in 2SLS FE model (Table 5, col. 2) were for the other rural regions, rural regions of Sumatera, the mining region of Balikpapan and Samarinda. This means that these regions provided the smallest skill premium (in contrast to Greater Jakarta). It is interesting to see that the coefficients for Greater Bandung are not statistically significant in Premium 1 and 2 estimations which may indicate that this region offered a skill premium which does not differ from Jakarta. A similar case was found for the coefficients of Sumateran mining and Greater Makassar in the Premium 2 estimation.

7. Conclusion and Policy Implication

This study has focussed 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 labor markets in Indonesia using the most recent data. The second is the development and inclusion of characteristics of regional labor markets as the factors influencing the skill premium. These results show that there were significantly different regional effects on differentials holding everything else constant.

Our results show that both supply and demand factors have significant impacts on the skill premium. Taking into account the endogeneity issue, on the supply side, the proportion of females in the workforce in each region was associated with a larger skill differential, although this was only significant for Premium 2. This indicates that female workers are a close substitute of unskilled male workers. Despite the findings show that the supply of tertiary-educated workers was negatively but not statistically significantly associated with the size of the skill premium, this does not mean expansion nor access to tertiary education is not important. Human capital investment is also required to shift female workers from undertaking unskilled jobs to skilled jobs and to reduce the earning gap between unskilled and skilled workers.

On the other side, the demand side factor also matters. The size of the mining sector had a significant and positive correlation with the skill differential between tertiary and high school graduates, which also implies the earning advantage for those skilled workers. Some other results also show that manufacturing sector and minimum wage contributed to reduce skill premium.

In terms of regional differentials, most of the regional coefficients were negative compared with Greater Jakarta, although the coefficients were not always statistically significant. These results suggest that Indonesia does not function as one labor market but that there are some differences in the returns to skill between regions with rural regions offer the smallest skill premium while some urban areas like Greater Bandung and Makassar does not significantly provide different skill premium than Jakarta. What are the policy implications of these findings? In the past, the policy was based on comparative advantage principle by facilitating the manufacturing industry, particularly the labour-intensive ones to establish the business and export their products overseas. The policy aimed to increase jobs and produces a more equitable outcome. Moreover, the minimum wages policy in Indonesia provides protection for low skilled workers, particularly in the labor-intensive manufacturing industry. Nevertheless, the literature shows evidence that Indonesia is started to reach the Lewis turning point where more labor works in the formal sector and non-agricultural sector and so the inequality started to rise. Therefore, a policy should be directed to facilitate the skills upgrading to enable the workers keep up with the technological change.

Nevertheless, the current policy agenda has focussed 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). Fiscal policy should focus on higher education sector more. Human capital investment and widening access to higher education, which is needed through more effective and productive social spending in the area of education, is important. It is also important potentially through partnerships between educational institutions and regional industry.

The variety of skill premium offered by regional development area suggests a role for local governments and other stakeholders to participate actively in the development of local education or training program. A national agenda to promote a more balanced regional development and equitable access to higher education particularly in the less developed regions is also required.

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Appendix A

Table A.1. 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 A.2. Partial-Correlation Across Explanatory Variables

Variables	Tertiary	Female	Casual	Agriculture	Mining	Manufacture	High-Skilled Services	Managerial
Tertiary	1							
Female	−0.14	1						
Casual	−0.69***	0.15	1					
Agriculture	−0.79***	0.23**	0.56***	1				
Mining	0.079	−0.48***	−0.17	0.021	1			
Manufacture	0.13	0.084	0.018	−0.56***	−0.43***	1		
High-skilled services+	0.83***	−0.26**	−0.69***	−0.64***	0.17	−0.15	1	
Managerial	0.24**	−0.17	−0.44***	0.16	0.42***	−0.72***	0.55***	1
Minimum wages	0.45***	−0.43***	−0.28***	−0.38***	0.1106	0.2843***	0.31***	−0.03

Source: Auth[55] estimations.
Notes: ***is significant at 1%; **is significant at 5% and ***is significant at 10%.
+High skilled services include communication, finance and professional.
Source: Sakernas Data 2000–2013, published by BPS.

Table A.3. Estimations of the Determinants of Skill Premium, 2007–2013

	Premium 1			Premium 2		
	Least Square Dummy Variable (LSDV) coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.	Least Square Dummy Variable (LSDV) Coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.
Tertiary	−5.97**	−1.99	−16.71***	−2.40	−0.49	−11.21***
	(2.39)	(2.07)	(5.72)	(1.51)	(1.31)	(4.30)
Female	3.74	6.37*	6.59	3.52	5.54**	5.86**
	(4.65)	(3.70)	(4.61)	(2.57)	(2.24)	(2.64)
Managerial	3.99	4.13	4.44	1.68	−0.53	2.05
	(2.57)	(2.93)	(2.94)	(1.41)	(2.00)	(1.90)
Manufacture	−5.54*	−2.12	−5.74**	−3.22**	−1.81	−3.38**
	(2.94)	(3.73)	(2.86)	(1.35)	(1.73)	(1.82)
Mining	5.05	9.14	20.20	3.51	6.99	15.94**
	(10.06)	(17.89)	(12.31)	(5.27)	(8.46)	(6.82)
Casual	−0.46	5.66	2.15	1.31	3.99	3.45
	(3.31)	(4.36)	(3.96)	(1.67)	(2.54)	(2.89)
_cons	4.08**	−0.087	4.48***	1.66*	−0.059	2.13***
	(1.78)	(0.053)	(1.76)	(0.97)	(0.027)	(0.91)

