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# Interprovincial differences in the endowment and utilization in labour force by educational attainment in Indonesia's post-crisis economy<sup>1</sup>

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## ABSTRACT

The labour endowment and utilization across sub-national regions differ by educational attainment. Generally, the high-income developed regions are richly endowed with the highly educated that enjoys greater employment stability. The reverse may be true for the lower-income developing regions. The educational expansion affects educational endowment in labour force across sub-national regions and region-specific shocks and minimum wage regulations affect its utilization.

We comprehensively explore the factors contributing to interregional inequalities in the labour endowment and utilization by educational attainment in the Indonesia's post-crisis economy, introducing a variable of the employment with  $j$  educational attainment per capita (where  $j$  consists of five different levels of educational attainment) and employing Cheng and Li's (2006) additive inequality decomposition method. Further, we employ Shorrocks' (1980) one-stage Theil decomposition method to measure the factors contributing to overall inequality in employment rate, which is the divergence between the employment rate in a nation and employment rates with  $j$  education attainment in province  $i$ .

We find that the industrial structures and business functions seem to vary more widely from province to province than the other characteristics, such as demographic structures and labour market efficiency, do. The interprovincial differences in labour market efficiencies tend to be greater for the highly educated groups than the less educated. This is affected by several factors: no universal social security system, province-specific compositions of formal/informal sectors, and different minimum-wage provisions across provinces. Moreover, the interprovincial inequities in employment rates with the junior secondary education attainment have the most significant influences among all education groups. The recent increase in the corresponding labour force share could make this a crucial issue for the country. Consequently, policies for improving the efficiency in the corresponding labour market must be implemented.

*Keywords:* Education, interprovincial allocation, Indonesia, inequality decomposition

JEL classification code: R11, R12, R58

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## 1. INTRODUCTION

There seems to be a broad consensus that education, which refers to the development of skills and knowledge of the labour force, affects economic growth and economic growth promotes improvement in educational level.

The share of the highly educated labour force in an economy, a proxy for educational endowment, varies across sub-national regions. Within a nation, the high-income developed sub-national regions are richly endowed with the highly educated that generally works in the high-value-added manufacturing sector and knowledge-intensive business sector. The reverse is also true for the low-income undeveloped sub-national regions. It is also assumed the high-income developed sub-national regions may attract less educated immigrants who work in the urban informal sector.

Employment rate, the extent to which labour force is being utilized, is a proxy of labour market efficiency and differs by sub-national regions as well as by educational attainment of labour force. Educated workers enjoy greater employment stability over less educated workers in the labour market (Mincer 1991). For instance, the educated generally invest more in on-the-job training and specific training marries firms and workers; therefore, firms are unlikely to lay off educated workers when they face adverse economic conditions. When educated workers switch jobs, they typically made the switch without suffering an intervening spell of unemployment. The educated workers are better informed and have better networks for learning about alternative job opportunities (Borjaos 2012). Besides, the seriousness in negative shocks, which falls labour demand, and the wage flexibility, which is a degree to changes in labour supply and demand, varies across sub-national regions (Armstrong and Taylor 2000).

The disproportional educational endowment and disparities in the corresponding labour market efficiency are growing public concerns, especially, in the developing nations with an inadequate market mechanism to adjust interregional imbalance and rapid educational expansion.

Over the past two decades, Indonesia has experienced a massive increase in its labour force from 77.4 million in 1990 to 116.5 million in 2010 and the labour force annually grew by 2.1%, which is significantly faster than the annual population growth rate (1.5%). The annual growth rates of the different education groups of labour force varied widely: No primary, -1.5%; Primary, 1.1%; Junior secondary, 5.6%; Senior secondary, 6.2%; and Tertiary, 9.8% (BPS various years b; BPS various years d).

The pronounced changes in the education demographics could have been driven by a wide variety of factors, including deagrarianization, the size of the youth population, ambitious universal primary education policies (promotion of increase in primary school buildings and extension in education compulsory), and increase in supply and demand for higher education. For instance, between 1990 and 2010, the agriculture sector, which generally provides the largest source of employment for the less educated (i.e., those with either no primary or only primary education) went from employing 55.9% of Indonesia's entire labour force to employing only

38.3%. At the same time, the primarily or less educated went from representing 75% of the labour force to only 49% (BPS various years d).

A number of studies describe the interregional distribution in educational opportunities associated with educational expansion (Hill 2000; Hill and Wie 2012; Suharti 2013). Hill (2000) summarized the differences in school enrolment per capita by province and education level. Since 1970, primary education has spread rapidly across all of Indonesia so that by the early 1990s, no province was significantly lagging behind. In 1990, owing to larger youth populations and a catch-up effect from earlier neglect, several off-Java provinces showed higher enrolment rates than those on Java. In the 1980s, the emphasis shifted to secondary education, and as such, enrolment rates among teenagers grew at a faster rate than those among the primary-age group. In 1990, the interregional distribution of tertiary enrolment seemed more uneven than primary or secondary enrolment; Jakarta, Yogyakarta, and major off-Java regional centres, such as North Sumatra and South Sulawesi, showed higher enrolment rates in tertiary education.

Hill and Wie (2012) noted that, in line with the country's commitment to achieve universal education (and several other factors), tertiary education began to grow very rapidly during the 1980s. At the time, Indonesia was transforming itself into a lower-middle income nation, wherein the demand for higher education would become highly income-elastic, thereby requiring more formally qualified professionals and a skilled workforce. In response to the rising income, limited state fiscal capacity, increased commercial demand for graduates and general economic deregulation, the private tertiary education sector began to grow quickly. However, the distribution in tertiary education opportunity remained uneven across subnational regions. The gross enrolment ratio of tertiary education ranges between about 75% in Jakarta and Yogyakarta provinces and 10% or less in the provinces of Bangka-Belitung Island, Banten, Riau, East and West Kalimantan, and West Papua in 2001.

Suharti (2013) comprehensively described the recent trend in Indonesia's education and the driving forces to spread primary and secondary education across sub-national regions. The rapid spread of primary education began with the started from Presidential Primary School (Inpres Sekolah Dasar, Inpres SD) Program, which aims at building primary school in every village and then large numbers of primary schools were built under the program in 1973. In 1984, the government made it compulsory to attend school for six years and extended this to nine years in 1994. Other educational indicators remain uneven across provinces, though. In 2010, the average years of schooling ranged from 6.7 in Papua to 10.9 in Jakarta, and adult illiteracy rates ranged from 0.7% in North Sulawesi to 31.2% in Papua.

