ESSAYS ON REGIONAL DEVELOPMENT IN INDONESIA:

A DISTRICT LEVEL DATA ANALYSIS ON THE ECONOMY,

EDUCATION, AND POVERTY

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Abdul Wahid Fajar Amin

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Abstracts

This dissertation examines the dynamics of regional development across Indonesian districts through several indicators, namely regional GDP per capita, educational attainment, and poverty incidence. These variables are chosen since they are the primary concern of the Indonesian Government and are a fundamental necessity for other aspects of developments.

Despite the achievements in socio-economic development at the national level in the past decades, some Indonesia regions still face several challenges. Therefore, using district-level data, this study examines regional development in Indonesia from three perspectives. First, whether regional disparities have narrowed or remained persistent. Second, what factors affect the results. Third, what is the role of decentralization on the achievements of regional development.

Moreover, each region of Indonesia has its unique geographical, ethnical, and demographical profile, which one way or another contributes to different regional performance. Therefore study in Indonesia regions may present a miniature observation of the world.

This study presents several findings as follows:

1. In Chapter 2, this study finds that regional disparities, represented by Theil indices, remain considerable in 2014, at the level of the early 1990s. Indonesia's inequalities are largely affected by within-region rather than between-region inequality. Among the six main islands, the Moluccas and Papua show the highest disparities, followed by Java-Bali, Kalimantan, and Sumatera islands. Nusa Tenggara and Sulawesi consistently show the lowest disparity level. Furthermore, this study finds the association between sectoral composition and regional GDP per capita level. Regions with high GDP per capita are associated with abundant mining resources,

large manufacturing industries, and the development of transportation and telecommunication sector, while regions with low regional GDP per capita are linked to large shares of either agricultural or public service and other service sectors.

2. *Chapter 3 shows the positive effect of the number of schools, the average distance to the nearest school, and the free tuition policy, as well as the enrolment rate in the previous school level, the household expenditure in education, in educational attainment. However, this study finds different patterns in regional disparities. The difference between regions becomes narrow at the upper-secondary school but it remains considerable at the lower-secondary school. Moreover, this Chapter suggests the rise of gender disparities in Indonesia's districts.*

3. *In Chapter 4, this study confirms the positive effect of agricultural and service productivity in regional poverty reduction. The role of the agricultural sector is significant in outside Java-Bali, while the service sector is more dominant in Java-Bali regions. This study suggests that the effect of sectoral productivity is mainly associated with the share of sectoral labor, a sector with large labor shares will show high elasticity and vice versa.*

4. *According to Chapter 2-4, this study also confirms the positive effect of decentralization policy in regional development yet it suggests different effect sizes on the economy, education attainment, and poverty incidence.*

Based on those findings, this study argues that there is no panacea nor a one-size-fits-all approach to address the development gap properly, meaning that the prescription may be different among Indonesia regions. However, this study suggests a sequence of policies as follows: first, the policy should be focused on increasing human capital through the improvement of educational attainment. Second, it should be followed by an improvement in regional infrastructure that eases access to education and enhances regional connectivity. Lastly, Indonesia governments should consider sectoral approaches when conducting a regional development plan.

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Chapter 1   Introduction

1. 1 Motivation

During the past decades, Indonesia shows remarkable achievement in improving its socio-economic. Economic growth stands around 5-6 percent annually at the pace before the Asian financial crisis. Educational attainment in both lower- and upper-secondary level increase almost double. At the same time, poverty incidence decrease by half of its initial level in the early decentralization. Yet, a different outline emerges when we look at the regional level. Hill (2014) shows that the richest district has a per capita income more than 50 times that of the poorest. Moreover, Yusuf, Sumner, and Rum (2014) suggest the rise in expenditure inequality, especially after the 1998 crisis. The presence of regional disparities is also found in educational attainment and poverty incidence. Studies by Jones & Pratomo (2016), Lanjouw, Pradhan, Saadah, Sayed, and Sparrow (2001), OECD/Asian Development Bank (2015), Tobias, Wales, Syamsulhakim, and Suharti (2014) suggest that the regional difference in school enrolment rate remains considerable at both the provincial and district levels. Meanwhile, Ilmma and Wai-Poi (2014) and Sumarto, Vothknecht, and Wijaya (2014) suggest the presence of large variation in regional poverty incidence among provinces and districts in Indonesia.

Each region of Indonesia has its unique geographical, ethnical, and demographical profile, which one way or another contributes to different regional performances, meaning that each regional case in Indonesia may represent a miniature observation of the world. Correspond to those factors, this study has attempted to address what factors affect regional development and how the different outcome occur and persist, whether the difference of regional performance become narrowed or remained persistent, and whether the implementation of decentralization also affects the achievements of regional

development.

Moreover, a study in regional development in Indonesia also provides several benefits such as. First, it provides a useful basis on how the different endowments may affect regional achievements. Second, it provides a useful basis for comparison and helps the government to formulate appropriate policy in corresponding to the presence of regional disparities. Third, it corresponds to the implementation of a decentralization policy that shifts many authorities to local governments (Hill & Vidyattama, 2014).

1. 2 Background of the study areas

Hill (2014) argues that the regions are central to an understanding of modern Indonesia. This argument comes with the fact that Indonesia is recognized as the largest archipelagic state and featuring enormous diversity in its economy, ethnography, demography, and much else.

This study concentrates the discussion on several indicators, namely, regional GDP per capita level, educational attainment, and poverty incidence for two reasons. First, these variables become the primary concern of regional development by the Indonesian government during the past decade. Second, they are a fundamental necessity for other aspects of development.

In terms of regional GDP per capita, districts in Indonesia present a wide range. Some regions show a high-income level, which equals the level of the upper-middle-income state, while others would be in the least developed group of impoverished countries (Hill, 2014). This fact is also confirmed by the Theil index, which stands between 0.40 to 0.52 points, showing large regional GDP per capita dispersion from 1990-2014.