Table A.3. (*Continued*)

	Premium 1			Premium 2		
	Least Square Dummy Variable (LSDV) coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.	Least Square Dummy Variable (LSDV) Coef.	First Difference Coef.	Two-Stage Least Square (2SLS FE) Coef.
	Regional development area (Greater Jakarta as a base)					
Greater Bandung	0.37		−0.64	0.3		0.53
	(0.48)		(0.76)	(0.21)		(0.52)
Greater Semarang	−1.61***		−2.80***	−0.54*		−1.52***
	(0.57)		(0.71)	(0.31)		(0.54)
Greater Surabaya	−1.33***		−1.76***	−0.28*		−0.63***
	(0.32)		(0.37)	(0.14)		(0.22)
Java urban	−0.51		−0.75**	0.20		0.006
	(0.35)		(0.33)	(0.21)		(0.22)
Java rural	−0.84		−2.47***	−0.19		−1.53**
	(0.59)		(0.95)	(0.32)		(0.73)
Medan Batam	−1.17***		−1.30***	−0.18*		−0.28**
	(0.48)		(0.24)	(0.09)		(0.12)
Sumateran mining	−1.69***		−1.88***	−0.35		−0.50
	(0.48)		(0.49)	(0.22)		(0.31)
Sumateran rural	−2.53***		−3.83***	−0.91***		−1.98***
	(0.62)		(0.83)	(0.32)		(0.59)
Balikpapan and Samarinda	−2.28***		−3.24***	−0.85**		−1.64***
	(0.75)		(0.91)	(0.40)		(0.52)
Greater Makassar	−1.44***		−1.79***	−0.25		−0.54*
	(0.49)		(0.48)	(0.24)		(0.30)
Others	−2.34***		−3.81***	−1.14***		−2.34***
	(0.71)		(0.95)	(0.38)		(0.64)
Observation	84	84	84	84	84	84
R^2	0.73	0.12	0.67	0.64	0.18	0.48

Source: Authors' estimations.
Note: ***is significant at 1%; **is significant at 5% and *is significant at 10%.

Table A.4. Estimations of the Determinants of Skill Premium, 2007–2013 Using the Hills' Classification

	Least Square Dummy Variable (LSDV)	
	Premium 1 Coef.	Premium 2 Coef.
Tertiary	−11.45**	2.99
	(4.23)	(1.80)
Female	9.67	−1.92
	(12.55)	(5.35)

Table A.4. (*Continued*)

	Least Square Dummy Variable (LSDV)	
	Premium 1 Coef.	Premium 2 Coef.
Managerial	−2.82	2.65
	(5.45)	(2.32)
Manufacture	−2.05	−1.09
	(5.79)	(2.47)
Mining	−0.69	−2.84
	(8.80)	(3.75)
Casual	−1.67	9.74*
	(11.70)	(4.99)
_cons	1.20	1.49
	(4.81)	(2.05)
Regional development area (resource−rich province as a base)		
Densely populated provinces	0.37	0.066
	(0.48)	(0.60)
Isolated provinces	−1.61***	−0.41
	(0.57)	(0.57)
Settled outer island provinces	−1.33***	0.11
	(0.32)	(0.27)
Sparsely populated provinces	−0.51	0.088
	(0.35)	(0.24)
Observation	35	85
R^2	0.84	0.2651

Note: Note that the results presented in Table A.4 are not directly comparable with the LSDV results presented in Table A.3, as the base category for the regional development area is different (as the regional classification is different, then we are not able to apply Greater Jakarta as a base category in Table A.4).

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b. Ruang lingkup dan kedalaman pembahasan : Studi ini merupakan kajian yang mendalam dan baru yang menyelidiki pola dan tren pengembalian keterampilan di pasar tenaga kerja Indonesia selama periode 2007 hingga 2013, periode meningkatnya pendapatan dan ketimpangan pendapatan. Hasilnya mendukung fokus kebijakan pada pengembangan sumber daya manusia di Indonesia untuk memenuhi meningkatnya permintaan akan pekerja terampil dan menunjukkan peran sektor manufaktur dan kebijakan upah minimum dalam mengurangi premi keterampilan. (skor=10)

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f. Kesesuaian bidang ilmu: Sangat sesuai bidang ekonomi terutama dalam bidang ekonomi pembangunan

Surakarta, 14 MAY 2020

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