There are also several studies focusing on the disparities in employment rates across sub-national regions (Dhanani, 2004; Islam and Chowdhury 2010; ADB 2011). Dhanani (2004) confirmed with multi-variate analysis that the large provincial differences in unemployment rate were due to a combination of structural factors, such as proportion of the (educated) youth population, educated women, wage workers, urban workers in the agriculture and trade sectors. Islam and Chowdhury (2010) found the 11 provinces, which are mostly resource rich-provinces and industrial centres, above the national average unemployment rate accounted for 52% of total

unemployed labour force in 2007. They implied that those regional concentrations of unemployment resulted from the much interregional immigration from other provinces. They also found that the labour force with the senior secondary education attainment showed the highest unemployment rate in the year 2002-2006, followed by those with junior secondary education attainment and emphasized the improvement in competencies required for employment.

ADB (2011) conducted a sampling survey for the employment in the informal sector in the two pilot provinces, Yogyakarta and Banten in 2009, mixed with the regular survey of National Labor Force Survey (SAKERNAS). This survey results confirm that workers who were informally employed tend to have lower educational backgrounds than those with formal jobs. The labour force with tertiary educational attainment in Yogyakarta accounted for 46.8% of the total number of formal jobs. In contrast, those with primary or less education attainment accounted for 49.8% in Yogyakarta and 56.4% in Banten of the total number of informal jobs.

Several inequality decomposition studies, such as Akita and Miyata (2008) and Hayashi et al. (2014) confirmed that education had a significant effect on expenditure inequality, employing two-stage nested Theil inequality decomposition analysis, based on with data from the National Socioeconomic Survey (SUSENAS). Others empirically examined the role of education in income growth, poverty reduction, and income/expenditure inequality at the sub-national level in Indonesia, employing the regression based approaches, although those do not focus directly on the disparities in the educational endowment and its utilization across sub-national regions (Garcia and Soelistianingsih 1998; Balisacan et al. 2003; Vidyattama 2010).

Observing the existing literature, few studies thoroughly focused on the endowment and utilization in labour force across Indonesia's sub-national regions by educational attainment. We comprehensively examine this subject in the Indonesia's post-crisis economy, employing Cheng and Li's (2006) additive inequality decomposition method. Further, we employ Shorrocks' (1980) one-stage Theil decomposition method to measure the factors contributing to overall inequality in employment rate, which is the divergence between the employment rate in a nation and employment rates with  $j$  education attainment in province  $i$ .

The remainder of this paper is organized as follows: Next, we describe the method and data used in this study. Then, we describe the empirical results, and finally, we present our conclusions.

## **2. METHOD AND DATA**

### **2.1 Method**

#### **2.1. Cheng and Li's (2006) inequality decomposition method**

This study measures the inequalities in employment with  $j$  education attainment per capita in province  $i$  and explores the factors contributing to the inequalities, employing the method, which developed by Cheng and Li (2006). This shows the additive inequality decomposition method by using causal factors when the decomposition variable is expressed with multiplicative components.

Their technique, which improved upon that of Duro and Esteban (1998),<sup>2</sup> presents the additive interpretive inequality decomposition in per capita income, consisting of Theil second measures in productivity and labour participation rates and their interaction terms. Since employment with  $j$  educational attainment per capita is obtained by three multiplicative components, therefore we can apply Cheng and Li's (2006) method to our study.

Let  $P_i$ ,  $L_i$ , and  $E_i$  represent the population, labour force, and employment in province  $i$ , respectively. Furthermore, let the nation in question have a total of  $m$  provinces. We divide the labour force and employment variables into  $n$  groups based on educational attainment; as such,  $L_{ij}$  and  $E_{ij}$  represent labour and employment with  $j$  educational attainment in province  $i$ . When the subscript  $i$  is omitted, the aforementioned variables represent the corresponding national values.

Now, we introduce a variable of the employment with  $j$  educational attainment per capita in province  $i$ , denoted as  $x_{ij} = E_{ij}/P_i$ . This can be multiplicatively expressed as

$$x_{ij} = l_i \cdot l_{ij} \cdot e_{ij} \quad (i=1 \cdots m, j=1 \cdots n, x_{ij} > 0 \text{ for all } i \text{ and } j), \quad (1)$$

where  $l_i = L_i/P_i$  is the labour force participation rate (LFPR) in province  $i$ ,

$l_{ij} = L_{ij}/L_i$  is the share of labour force with  $j$  educational attainment in province  $i$ , and

$e_{ij} = E_{ij}/L_{ij}$  is the employment rate among those with  $j$  educational attainment in province  $i$ .

The first two multiplicative terms at the right hand side of Equation (1) is regarded as endowments for the entire labour force and the labour force with  $j$  educational attainment, while the third term is regarded as labour utilization/market efficiency with  $j$  educational attainment in a province. The provincial mean of the each variable in Equation (1) is expressed as  $\mu_{x_j}$ ,  $\mu_l$ ,  $\mu_{l_j}$ ,

and  $\mu_{e_j}$ , that is,  $\mu_{e_j} = \frac{1}{m} \sum_{i=1}^m e_{ij}$ .

The interprovincial inequality in employment with  $j$  educational attainment per capita, as measured by the Theil second measures,  $T_j$ ,  $T_{x_j}$ ,  $T_{l_j}$ , are given by

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<sup>2</sup> The additive inequality decomposition terms in Duro and Esteban (1998) can take positive or negative values, although a strict Theil index maintains a non-negative value for its property. It is difficult to interpret the role of the negative values, which indicates that the inequality of the corresponding factor negatively affects the inequality (Gisbert 2001; Cheng and Li 2008).

$$T_j(\mu_{x_j}, x_j) = \frac{1}{m} \sum_{i=1}^m \ln \left( \frac{\mu_{x_j}}{x_{ij}} \right) \geq 0, \text{ for all } j \quad (2)$$

Now, substituting Equation (1) into the right hand side of Equation (2) and multiplying quotient inside the natural logarithm by  $\mu_l \cdot \mu_{le_j} / \mu_l \cdot \mu_{le_j}$  yields

$$\begin{aligned} T_j(\mu_{x_j}, x_{ij}) &= \frac{1}{m} \sum_{i=1}^m \ln \left( \frac{\mu_l \cdot \mu_{le_j}}{l_i \cdot l_{ij} \cdot e_{ij}} \cdot \frac{\mu_{x_j}}{\mu_l \cdot \mu_{le_j}} \right) \\ &= \frac{1}{m} \sum_{i=1}^m \ln \left( \frac{\mu_l}{l_i} \right) + \frac{1}{m} \sum_{i=1}^m \ln \left( \frac{\mu_{le_j}}{l_{ij} \cdot e_{ij}} \right) + \ln \left( \frac{\mu_{x_j}}{\mu_l \cdot \mu_{le_j}} \right) \end{aligned} \quad (3)$$

where  $\mu_{le_j} = 1/m \sum_{i=1}^m l_{ij} \cdot e_{ij}$ . Similarly, multiplying the quotient inside the natural logarithm in