A similar pattern emerges in educational attainment. This study finds a significant

difference between Indonesia regions, which not only limited between western and eastern areas but also between and within six-main islands. The spatial data shows that even in Java, well-known region as the center of Indonesian development during Suharto's administration (see Booth 1998; Hill 2000), districts in its southern part also present low enrolment rates at the secondary level. This study finds that the gap is getting wider in Nusa Tenggara, Moluccas, and Papua islands.

Lastly, this study also finds a disparity problem in regional poverty incidence. While districts in Jakarta and Bali present the lowest poverty incidence, their counterpart in East Nusa Tenggara, Papua, and Madura show the opposite direction by having high poverty incidence. Their poverty incidence outstrip more than double of national level.

With those facts, it is essential to discuss how regional disparities emerge in Indonesia regions[1], whether it is clustered geographically between west and east areas or scattered randomly, and what factors affect this phenomenon. This dissertation can be considered as an answer to those questions. Furthermore, this study also considers the role of decentralization on regional achievements. Moreover, capturing the output of the

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[1] This study divides Indonesia regions into six main-islands, namely Sumatera, Java-Bali, Kalimantan, Sulawesi, Nusa Tenggara, and Moluccas-Papua. It adopts the concept of MP3EI or the Master Plan for Acceleration and Expansion on Indonesia's Economic Development that launched in 2011 by Indonesia government. Originally the concept clusters Indonesia regions into six growth centers or economic corridors namely Sumatera, Java, Kalimantan, Sulawesi, Bali-Nusa Tenggara, and Moluccas-Papua. Due to its economic level and structure, this study groups Bali into Java (become Java-Bali) but left other regions as the basic concept.

decentralization policy in different sectors can be seen as an initial step of the future research agenda, which comprehensively captures various aspects of regional development.

1. 3 Decentralization and Regional Development

World Development Report (1997) suggests that the implementation of decentralization policy increases the effectiveness of local government; strengthens community participation in economic, social, and political decisions; and enhances government responsiveness, transparency, and accountability. Bird and Vaillancourt (1998) argue that the policy has been considered as one possible way to escape from the trap of ineffective and inefficient governance and promotes economic development.

Empirical studies on the role of decentralization in regional development show different results. Studies by Pepinsky and Wiharja (2011), Ross (2006), and Schulze and Sjahrir (2014) show that the policy has neither a positive nor negative impact on regional development. Meanwhile, Bermeo (2012), Fossati (2016), Lewis (2012), and Orenstein (2012) suggest a positive impact of the decentralization policy in regional development. However, studies by Hazel (2007), Prud'homme (1995), and Tanzi (2000) show the negative impact of decentralization. They argue that the policy may cause several problems, such as income disparities, the spread of corruption, macroeconomic policy disruption, and regional stabilities disturbance.

Other studies suggest that the role of decentralization may come from the democratization process. Lewis (2012) argues democratization increase the opportunity for people, especially the poor, to mobilize and gain political influence. Therefore, they can push local leaders to improve regional economies and social welfares. A similar argument is proposed by Besley (2005), Besley and Kudamatsu (2006), Besley and Smart

(2005), List and Strum (2006), and Orenstein (2012). They argue that decentralization, through direct election, will enhance political accountability. It gives voters the power to reward and punish incumbent politicians. It also offers an incumbent an incentive to improve the quality of social welfare and governance.

Current studies on the effects of decentralization in Indonesia also show different results. In terms of regional economies, Mahi, Adinirekso, and Resosudarmo (2002) argue that decentralization is an essential factor affecting economic growth. Meanwhile, Pepinsky and Miharja (2011) and Hill and Vidyattama (2014) suggest that the policy has no discernable impact on the regional economies since the growth patterns remain similar to pre-decentralization for many Indonesia regions.

Kristiansen and Pratikno (2006) highlight the negative consequences of decentralization in the education sector since it may create a lack of transparency and accountability in government spending. They argue that the policy may increase household spending on education and lead to geographical disparities. On the other hand, Falch and Fischer (2012), Gallego (2010), Jeong, Lee, and Cho (2017), and Toi (2010) shows that the policy increases student attainment, improves the quality of the educational environment, leads to higher test scores, and lower dropout rates.

In terms of regional poverty, a study by Khan (2013) suggests the positive effect of decentralization in poverty reduction. He argues that the effect may come from three dimensions. First, decentralization might lead to economic growth, which may, in turn, reduce absolute poverty. Second, it also increases public services provision, which reduces the prevailing extent of relative deprivation. Lastly, it empowers the poor a voice in the decision-making process.

1. 4 Methodologies

This study examines the dynamics of regional development across Indonesian regions through several indicators, namely regional GDP per capita level, educational attainment, and poverty incidence. For such purposes, this study uses several approaches that cover for econometric, statistical, and spatial analysis[2].

In Chapter 2, this study estimates Theil index developed by Akita (2003). Thus, this study clusters the regional GDP per capita level and then links with the sectoral composition. In Chapter 3, this study develops a model that examines the factors affecting educational attainment from both supply and demand-side. Furthermore, this study uses statistical and spatial analysis to examine the presence of regional and gender disparities. In Chapter 4, this study extends the model developed by Suryahadi, Suryaharma, and Sumarto (2009) and Loayza and Raddatz (2010) on examining the effect of sectoral growth and its composition in poverty reduction. Lastly, this study employs the ternary diagram to connect the relationship between sectoral composition and poverty reduction

This study uses district-level which mainly collected from Indonesia Statistics Bureau (Badan Pusat Statistik [BPS]), World Bank's Indonesia Database for Policy and Economic Research (INDODAPOER), and the Ministry of Finance (MoF). This study also estimates some of the data from individual/household/village-level data since they are not available at the district-level.

1. 5 Overviews of the Essays

This dissertation explores the dynamic of economic development in Indonesia which focusses in three main topics, regional GDP per capita level, educational

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[2]   Detail on research methodologies are presented in each Chapter.

attainment, and poverty reduction. This essay examines factors affect the achievement in those three topics, whether the difference among regions become narrowed or remain wide, and how the implementation of decentralization policy affects the outcome. The following sub-sections present essential findings of the essays.