the second equity of the right hand side of Equation (3) by  $\mu_{l_j} \cdot \mu_{e_j} / \mu_{l_j} \cdot \mu_{e_j}$ , we obtain

$$\begin{aligned} T_j(\mu_{x_j}, x_{ij}) &= \frac{1}{m} \sum_{i=1}^m \ln \left( \frac{\mu_l}{l_i} \right) + \frac{1}{m} \sum_{i=1}^m \ln \left( \frac{\mu_{l_j} \cdot \mu_{e_j}}{l_{ij} \cdot e_{ij}} \cdot \frac{\mu_{le_j}}{\mu_{l_j} \cdot \mu_{e_j}} \right) + \ln \left( \frac{\mu_{x_j}}{\mu_l \cdot \mu_{le_j}} \right) \\ &= \frac{1}{m} \sum_{i=1}^m \ln \left( \frac{\mu_l}{l_i} \right) + \frac{1}{m} \sum_{i=1}^m \ln \left( \frac{\mu_{l_j}}{l_{ij}} \right) + \frac{1}{m} \sum_{i=1}^m \ln \left( \frac{\mu_{e_j}}{e_{ij}} \right) + \ln \left( \frac{\mu_{le_j}}{\mu_{l_j} \cdot \mu_{e_j}} \right) + \ln \left( \frac{\mu_{x_j}}{\mu_l \cdot \mu_{le_j}} \right) \end{aligned} \quad (4)$$

Further, we focus on the quotient inside the natural logarithm in the last two terms of the right hand-side of Equation (4). Now, we may express the covariance of  $l_i$  and  $l_{ij} \cdot e_{ij}$  (denoted as  $\sigma_{l_i, l_{ij} \cdot e_{ij}}$ ) as follows:

$$\begin{aligned} \sigma_{l_i, l_{ij} \cdot e_{ij}} &= \left( m \sum_{i=1}^m (l_i - \mu_l)(l_{ij} \cdot e_{ij} - \mu_{le_j}) \right) \\ &= \left( m \sum_{i=1}^m (l_i \cdot l_{ij} \cdot e_{ij} - l_i \cdot \mu_{le_j} - \mu_l \cdot l_{ij} \cdot e_{ij} + \mu_l \cdot \mu_{le_j}) \right) \\ &= \mu_{x_j} - \mu_l \cdot \mu_{le_j} \end{aligned} \quad (5)$$

If we divide all of the terms in Equation (5) by  $\mu_l \cdot \mu_{le_j}$ , we get

$$\frac{\mu_{x_j}}{\mu_l \cdot \mu_{le_j}} = \frac{\sigma_{l_i, l_{ij} \cdot e_{ij}}}{\mu_l \cdot \mu_{le_j}} + 1 \quad (6)$$

Similarly, the covariance of  $l_{ij}$  and  $e_{ij}$  (denoted as  $\sigma_{l_{ij}, e_{ij}}$ ) can be expressed as

$$\sigma_{l_{ij}, e_{ij}} = \left( m \sum_{i=1}^m (l_{ij} - \mu_{l_j})(e_{ij} - \mu_{e_j}) \right) = \mu_{le_j} - \mu_{l_j} \cdot \mu_{e_j} \quad (7)$$

Then, by dividing all of the terms in Equation (7) by  $\mu_{l_j} \cdot \mu_{e_j}$ , we obtain

$$\frac{\mu_{e_j}}{\mu_{l_j} \cdot \mu_{e_j}} = \frac{\sigma_{\mu_{l_j}, e_{ij}}}{\mu_{l_j} \cdot \mu_{e_j}} + 1 \quad (8)$$

Then, we may substitute Equations (6) and (8) into Equation (4) in order to finally obtain

$$\begin{aligned} T_j(\mu_{x_j}, x_{ij}) &= \frac{1}{m} \sum_{i=1}^m \ln\left(\frac{\mu_{l_i}}{l_i}\right) + \frac{1}{m} \sum_{i=1}^m \ln\left(\frac{\mu_{l_j}}{l_{ij}}\right) + \frac{1}{m} \sum_{i=1}^m \ln\left(\frac{\mu_{e_j}}{e_{ij}}\right) + \ln\left(\frac{\sigma_{\mu_{l_j}, l_{ij}}}{\mu_{l_j} \cdot \mu_{e_j}} + 1\right) + \ln\left(\frac{\sigma_{\mu_{l_j}, e_{ij}}}{\mu_{l_j} \cdot \mu_{e_j}} + 1\right) \\ &= T_j(\mu_{l_i}, l_i) + T_j(\mu_{l_j}, l_{ij}) + T_j(\mu_{e_j}, e_{ij}) + Cov_j(\mu_{l_j}, l_{ij} \cdot e_{ij}) + Cov_j(\mu_{l_j}, e_{ij}) \end{aligned} \quad (9)$$

Equation (9) shows that the interprovincial inequality in employment with  $j$  educational attainment per capita is the sum of three inequality terms and two interaction terms. The first three terms are strict Theil second measures and take on non-negative values.<sup>3</sup> Each inequality is governed by different forces: The first term depends on regional demographic patterns, the level of economic development, and the existence of unemployment benefits. The second depends on regional industrial structures, business functions, and education systems. The third depends on regional shocks and labour market efficiency.

The last two interaction terms take on positive (negative) values when the component variables are positively (negatively) correlated. They are equal to zero when the component variables are totally uncorrelated. It should be noted that the last two terms never take on undefined values: as all of the mean variables on the left-hand side of Equations (6) and (8) are positive, so too are the terms within the natural logarithms.

Especially, the last interaction term indicates an interesting implication as it shows the correlation between the relative size of labour market and its employability (market efficiency) in a province. The labour market efficiency in a province is associated with wage flexibility, which is determined by several factors such as minimum wage provisions, union activity, and proportion of large firms (Armstrong and Taylor 2000). The implementation of a minimum wage will reduce wage flexibility since wages will be prevented from falling below the legal minimum even in the face of high unemployment. Strong unions can prevent wage cuts during the recessions, thereby reducing wage flexibility. Large firms are unlikely to be on the edge of competitiveness and do not therefore monitor their wage costs very closely.

The dual economy, which separately coexists the formal and informal sectors, normally exists in the developing economies. The aforementioned determinates factors do not apply in the informal sector (Comola and de Mello 2009)<sup>4</sup>. Like other developing nations, most less-educated work in the informal sector in Indonesia (ADB 2010). In general, (less) developed provinces are richly endowed with highly (less) educated and with large (small) firms. Conclusively, the highly

<sup>3</sup> The equation forms of the Theil first and second measures are the divergence between the shares of two variables, weighted by the numerator of variables inside natural logarithm (Gisbert 2001). The quotient inside the natural logarithm of first three terms in Equation (9) are expressed as  $\mu_{l_i}/l_i = \mu_{l_i} / \sum_{i=1}^m l_i$ ,  $\mu_{l_j}/l_{ij} = \mu_{l_j} / \sum_{i=1}^m l_{ij}$ , and  $\mu_{e_j}/e_{ij} = \mu_{e_j} / \sum_{i=1}^m e_{ij}$ . Those are satisfied with the property of Theil second measure.