1.5. 1 Pattern of Regional Economies in Indonesia

This chapter examines the pattern of regional economies in Indonesia. For such purpose, this chapter estimates the Theil index using district-level data for the year 1990-2014. The one-step and two-step Theil indices decomposition show that the within-region inequality contributes at least 90 percent of Indonesia's inequality. Moreover, this chapter suggests that Java-Bali shows the highest contribution, followed by Kalimantan and Sumatera.

In general, with an exception for Java-Bali, this chapter suggests the positive association between decentralization and regional economies since most of Indonesia regions present decreasing trends during the past decade. Moreover, rather than the geographical clustering, this chapter associates regional disparities with sectoral composition. This chapter also suggests that regional disparities are linked to the presence of mining resources, the development of manufacturing industries, transportation and telecommunication, and financial and business sectors. To sum up, this chapter concludes that. First, this study suggests a negative association between the agricultural sector and the public and other service sector shares and regional GDP per capita level. Second, a positive relationship between industrial sector share and regional GDP per capita level.

1.5. 2 Dynamics of Educational Attainment in Decentralized Indonesia, 2002-2014

This chapter investigates the determinants of educational attainment at the secondary level of education in Indonesia. It also assesses regional disparities in education

in the past decades. For such purposes, this study applies two approaches. First, this chapter develops a model that covers both supply and demand-side using district-level data from 2002-2014. Second, it clusters regional data of educational attainment into six-main islands and a provincial basis and does the statistical analysis.

In general, Chapter 3 shows that the enrolment rate in the previous education level, household expenditure on education, the numbers of schools, the average distance to the nearest school as well as the free-tuition policy show a positive effect in school enrolment in the secondary level. This chapter also confirms the positive effect of decentralization in educational attainment, yet this chapter also finds the presence of higher between-cycle dropout.

Aside from that, this chapter also finds different results of educational attainment in six-main islands. The gap between western and eastern areas becomes narrowed at the upper-secondary level, yet the difference remains open at the lower-secondary level. This chapter also finds that Nusa Tenggara, Moluccas, and Papua regions continuously show low enrolment rates. This chapter also shows the rise of gender disparities during the past decade, which surprisingly favor girls over boys. In addition, this chapter also associates educational attainment with other socio-culture such as kinship, fervent religious culture, early marriage tradition, and household's perspective in education. Therefore, local governments should consider these factors in designing its regional policy in education.

1.5. 3 Sectoral Labor Productivity and Poverty Reduction in Indonesia Regions: An assessment using district-level data 2002-2013

This chapter examines the role of sectoral productivity in regional poverty incidence and factors affecting the different sizes of sectoral productivity in poverty reduction. This chapter also investigates the role of decentralization in poverty reduction.

For such purposes, this study applies two step. First, this study estimates sectoral productivity at the district-level from Indonesia statistics and *Susenas* for years 2002-2013. Second, this study adopts a model by Suryahadi et al. (2009), and Loayza and Raddatz (2010).

This chapter highlights the role of agricultural and service sectors in poverty reduction. The role of the service sector is significant in Java-Bali regions, while the agricultural sector shows a positive association in both Java-Bali and outside Java-Bali regions. Moreover, this study argues that the size of sectoral productivity effect in poverty reduction is linked to the share of sectoral labor in total regional labor. It implies that a sector with higher labor-share will demonstrate higher elasticity in poverty reduction and vice versa.

This study also finds the positive association of decentralization in poverty reduction, primarily through the local budget provision and direct election. However, this chapter suggests that the diminishing trends during the past decades do not solve the problem of regional disparities in Indonesia. This issue emerges in many regional groups such as Western and Eastern regions, Java-Bali and outside Java-Bali, and even within-island.

1. 6 Organization of the Study

This study is organized into five chapters. The first chapter or the introduction, presents the motivation of the study, the background of the study areas, previous studies on the decentralization and regional development, the methodologies used, and overviews of essays.

The second chapter presents the pattern of regional economies in Indonesia. This chapter starts with the background and literature reviews. Next, this chapter presents the

dynamics of regional economies in Indonesia from 1990-2014. Thus, it shows the data source and methodology used. The next section shows the statistical, spatial and ternary analysis to examine the pattern of regional disparities in Indonesia regions. Lastly, it provides conclusions.

The third chapter presents the dynamics of educational attainment in secondary level during decentralization. It starts with the background and literature reviews. Thus, this chapter explains the education system and presents the secondary enrolment data for the past decades. After showing the data and methodology, this chapter start the discussion by presenting the empirical result from econometric analysis, showing the pattern of educational attainment, and then the emerging of gender disparity in Indonesia regions. In accordance to that, this chapter presents case studies by taking an example from Aceh and Madura. In the last part, this chapter concludes the findings.

The fourth chapter presents the role of sectoral labor productivity in regional poverty reduction in Indonesia. This chapter starts the discussion by literature reviews. This chapter then presents the data of regional poverty and sectoral labor productivity. Thus, this chapter shows the data and methodology. This chapter commences its discussion by presenting the empirical result from econometric analysis. Furthermore, it discusses the role of sectoral labor intensity and labor share in poverty reduction. Then it investigates the role of decentralization in poverty reduction. This chapter ends the discussion by providing conclusions.

The last chapter concludes the discussion by summarizing the contributions of chapters two, three, and four, as well as by reiterating the policy implication that may be valuable to policy makers. This chapter also presents the limitation of the study and indication on possible future research.

Chapter 2   Pattern of Regional Economies in Indonesia

2. 1 Introduction

During the past decades, Indonesia shows remarkable achievements in improving its economy. Economic growth stands around 5-6 percent annually at the pace before the Asian financial crisis. However, a different outline emerges at the regional level. Hill (2014) shows that the richest district has a per capita income more than 50 times that of the poorest. In general, many studies support the common consensus, which argues that the Western part of Indonesia is more prosperous than the Eastern part (see Carnegie, 2008; Nazara, Sonis, & Hewing, 2001).