<sup>4</sup> See Rama (2001), Islam and Nazara (2000), Chun and Khor (2010), for the empirical evidence in Indonesia which suggests that wage increases will benefit some workers while disadvantaging many others.



educated abundant provinces, which are more likely (unlikely) to lose wage flexibility, show lower employability. Then, it can be assumed that the last interaction term  $\sigma_{(j, e_j)}$  takes the negative (positive) values for the higher (less) educated labour.

### 2.1.3 Shorrocks' (1980) one-stage Theil decomposition method

The second method was derived by Shorrocks (1980), which can decompose the overall inequalities in employment rate into those between education subgroups and those between provinces within each subgroup based on the Theil second measure.

As stated above, labour and employment are divided into  $n$  education groups, which are classified into  $m$  mutually exclusive and collectively exhaustive provinces in accordance with working location. The relationships can be expressed as  $L = \sum_{j=1}^n \sum_{i=1}^m L_{ij}$  and  $E = \sum_{j=1}^n \sum_{i=1}^m E_{ij}$ . Based on the aforementioned structure, overall inequality in employment rates can be measured by the following Theil second measure: (Anand 1983; Fields 2001)

$$T(e_{ij}) = \sum_{j=1}^n \sum_{i=1}^m (L_{ij}/L) \ln(L_{ij}/e_{ij}) \quad (10)$$

where  $e = E/L$ . Equation (10) can be additively decomposed into between-group inequality and within-group inequality as follows (Shorrocks 1980):

$$\begin{aligned} T(e_{ij}) &= \sum_{j=1}^n (L_j/L) \ln(L_j/e_j) + \sum_{j=1}^n (L_j/L) T_{w_j} \\ &= T_B + T_W \end{aligned} \quad (11)$$

where  $T_{w_j} = \sum_{i=1}^m (L_{ij}/L_j) \ln(L_{ij}/e_{ij})$ . This term is the Theil second measure index for the within-group inequality, which is a weighted average of the between-province inequalities in employment rates for each education group..

## 2.2 Data

The data used in this study consists of annual observations of 30 contiguous Indonesian provinces' populations, labour forces, and employment figures from 2002 to 2010. The population data are from the *Population Census* (BPS various years b) and the *Intercensal Population Survey* (BPS various years c). The data on the provincial labour forces and employment are from *Labour Force Situation in Indonesia* (BPS various years d).

In the labour force statistics, labour and employment are divided into 10 subgroups based on educational attainment. The present study aggregates these into five groups in order to conduct a decomposition analysis: (1) no primary (no schooling or incomplete primary education); (2) primary; (3) junior secondary; (4) senior secondary and (5) tertiary education. Note that the labour force and employment with the technical and vocational educational attainment are included in the corresponding education groups in accordance with the term of study.

BPS redefined labour force and employment status twice for the last two decades. Currently, the labour force is defined as persons aged 15 and above, while before 1994, it was those aged 10 years and above. This change affected all of the provincial labour force statistics recoded from 1998 onward. In 2001, unemployment status was redefined to include those who were not working and had given up actively searching for a job, whereas previously, it had only included those who were seeking employment. This change served to increase the unemployment rate such that in 2007, the reported rate was 9.8% as compared to what would have only been about 6% under the earlier definition (Islam and Chowdhury, 2010). However, no retroactive adjustment of past relevant data (by province and educational attainment) has been officially made thus far. Consequently, we use the data on those variables covering the years 2002 – 2010 in conducting our analysis.

It should also be noted that after the economic crisis of 1998, political reforms led to the creation of eight new provinces and that the province of East Timor gained independence. Consequently, the number of provinces changed from 27 to 34.<sup>5</sup> However, only four provinces established prior to the year of 2002 has released data in 2002 and after. As of yet, no effort has been made to adjust the historical data in order account for these changes. As such, we study only 30 provinces and aggregate the data from the new and existing provinces for each year.

### 3. EMPIRICAL RESULTS

Before showing the empirical results, we briefly review the endowment and utilization in labour force in a nation and provinces by educational attainment. Table 1 shows the national and provincial values of LFPRs, the labour force shares for each education group, and total employment rate and those for each education group in 2002 and 2010. The provincial values are listed the three largest/smallest values for each category.

First, LFPR increased from 47.5% in 2002 to 49.0% in 2010 at the national level, owing to the increase in the youth population and the in female labour force participation rate. The pronounced change in labour force shares by education attainment at the national level shows the educational expansion. The share of primary or less educated labour force declined from 58.6% in 2002 to 48.7% in 2010 while the share of secondary or higher educated labour force rose from 41.4 % to 51.3%. As would be expected across provinces, the high-income developed provinces such Jakarta and East Kalimantan, are richly endowed with the highly educated while remote, agriculture-dominated off-Java low-income provinces, such as East/West Nusa Tenggara and Papua are richly endowed with the less educated.

Total employment rate, which once deteriorated between 90.1% in 2003 and 88.8% in 2005 during the study period, improved from 90.9% in 2002 to 92.9% in 2010 (BPS various years d). Aswicahyono et al (2010) empirically confirm the lower employment elasticities with respect to

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<sup>5</sup> The eight newly established provinces are as follows: North Maluku (Maluku, 1999), West Papua (Papua, 1999), Banten (West Java, 2000), Bangka-Belitung (South Sumatra, 2000), Gorontalo (North Sulawesi, 2000), the Riau Islands (Riau, 2002), West Sulawesi (South Sulawesi, 2004), and North Kalimantan (East Kalimantan, 2012). The province and year within parentheses are the original province and the year in which the new province was established.

output in several sectors in the early post-crisis period than in the pre- crisis period and the nation experienced the so-called jobless growth, which the economy recovered from the economic crisis without increase in employment. They hypothesized that the reason behind the jobless growth is higher labour market rigidity, provided by the labour market regulation and higher minimum wage. After the year of 2005, the macroeconomic growth with annual growth rate of 5.5% has succeeded in pushing Indonesia's employment rate into a steady upward trend. The progress in employment opportunities has been mixed, notably in three critical areas: gender, youth, and informal employment (ILO 2011)

The employment rates among the different education groups do not support the general assumption that highly educated labour enjoys greater employment stability. In both years of 2002 and 2010, the employment rates among those with no primary and primary education exceed the group average of 90.9% and 92.9%. This is most likely because the absence of a universal social security system made it so that the less educated could not afford to remain unemployed. In the dual economy, minimum-wage provisions apply in the formal sector, which mainly consist of highly educated while those are unlikely to apply in the less educated counterparts.