Other studies suggest that the concern of regional disparities does not limited in West-East regions, this issue also arises in many Indonesia regions. Despite being the center of Indonesia's economic development during the Suharto administration, Java also indicates large disparities level, showing the uneven development in their regional economies (see Akita, 2003; Akita & Alisjahbana, 2002; Akita et al, 2011). They also argue that Java has the largest contribution to Indonesia's inequality. In addition, Akita et al. (2011) also show substantial disparities of regional GDP per capita in Sumatera, Kalimantan, and Papua. Lastly, Akita (2003) suggest that between-province and within-province inequality are recorded as the main contributors to regional disparities.

Therefore, rather than clustered geographically, several studies suggest that regional disparities in Indonesia are primarily affected by the sectoral composition of regional economies. Studies by Akita et al. (2011), Hill and Vidyattama (2014), Resosudarmo (2014), and Sumarto et al. (2014) suggest the effect of mining resources in Indonesia disparities. They argue that this sector has escalated regional GDP per capita of many its possessing regions. Yet, the role of mining resources depends on commodity

prices (see Burke & Resosudarmo, 2012; Yusuf, Komarulzaman, Purnagunawan & Resosudarmo, 2013; Yusuf et al., 2014). Meanwhile, Akita et al. (2011) and Gordon and Resosudarmo (2018) argue the important role of manufacturing sector in regional inequality. They also suggest the negative effect of the agricultural sector in regional inequality (also see Akita & Alisjahbana, 2002).

However, those studies do not discuss yet how a sector may show different effects in the different clusters and regions. Moreover, most of them are not considering yet the effect of decentralization in regional disparities. Therefore, by using a district-level dataset from 1990-2014, this study aims to examine the pattern of the regional economies in Indonesia. For such purpose, this paper applies several approaches. First, this study estimates the Theil index, analyzes the trend during pre- and post-decentralization, and assesses factors affecting the movement. Second, this study applies statistical and spatial analysis, and ternary diagrams to examine the effect of sectoral composition in regional GDP per capita level. These approaches are expected to give a more rigorous analysis of the pattern of regional economies in Indonesia.

The remainder of this paper is organized as follows. It provides literature reviews on regional disparities in Indonesia. Third, this study discusses regional economies from 1990-2014. Fourth, it presents the methodology used in this paper. Fifth, this study presents a discussion using statistical and spatial analysis. Lastly, it will provide some concluding remarks.

2. 2 Previous Studies

Although studies in regional disparities show different results on the contribution of each region in Indonesia inequality, in general, most of them cite the immense role of Java region in shaping Indonesia inequality (see Akita, 2003; Akita & Alisjahbana, 2002;

Akita et al., 2011). This argument comes with the fact that Java is accounted for 60 percent of Indonesia's GDP and population. However, other studies show that the contribution of each region in total inequality depends on the clustering process.

Akita (2003) shows the high regional disparities in Indonesia during the pre-decentralization periods. Moreover, using two-step decomposition analysis, he argues that, after excluding the oil and gas sectors, the within-province component contributes to 49 percent of regional disparities. Meanwhile, the between-province and between-region inequality components contributed to 44 and 7 percent, respectively. He suggests that Java-Bali shows the highest between-province inequality and accounts for the largest share for Indonesia's inequality, followed by Kalimantan and Sumatra. Similar to that, a study by Akita and Alisjahbana (2002) shows that before the Asian financial crisis, regional income inequality rose significantly. The rise of regional disparity was due mainly to an increase in within-province disparities, especially in Riau, Jakarta, West, and East Java.

Using the household expenditure data from *Susenas* for 1993–2013, Yusuf et al. (2014) suggest that Indonesia is experiencing both divergence and convergence in its regional inequality at the same time. They show a significant magnitude in the rise of regional disparities, yet the change is larger in provinces or districts with low initial levels of inequality. According to them, this phenomenon is affected by several factors, such as the presence of commodities boom in the last decade, the rigidity in the formal labor market, and the effect of rice prices and cash transfer programs.

Other studies argue that Indonesia inequality is primarily affected by the sectoral composition. Akita (2003), Akita et al. (2011), Hill and Vidyattama (2014), Resosudarmo (2014), and Sumarto et al. (2014) suggest that regional inequality is primarily affected by

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the presence of mining resources. They argue that this sector has unevenly increased regional GDP per capita, with many possessing regions escalated their income above the average national level. However, the effect of mining resources in regional inequality also fluctuates, depending on the commodity price movement (see Burke & Resosudarmo, 2012; Yusuf et al., 2013, 2014).

Meanwhile, Akita (2003), Akita et al. (2011), Akita and Alisjahbana (2002), and Gordon and Resosudarmo (2018) suggest the role of manufacturing in regional inequality. Moreover, Akita and Alisjahbana (2002) suggest that the high level of within-province inequality in Riau is related to the presence of export-oriented industrials zone in Batam (also see Akita, 2003). Similar to that, Akita et al. (2011) argue that, aside from Java regions, the spatial distribution of manufacturing also plays an important role in the inequality of Sumatra and Kalimantan. On the other hand, studies by Akita et al. (2011) and Gordon and Resosudarmo (2018) show the negative effect of the agricultural sector in regional inequality (also see Akita & Alisjahbana, 2002).

Studies on the effect of decentralization in regional economies also show different results. Mahi, Adinirekso, and Resosudarmo (2002) argue that decentralization is an essential factor affecting economic growth. Meanwhile, Pepinsky and Miharja (2011) suggest decentralization has no discernable impact on the Indonesia economy. A similar result showed by Hill and Vidyattama (2014). They suggest that the policy seems to have neither a positive nor negative effect on regional development since the growth patterns remain similar to pre-decentralization for many Indonesia regions.

With the different results on regional disparities in Indonesia and factors affecting the results, further studies on this topic remain open. In the following section, this study discusses the data of regional GDP per capita from 1990 to 2014.

2. 3 Regional economies in Indonesia

2.3.1 Regional economies 1990 – 1996

As demonstrated in Figure 2. 1, this study finds that in the early 1990s, Indonesia's regional GDP per capita varies from 263,000 to 41,238,000 rupiah, showing a vast difference in regional GDP in Indonesia. Although the spatial data in Figure 2. 1 shows that the outline of regional GDP level disperses randomly, this study confirms the common consensus which argues that the Western part of Indonesia is more prosperous than the Eastern part (see Carnegie, 2008; Nazara, Sonis, & Hewing, 2001).

Figure 2. 1 Regional GDP per capita by district and quintile 1990
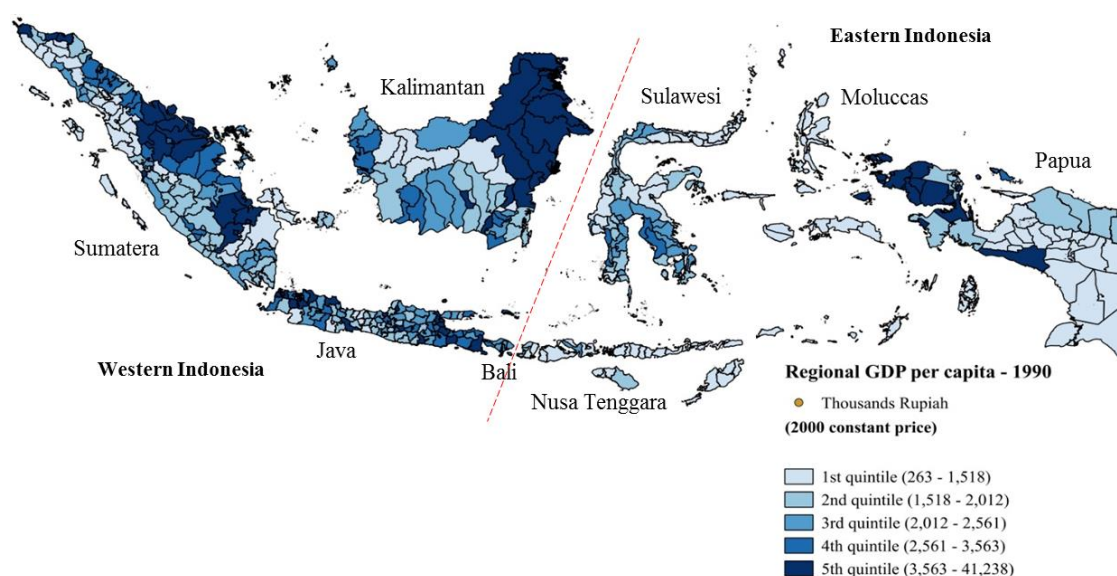
Source: Author's calculation from Indonesia statistic 1990

However, Figure 2. 1 also shows several exceptions, some of Eastern districts present a high regional GDP per capita such as Mimika and Sorong of Papua while many Western districts show the opposite direction by having lower regional GDP per capita than national level. Therefore, rather than grouped geographically between the western and eastern regions, this study suggests that sectoral economic composition is more remarkable in affecting the regional GDP per capita level (see Gordon & Resosudarmo,

2018; Echevarria, 1997).

In general, this study finds that districts with low regional GDP per capita are associated with large shares of the agricultural sector or public service and other service sectors. Meanwhile, districts with high regional GDP per capita show either large shares of mining resources such as oil, gas, coal, and other mineral resources or large manufacturing industries or the development of the financial and business sector or the combination of these economic sectors. Moreover, this study finds that mining resources are scattered mainly in outside Java-Bali regions, while manufacturing or service sectors are more distributed in Java-Bali.

According to geographical based, this study finds that Sumatera's districts located in the fifth quintile with the highest regional GDP per capita, are mainly found in Aceh, Riau, and South Sumatera provinces[3]. These districts are well-known for their large share of mining resources in oil and gas. Meanwhile, the fourth quintile districts are located mainly in North Sumatera and Riau islands provinces, which associated with the presence of large manufacturing industries. On the other hand, this study finds that districts with low regional GDP per capita are found mainly in the western coastal and southern parts of Sumatera islands. These districts are associated with two factors. First, they are neither possessing abundant mining resources nor large manufacturing industries. Second, they are showing a large share of the agricultural sector or service sector from the public sector and other services. The latest fact may indicate a high dependency on government expenditure to support regional economic activities.

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[3] In 2001, South Sumatera province was proliferated into South Sumatera and Bangka Belitong province while Riau was divided into Riau and Riau islands province

This study suggests similar patterns for the Kalimantan islands. As demonstrated in Figure 2. 1, districts in East Kalimantan are grouped mostly in the fifth quintile. These regions are famous for their abundant resources in oil, gas, and coal. Despite showing a large mining output from coal, this study finds that districts in Central Kalimantan only located in the fourth quintile. This study suggests that the output of Central Kalimantan is lower than East Kalimantan's, as the value of coal is less than oil and gas. For two reasons, this study finds that West Kalimantan districts present the lowest regional GDP levels than other Kalimantan's. First, they are having neither abundant natural resources nor large manufacturing industries. Second, they exhibit high reliance on agricultural and public service and other services for their regional output. Still, due to the development of estate crops such as palm oil and rubber in their agricultural production, West Kalimantan districts show higher regional GDP per capita level than the average agricultural-based districts in Indonesia.

Although the Suharto administrations focused their regional economic development in Java, surprisingly, this study finds that at least two-thirds of Java's districts show lower regional GDP per capita than the average national level in 1990. This fact implies that Java's districts do not necessarily present better condition than other regions. Figure 2. 1 also shows that districts with low GDP per capita level are mainly found in either the southern or central part of Java. These districts are well-known for extensive food crop cultivations as their primary economic sector (see Figure A2. 1). Moreover, this study also argues that these districts are notorious for being mountainous and lacking infrastructure. Those conditions then obstruct the distribution of goods and services to and/or from those areas.