The regional employment rates are greatly affected by province-specific shocks and wage flexibilities; therefore, we found the difficulty in the general trends across provinces by education attainment.

### 3.1 Cheng and Li's (2006) inequality decomposition method

Figures 1 through 5 present the inequality decompositions of the education groups' employment by a number of factors (which were calculated using Equation (10)).<sup>6</sup>

First, it should be noted that  $T_j \mu_{i, l_{ij}}$  is mainly determined by province-specific industrial structures, business functions, and education systems, appears to be a significant factor in determining the overall inequalities  $T_j \mu_{x_j, x_j}$ . The observations are fairly uniform across the education groups. These findings show that the industrial structures and business functions seem to vary more widely from province to province than the other characteristics, such as demographic structures and labour market efficiency, do. Those values for no primary education group (ranging between 0.060 and 0.141) and tertiary education group (ranging between 0.030 and 0.924) are more uneven than those with other education group are. This may be because less educated workers are more often employed in the labour intensive agriculture sector, which has a greater presence in less developed provinces, while highly educated workers are more attracted to the value-adding manufacturing and service sectors, which are more common in developed provinces.

Second,  $T_j \mu_{i, l_{ij}}$  in Figures 1 to 3 take on inverted U-shapes, indicating that interprovincial inequality was initially divergent but became convergent as the years passed. However, the values in Figures 2 and 3 show the smaller divergent and convergent values. Conversely, Figures 4 and 5 (which refer to the more highly educated labour groups) present

<sup>6</sup> The interaction term  $\text{cov}(\mu_{i, l_{ij}} \cdot e_{ij})$  are excluded from Figure 1 to 5 as those do not provide significant economic interpretations.

$T_j \left( u_j, l_{ij} \right)$  for as flat and downward sloping, which would indicate that the interprovincial distribution for highly educated labour force spread over the study period.

The association between educational expansion and economic development should decrease (increase) the less (more highly) educated labour groups; however, this change disproportionately spreads across provinces. Initially, they tend to have more (less) difficulties finding employment in developed provinces where the work tends to be better suited to a more skilled labour force. Later, as less developed provinces catch-up, the size of the less (highly) educated labour force should shrink (grow), thereby reducing the disparity. This line of reasoning clearly fits with our observations in the no primary educated labour, but not fit in other education group.

Third, interprovincial inequalities in labour market efficiency by education group, which takes on small values, has very little influence on the overall inequality for each education group. However, the cross-group comparisons shown at Figure 6 provide interesting observations. The interprovincial differences in labour market efficiencies for the highly educated groups tend to be greater and more fluctuate than the less educated. This is simply because there is no universal social security system, so there is no province in which the less educated can afford to remain unemployed, regardless of whether the economy is in a recession or business cycle expansion. Additionally, minimum-wage provisions do not apply in the informal sector, which more consist of less educated. The reverse is also true for the higher educated. In 2001, the nation decentralized the minimum wage provisions to provinces and districts and the minimum wages rapidly increased by the mid-2000s and those increases varied across provinces (Islam and Chowdhury 2010). Besides, the province-specific compositions of formal/informal sectors also affect interprovincial differences in labour market efficiencies. The more fluctuation values for the period for the higher educated group infers that the regional shocks affects the corresponding group's provincial labour market more greatly than less-educated counterparts.

Finally, the interaction terms  $Cov_j \left( u_j, e_{ij} \right)$  take on positive (negative) values for lower (higher) education groups; though, these values are small and fluctuate cyclically. For instance, the annual arithmetic mean values for Groups 1 through 5 are 0.0029, 0.0007, -0.0003, -0.0030, and -0.0013, respectively. The values of  $Cov_j \left( u_j, e_{ij} \right)$ , which is not standardized, can range from zero to positive infinity. Thus, we employ a scaled version of covariance, correlation coefficient, which is takes on a value between 1 and -1. The annual arithmetic mean values for Groups 1 through 5 are 0.4103, 0.1425, -0.0041, -0.1847, and -0.0548 respectively (Table 2). This observation do not support our hypothesis that the highly educated abundant provinces, which are likely to have the lower wage flexibility, show lower employability.

### 3.2 One-stage Theil decomposition of the employment rate by educational attainment

Table 3 shows the results of the one-stage Theil decomposition analysis of the inequality in employment rates for three selected years. The overall inequality increased from 0.0020 in 2002 and peaked to 0.0028 in 2005, and then decreased to 0.0012 in 2010. Decomposition analysis reveals that the inequalities between the education groups' employment rates (TB) played a crucial

role in determining the overall inequality. The between-group inequality (TB) increased from 0.0013 in 2002 to 0.0019 in 2005 and then decreased 0.0008 in 2010 and the corresponding contribution share increased from 67.4% in 2002 to 68.8% in 2005 and then decreased 64.8% in 2010.

Decomposition of the within-group inequality (TW) also showed the divergence and convergence process and the inequality values increased from 0.0007 in 2002 to 0.0009 in 2005 and then decreased to 0.0004 in 2010. In the contribution shares of each group's (TW<sub>j</sub>), those in the junior secondary group show the most significant values among the education group, 12.1% in 2002, 12.1% in 2005, and 11.5% in 2010. Generally, higher interprovincial variations in the employment opportunities could lead to increased interprovincial migration. Then, if provinces with greater employment opportunities were to restrict labour immigration, interprovincial tensions would rise precipitously. Since the ongoing increase in the labour force share of junior secondary education group could make this a crucial issue for the country.

#### **4. CONCLUSION**

We explore the interprovincial inequalities in employment with *j* educational attainment per capita as well as the factors that contribute to these inequalities in Indonesia from 2002 to 2010, employing Cheng and Li's (2006) inequality decomposition method. Further, we explore the factors that contribute to the overall interprovincial inequality in employment rate, employing Shorrocks' (1980) one-stage Theil decomposition analysis.

One of our major findings is that the industrial structures and business functions seem to vary more widely from province to province than the other characteristics, such as demographic structures and labour market efficiency, do. Those factors are more uneven in the no primary and tertiary educated labour forces than those with in other education group.

Another major finding is that the interprovincial differences in labour market efficiencies for the highly educated groups tend to be greater and more fluctuate than the less educated. This is simply because there is no universal social security system, so there is no province in which the less educated can afford to remain unemployed, regardless of whether the economy is in a recession or business cycle expansion.

The inequalities between the education groups' employment rates played a crucial role in determining the overall inequality. Then, the interprovincial inequities in employment rates within the junior secondary education attainment have the most significant influence among all education groups. Higher interprovincial variations in the employment rate could lead to increased interprovincial migration. Then, if provinces with greater employment opportunities were to restrict labour immigration, interprovincial tensions would rise precipitously. Since the ongoing increase in the labour force share of junior secondary education group could make this a crucial issue for the country. Consequently, policies for improving the efficiency in the corresponding labour market must be implemented.