Furthermore, with the share less than ten percent in total regional output, this study

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suggests that the role of the mining resource is minuscule in Java-Bali's economy, especially compared to Sumatera and Kalimantan. In Java, the presence of mining sector resources is limited to five regions, namely Kepulauan Seribu[4], Indramayu, Cilacap, Bojonegoro, and Tuban districts. Therefore, rather than driven by the mining sector, this study suggests that districts with high regional GDP per capita in Java-Bali are associated with large manufacturing industries, the expansion of transportation and telecommunication sector, the development of the financial and business sector, or the combination of those activities. Districts with high regional GDP levels cover districts in greater Jakarta[5], greater Surabaya[6], Semarang city, Malang city, and Kediri city.

However, this study finds that most of the districts in Nusa Tenggara, Moluccas, and Papua islands are suffering for low regional GDP per capita, with 72 percent of them are grouped in the first quintile, and the other 13 percent are found in the second quintile. Similar to other islands, this study finds that most of the districts grouped in both quintiles show identical patterns, the domination of the agricultural sector, and the public sector and other services in their regional output. These two sectors are associated with less value-added than other economic activities. In contrast, districts with high regional GDP

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[4] In 1990, Kepulauan Seribu was a sub-district of North Jakarta, but it was formed as an administrative district under Jakarta province since 1999.

[5] Greater Jakarta area covers Jakarta's city-administered districts, Bekasi, Bogor, Depok, and Tangerang districts.

[6] Greater Surabaya includes Surabaya, Gresik, and Sidoarjo districts.

per capita, namely Sorong, Manokwari, and Mimika[7] are linked with mining-sector such as oil, gas, and gold.

Among six main islands, this study finds that districts in Sulawesi show modest regional GDP per capita. This study suggests several factors as follows. First, they exhibit large shares of estate crop cultivation, especially from copra and cacao. These commodities show moderate value-added compared to palm oil plantation in Sumatera and Kalimantan. Second, in the 1990's the development of large manufacturing industries are not established yet. Third, an absence of abundant mining resources such as oil and gas in Sulawesi.

Data from Indonesia statistics show that from 1990 to 1996, a year before the Asian financial crisis, Indonesia performs steadily growth at 5.5 percent annually. Wie (2000) argues that the development of manufacturing industries and export-oriented commodity largely supports Indonesia's economic growth. However, as demonstrated in Figure 2. 2, this study finds similar patterns of regional GDP per capita quintile in 1996. The findings confirm a study by Garcia and Soelistianingsih (1998), which argues that in the 1990s, Indonesia regions kept their ranking in the income ladder with the richest and poorest regions continued to be in the same position.

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[7] Since 1999, these districts had been gradually proliferated into several regions. Sorong was proliferated into Sorong, Raja Ampat, Tambrauw, Maybrat, South Sorong, and Sorong city. Manokwari was divided into Teluk Wondama, Teluk Bintuni, South Manokwari, and Pegunungan Arfak districts. Mimika was proliferated into Mimika, Fak-fak, and Kaimana districts.

Figure 2. 2 Regional GDP per capita by district and quintile 1996
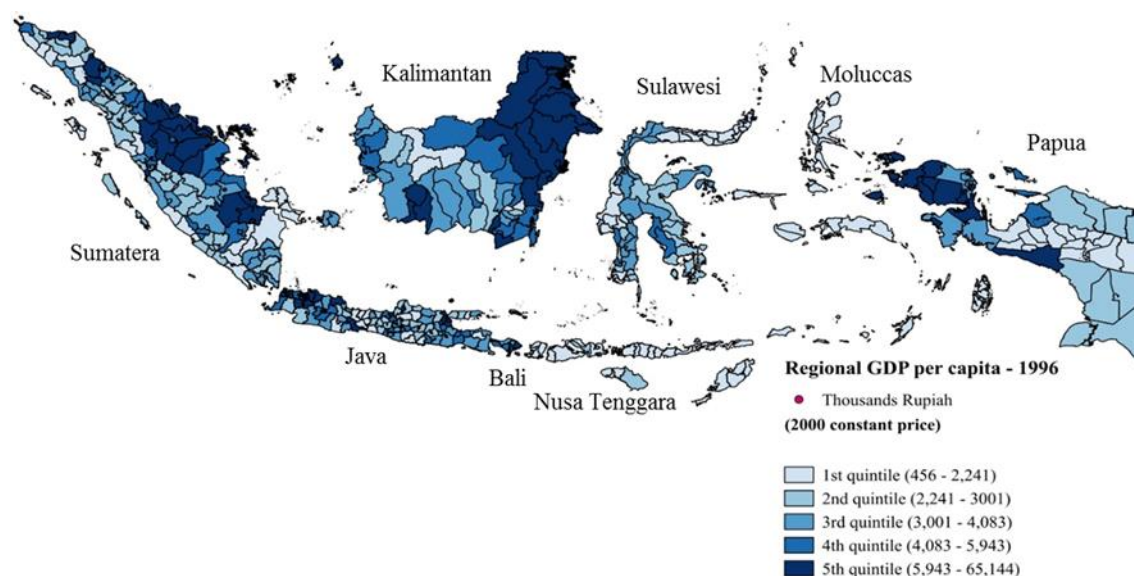
Source: Author's calculation from Indonesia statistic 1996

This study argues that districts which consistently perform higher regional GDP per capita are associated with several conditions. First, it is related to the presence of abundant mining resources, mainly oil, gas, coal, or gold (for example, districts in Riau, Riau Islands, East Kalimantan, and Papua). Second, it shows the progressive development of high value-added service sectors such as transportation and telecommunication and finance and business sector. These districts include district in greater Jakarta, district act as the capital city of provinces, and city-administered districts. Lastly, it has massive development in manufacturing industries such as industrial agglomeration districts in Java islands, North and South Sumatera, East Kalimantan, and South Sulawesi. In contrast, districts with low regional GDP levels are still linked with either the high share of the agricultural sector, mainly producing food crops, or heavily relying on the public service and other service sectors.

2.3.2 Regional economies during the Asian financial crisis

Studies by Haggard (2000), Jang and Sul (2002) show that Indonesia's economy

largely suffered during the Asian financial crisis. The Indonesian economy contracted by almost 14 percent (Kartasasmita, 2001; Wie, 2000). Wie (2000) also argues that, among sectoral economies, industrial and service are the most suffering sectors. He suggests that construction, followed by financial and business, trade, hotel, and restaurant, and manufacturing sectors slump sharply during that periods. Meanwhile, the agriculture sector was the only sector that shows positive growth during the crisis.

The weakening of the Indonesian exchange rate, represented by the fall of Rupiah for more than sextuple from 2,500 to around 16,000 rupiahs per US dollar, had mainly affected imported-based industries such as construction and manufacturing sector and financial and business sectors. Moreover, it also increased the financial expenditures[8] as the payment for the foreign loan and interest increase sharply. Therefore, this study confirms that most of the districts which suffered their regional economies are either urban-districts or city-administered districts with large shares of industrial or service sectors. In contrast, this study also confirms that agricultural-based districts are less affected by the crisis.

2.3.3 Regional economies 2002 – 2014

For the last decade, the Indonesian economy grew steadily around five to six percent (World Bank, 2014), regaining its growth to the pace before crisis. This steady growth is supported by the expansion of the service sector (BPS, 2017; Gordon and Resosudarmo, 2018). However, Figure 2. 5 indicates that the district quintile of regional GDP level during decentralization does not change significantly. The findings confirm

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[8] This study finds that Indonesian corporations made huge foreign loans (mainly in US dollar), the weak of rupiah had escalated the total Rupiah paid by the corporation.

studies by Hill and Vidyattama (2014) and Pepinsky and Miharja (2011), which argue that decentralization policy neither gives positive nor negative impact in regional economies since the pattern remains similar to the pre-decentralization periods. Figure 2. 5 shows that western regions still dominate high regional GDP per capita districts, while eastern regions consistently show low regional GDP per capita.

Figure 2. 3 Regional GDP per capita by district and quintile 2002
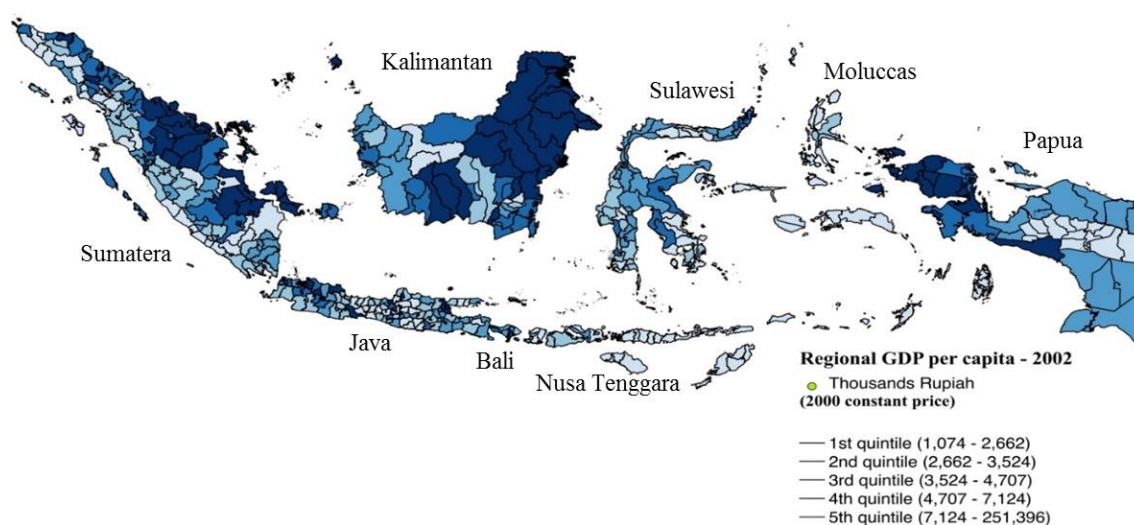
Source: Author's calculation from Indonesia statistic 2002

In decentralization, this study still associate the relationship between regional GDP per capita and sectoral economic structure. With similar intuition, this study suggests that districts with high regional GDP per capita are still dominated by several regions as follows. First, districts possess abundant mining resources, mainly in oil, gas, coal, or gold. These regions include districts in Riau, Riau Islands, South Sumatera, East Kalimantan, and Papua provinces. Second, districts show the development of large-scale manufacturing industries such as districts in West and East Java, North and South Sumatera, East Kalimantan, and South Sulawesi. Third, districts exhibit a well-developed transportation and telecommunication sector or an expansion of the financial and business

sector. Regions with the last characteristic cover the greater Jakarta districts, some capital city of Indonesia provinces, and city-administered districts.

Moreover, comparing Figure 2. 5 and Figure 2. 4, this study finds that some districts in Sumatera, Kalimantan, and Sulawesi had accelerated their regional economy during the past decades by moving its position into the upper quintile. This study suggests several factors affecting this movement. First, the expansion of palm oil plantation in Sumatera and Kalimantan islands. It increases the agricultural output and later improves the level of regional GDP per capita. These districts are located mainly in eastern coastal of Sumatera and West and Central part of Kalimantan. Second, the development of manufacturing and refinery industries. Aside from Java's industrial agglomeration, the development of these sectors are located in North Sumatera, East Kalimantan, and South Sulawesi. In addition, this study finds that Java's manufacturing industries diversify from food to automotive, while outside Java-Bali's industries are more concentrated on downstream processing industries such as refinery, petrochemical, and palm oil industries.