There are several potential extensions of our work. Firstly, it may be beneficial to conduct an

inequality decomposition study with micro-level data. The National Labour Force Survey (SAKERNAS) provides data on 200,000 households with information on employment, educational attainment, industries, occupations, and total wages/salaries per month at the regency/municipality level. An empirical study exploring the factors that contribute to the more highly educated population's wage inequity could contribute to further discussions and understanding of policy implications.

Secondly, an empirical study focusing on the different impacts of human capital composition on provincial economies at different levels of development would be of great use and interest. Wei et al. (2011) empirically confirmed that in the post-reform period in China, the regional impacts of human capital differed based on the level of schooling: productivity growth in the eastern region of China was predominantly influenced by secondary education, the central region was affected by primary and university education, and the western region was influenced by primary education. Given Indonesia's extraordinary diversity in economic structures, an empirical study examining whether the educational qualification required for economic growth varies by province would provide interesting policy implications.

## REFERENCES

- Akita, T. and Miyata, S. (2008) 'Urbanization, educational expansion, and expenditures inequality in Indonesia in 1996, 1999, and 2002', *Journal of Asia Pacific Economy* 13 (3): 147-67.
- Asian Development Bank (2011) *The informal sector and informal employment in Indonesia*, Manila, Philippines
- Aswicahyono, H., H. Hill and D. Ardiyanto, 2010. "Industrialisation after a Deep Economic Crisis: Indonesia." *Journal of Development Studies* 46(6): 1084-1108.
- Aswicahyono, H., H. Hill and D. Ardiyanto, 2011, 'Indonesian industrialization: jobless growth?' in C. Manning and S. Sumarto (eds.), *Employment, Living Standards and Poverty in Contemporary Indonesia*, ISEAS, Singapore, pp. 113-33.
- Balisacan, A.M., Pernia, E.M., and Asra, A. (2003) 'Revisiting growth and poverty reduction in Indonesia: what do subnational data show?', *Bulletin of Indonesian Economic Studies* 39 (3): 329-51.
- Borjas G. (2012) *Labor Economics*, McGraw-Hill Education, New York.
- BPS (Badan Pusat Statistik, Central Bureau of Statistics) (various years a) 'Statistical Yearbook of Indonesia', Jakarta.
- BPS (various years b) 'Population Census', Jakarta.
- BPS (various years c) 'Intercensal Population Survey', Jakarta.
- BPS (various years d) 'Labor Force Situation in Indonesia', Jakarta.
- Cheng, Y.-S. and S.-K. Li. (2006) 'Income inequality and efficiency: A decomposition approach and applications to China', *Economics Letters* 91 (1): 8-14.
- Chun, C. and Khor, N. (2010) 'Minimum wages and changing wage inequality in Indonesia', ADB Economics Working Paper Series No. 196, Asian Development Bank, Manila.

- Comola, M. and L. de Mello (2009). How Does Decentralised Minimum-Wage Setting Affect Unemployment and informality? The Case of Indonesia, OECD, Economics Department, OECD Economics Department Working Papers: 710.
- Dhanani Shafiq 2004 Unemployment and Underemployment in Indonesia, 1976-2000: Paradoxes and Issues, International Labour Office, Genva.
- Duro, J.A. and Esteban, J. (1998) 'Factor decomposition of cross-country income inequality, 1960–1990', *Economics Letters* 60 (3): 269–75.
- Fields, G. S. (2001) *Distribution and Development*. MIT Press, Cambridge, MA.
- Garcia, J.G and Soelistianingsih, L. (1998) 'Why do differences in provincial incomes persist in Indonesia?', *Bulletin of Indonesian Economic Studies* 34 (1): 95–120.
- Gisbert G F. J., (2001), 'On factor decomposition of cross-country income inequality: Some extensions and qualifications', *Economics Letters* 70 (3): 303-309.
- Hayashi, M., Katoka, M., and Akita, T. (2014) 'Expenditure inequality in Indonesia, 2008-2010: A spatial decomposition analysis and the role of education', *Asian Economic Journal* 28 (4): 389–411.
- Hill, H. (2000) *The Indonesian Economy*, Cambridge University Press, Cambridge, MA.
- Hill, H. and Wie, T.K. (2012) 'Indonesian universities in transition: Catching up and opening up', *Bulletin of Indonesian Economic Studies* 48 (2): 229–51.
- Jaoul M. (2004). Higher education, causality and growth: a comparison of France and Germany before the Second World War, Compare; A Journal of Comparative and International Education 34(1): 17 – 133.
- Islam, I. and Nazara, S. (2000) 'Minimum wage and the welfare of Indonesian workers', International Labour Organization Occasional Discussion Paper Series No. 3, Jakarta.
- International Labour Organization (ILO) (2011) *Decent work country profile Indonesia*, Geneva.
- Islam, I. and Chowdhury, A. (2009) *Growth, Employment and Poverty Reduction in Indonesia*, International Labor Office (ILO), Geneva.
- Mincer, J. (1991) *Education and Unemployment*. NBER Working Paper No. 3838.
- Rama, M. (2001) 'The consequences of doubling the minimum wage: the case of Indonesia', *Industrial and Labor Relations Review* 54 (4): 864–81.
- Shorrocks, A.F. (1980) 'The class of additively decomposable inequality measures', *Econometrica*, 48 (3): 613–25.
- Suharti (2013) 'Trends in Education Indonesia', in Suryadarma, D. and Jones, G.W. (eds) *Education in Indonesia*. Singapore: ISEAS.
- Vidyattama, Y.A. (2010) 'Search for Indonesia's regional growth determinants', *ASEAN Economic Bulletin* 27 (3): 281–94.
- Wei, Z. and Hao, R. (2011) 'The role of human capital in China's total factor productivity growth: A cross-province analysis', *The Developing Economies* 49(1): 1–35.

**Table 1 LFPRs, Shares of labour force, and Employment rate for each education group: National and provincial values in 2002 and 2010 (Unit: %).**

2002												
Rank	LF per capita (l, li)		Share of Labour force (lj, lij)									
	Total		No Primary	Primary	J-Secondary	S-Secondary	Tertiary					
	National	47.5	National	21.9	National	36.7	National	17.4	National	19.2	National	4.9
1	Bali	57.5	Papua	40.9	Gorontalo	45.1	Aceh	27.7	Jakarta	45.1	Jakarta	13.2
2	Yogyakarta	54.8	W. Nusa Tenggara	35.7	S. Sumatra	44.8	N. Sumatra	26.3	E. Kalimantan	32.3	E. Kalimantan	9.2
3	S. Kalimantan	52.1	E. Nusa Tenggara	31.3	W. Java	43.9	C. Kalimantan	25.2	N. Maluku	31.3	Bali	8.3
28	Maluku	41.6	N. Sulawesi	10.9	E. Kalimantan	27.2	W. Nusa Tenggara	14.0	Bangka-Belitung	13.0	W. Kalimantan	3.0
29	Aceh	39.6	Aceh	10.5	Papua	25.4	Bangka-Belitung	13.5	S. Kalimantan	12.6	Lampung	2.8
30	Gorontalo	38.3	Jakarta	4.7	Jakarta	16.9	E. Nusa Tenggara	10.7	E. Nusa Tenggara	12.3	E. Nusa Tenggara	2.7
2010												
	Total		No Primary	Primary	J-Secondary	S-Secondary	Tertiary					
	National	49.0	National	20.6	National	28.1	National	19.1	National	24.1	National	8.1
1	Papua	57.7	Papua	45.8	W. Java	35.0	N. Sumatra	24.1	Jakarta	42.8	Jakarta	16.3
2	Gorontalo	54.9	Gorontalo	35.1	E. Nusa Tenggara	34.9	Lampung	22.2	E. Kalimantan	34.9	Yogyakarta	12.1
3	W. Nusa Tenggara	54.4	W. Nusa Tenggara	35.1	C. Sulawesi	34.0	Aceh	21.8	Riau	34.4	Aceh	11.8
28	Aceh	43.1	Aceh	14.5	N. Sulawesi	19.3	Gorontalo	13.7	W. Kalimantan	17.7	E. Nusa Tenggara	5.7
29	W. Java	42.5	W. Java	14.1	Yogyakarta	18.7	E. Nusa Tenggara	12.9	Papua	16.4	Papua	5.7
30	Jakarta	42.2	Jakarta	6.9	Jakarta	12.9	Papua	12.1	E. Nusa Tenggara	14.8	W. Kalimantan	4.7
2002												
Rank	Employ. rate (e, ei)		Employment rate by educational attainment (ei, eij)									
	Total		No Primary	Primary	J-Secondary	S-Secondary	Tertiary					
	National	90.9	National	96.1	National	93.6	National	87.7	National	83.2	National	89.4
1	E. Nusa Tenggara	95.7	Yogyakarta	99.0	C. Kalimantan	98.6	Bali	97.1	Bali	92.3	Maluku	98.5
2	Bali	95.5	Jambi	98.8	Yogyakarta	98.1	E. Nusa Tenggara	95.4	Jambi	90.7	W. Nusa Tenggara	94.5
3	Yogyakarta	94.8	E. Nusa Tenggara	98.4	Bengkulu	97.5	Yogyakarta	93.6	Yogyakarta	89.8	W. Kalimantan	92.3
28	Banten	85.9	Banten	91.0	W. Java	89.6	W. Java	80.5	Maluku	78.6	N. Maluku	84.1
29	Jakarta	85.6	Gorontalo	90.9	Gorontalo	88.5	Banten	79.1	N. Maluku	77.2	Bangka-Belitung	82.0
30	N. Maluku	84.7	Jakarta	88.1	Banten	88.0	Gorontalo	78.9	S. Sumatra	77.1	SE. Sulawesi	80.7
2010												
	Total		No Primary	Primary	J-Secondary	S-Secondary	Tertiary					
	National	92.9	National	96.8	National	95.7	National	92.5	National	88.1	National	87.8
1	Bali	96.9	Yogyakarta	99.0	E. Nusa Tenggara	98.9	Bali	97.8	Bali	94.9	Bengkulu	94.5
2	E. Nusa Tenggara	96.7	E. Java	98.9	Bali	98.6	E. Nusa Tenggara	97.5	S. Kalimantan	92.3	Bali	94.4
3	C. Kalimantan	95.9	SE. Sulawesi	98.8	Papua	98.4	SE. Sulawesi	97.4	C. Kalimantan	91.0	C. Sulawesi	94.1
28	W. Java	89.7	E. Kalimantan	93.0	E. Kalimantan	92.5	E. Kalimantan	91.2	Aceh	85.5	W. Java	85.2
29	Jakarta	88.9	Jakarta	90.7	Jakarta	92.3	W. Java	86.6	W. Java	84.8	Papua	84.4
30	Banten	86.3	Banten	88.7	Banten	87.2	Banten	85.7	Maluku	82.6	Banten	83.0

Source: Sources: Population Census, Intercensal Population Survey, Labour Force Situation in Indonesia (BPS, various years b, c, and d)



Figures 1–5 Cheng and Li's (2006) inequality decomposition method by education attainment

Figure 1: No primary

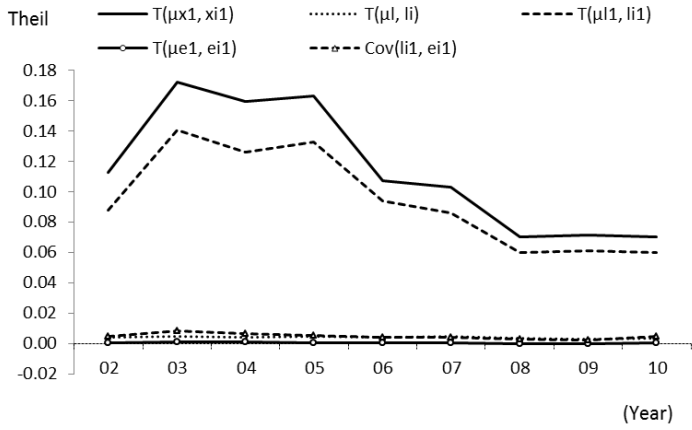


Figure 2: Primary

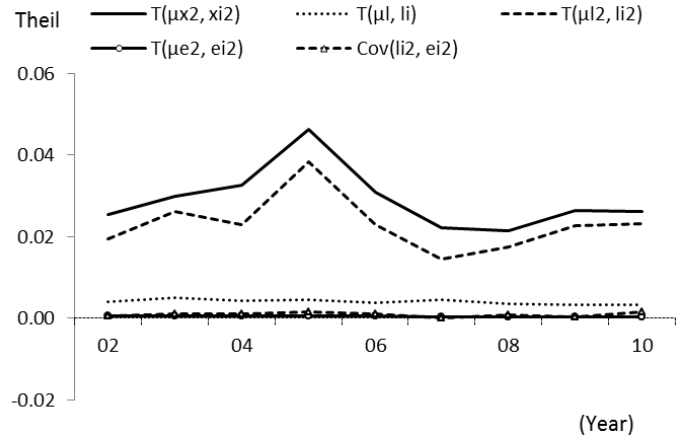


Figure 3: Junior secondary

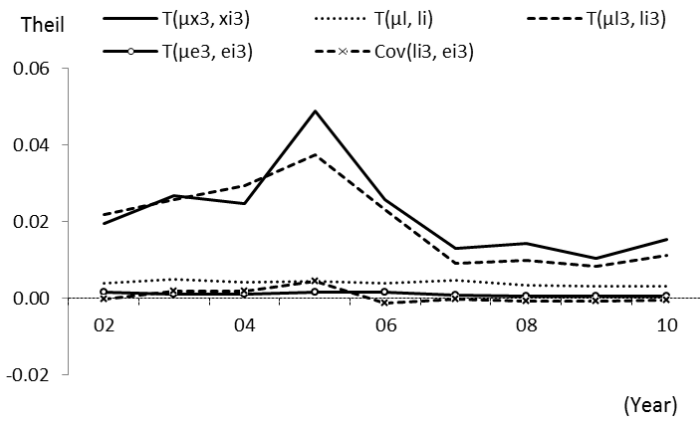


Figure 4: Senior Secondary

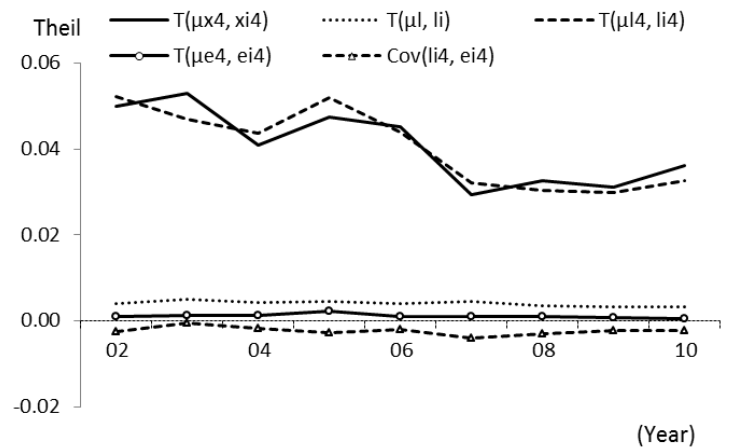
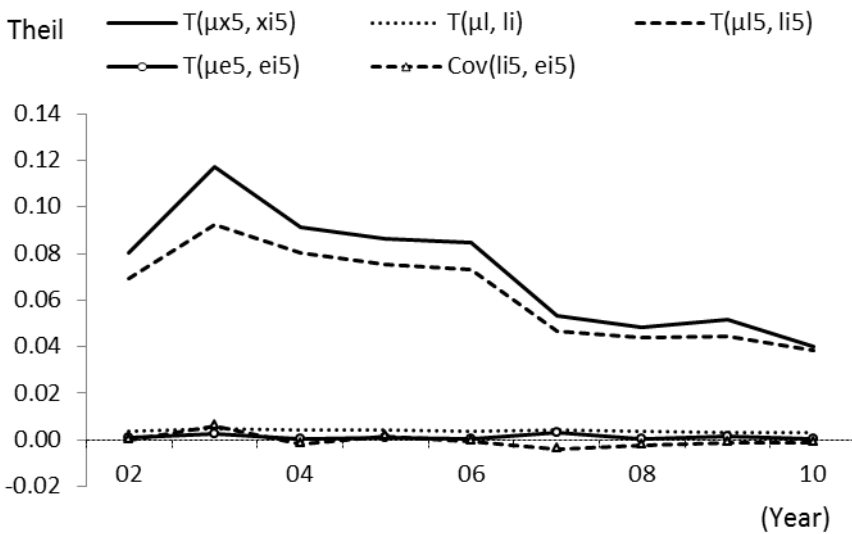
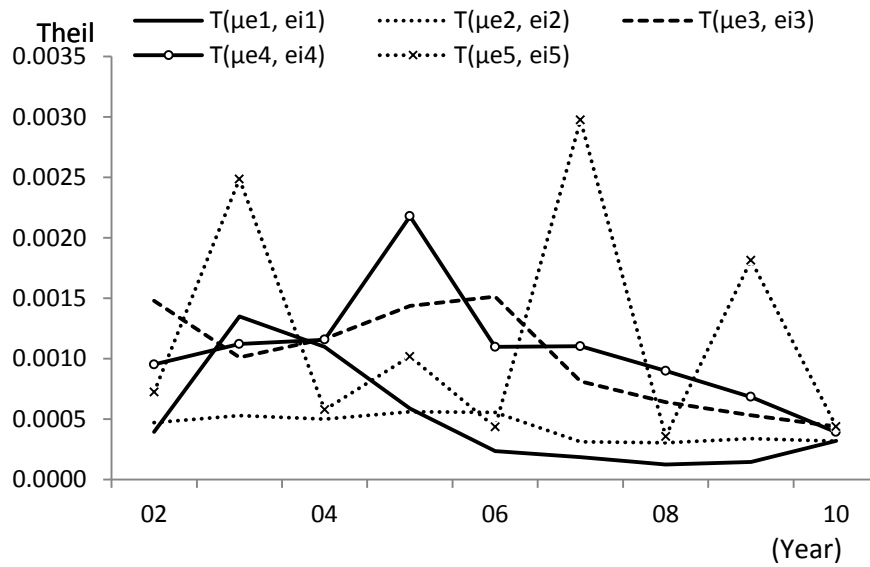


Figure 5: Tertiary



**Figure 6 Interregional inequalities employment rate with j education attainment**



**Table 2 Correlation coefficient between labour force share and employment rate with j education attainment**

	Minimum		Maximum		Mean
	Value	Year	Value	Year	Value
Cor(li1, ei1)	0.2888	2004	0.5312	2007	0.4103
Cor(li2, ei2)	-0.0009	2007	0.2914	2010	0.1425
Cor(li3, ei3)	-0.1690	2008	0.2838	2005	-0.0041
Cor(li4, ei4)	-0.3092	2007	-0.0325	2003	-0.1847
Cor(li5, ei5)	-0.2355	2008	0.1700	2003	-0.0548

**Table 3 One-stage Theil decomposition analysis of the inequality in employment rates**

	Theil Value			% of Contribution		
	2002	2005	2010	2002	2005	2010
T(e, ei)	0.0020	0.0028	0.0012	100.0	100.0	100.0
TB	0.0013	0.0019	0.0008	67.4	68.8	64.8
TW	0.0007	0.0009	0.0004	32.6	31.2	35.2
TW1	0.0001	0.0001	0.0001	2.8	2.5	4.8
TW2	0.0002	0.0002	0.0001	8.8	7.4	8.4
TW3	0.0002	0.0003	0.0001	12.1	12.1	11.5
TW4	0.0002	0.0002	0.0001	8.2	8.1	7.7
TW5	0.0000	0.0000	0.0000	0.7	1.1	2.7