Figure 2. 4 Regional GDP per capita by district and quintile 2014
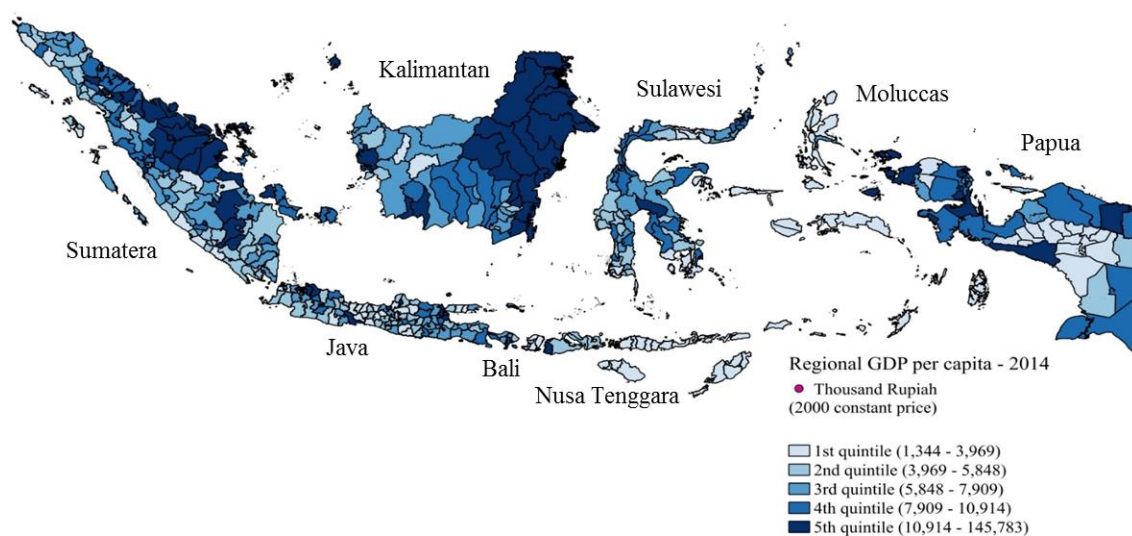
Source: Author's calculation from Indonesia statistic 2014

However, this study also finds that some regions are stagnant in the first and second quintiles, such as districts in Nusa Tenggara, Moluccas, and Papua. Moreover, this study also confirms that many districts in Java meet a similar challenge by showing low regional GDP per capita during the observation periods. These regions are dominated by districts in the southern and central part of Java and Madura islands. Most of those districts are continuously relying on the agricultural sector or public service sector to support their economic activities.

2. 4 Data and Methodology

2.4. 1 Data

This study uses macroeconomics data at the district level for statistical and spatial analysis. The data was retrieved from Indonesia Statistics (Badan Pusat Statistik [BPS]), World Bank's Indonesia Database for Policy and Economic Research (INDODAPOER), and the Ministry of Finance (MoF).

2.4. 2 Methodology

This study applies a model developed by Akita (2003) that decomposed the Theil index [9] into one-stage and two-stage decomposition methods.

One-stage Theil decomposition method

In the one-stage theil decomposition method, this study uses districts as the underlying regional unit to measure regional GDP inequality; hence the hierarchical structure would be region-district. As part of clustering the Indonesia regions, this study

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[9]   The Theil index is chosen since it feature decomposition analysis which allow us to dissolve regional disparities into its component, for example inequality within and between regions, and so on.

uses six-main islands classification, which in line with the strategy of the Indonesian government on developing its regional economy, especially through economic corridor and specialization [10]. Therefore, regional GDP inequality can be measured by the following Theil index formula:

$$T_d \quad = \sum_i \sum_k \left(\frac{Y_{ik}}{Y}\right) \log\left(\frac{Y_{ik}/Y}{N_{ik}/N}\right) \tag{1}$$

where Y_{ik} is the income of district k in region i

Y is total income of all districts ($= \sum_i \sum_k Y_{ik}$)

N_{ik} is the population of district k in region i, and

N is the total population of all districts ($= \sum_i \sum_k N_{ik}$)

Then defining T_{di} as follows to measure between-districts inequality for region i,

$$T_{di} \quad = \sum_k \left(\frac{Y_{ik}}{Y_i}\right) \log\left(\frac{Y_{ik}/Y_i}{N_{ik}/N_i}\right) \tag{2}$$

Theil index T in equation (1) can be decomposed into

$$T_d \quad = \sum_i \left(\frac{Y_i}{Y}\right) T_{di} + \sum_i \left(\frac{Y_i}{Y}\right) log\left(\frac{Y_i/Y}{N_i/N}\right)$$

$$= \sum_i \left(\frac{Y_i}{Y}\right) T_{di} + T_{BR} \tag{3}$$

$$= T_{WR} + T_{BR}$$

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[10] In accordance with the concept of MP3EI or the Master Plan for Acceleration and Expansion on Indonesia's Economic Development that launched in 2011 by Indonesia government.

where Y_i is the total income of region i $(= \sum_k Y_{ik})$

N_i is the total population of region i $(= \sum_k N_{ik})$ and

$$T_{BR} = \sum_i \left(\frac{Y_i}{Y}\right) \log \left(\frac{Y_i/Y}{N_i/N}\right)$$

Equation (24) shows the one-stage Theil inequality decomposition, in which the overall income inequality T_d is the sum of the within-region component (T_{WR}) and the between-region component (T_{BR}). Moreover, the within-region component is a weighted average of the between-districts inequality for each region (T_{ik}).

Two-stage Theil decomposition method

In two-stage Theil decomposition, this study changes the hierarchical structure into region-province-district structure. As a result, regional GDP inequality can be measured by the following equation:

$$T_d = \sum_i \sum_j \sum_k \left(\frac{y_{ijk}}{Y}\right) \log \left(\frac{y_{ijk}/Y}{n_{ijk}/N}\right) \tag{4}$$

where y_{ijk} is the income of district k in province j in region i

Y is total income of all districts $(= \sum_i \sum_j \sum_k y_{ijk})$

n_{ijk} is the population of district k in province j in region i, and

N is the total population of all districts $(= \sum_i \sum_j \sum_k n_{ijk})$

With the similar steps, this study decomposes within-region (T_{WR}) into two parts the within-province component (T_{WP}) and the between-province component (T_{BP}). Then equation (5) can be formulated as follows:

$$T_d = T_{WP} + T_{BP} + T_{BR} \tag{5}$$

Where regional inequality is decomposed into the within-province component (T_{WP}), the

between-province component (T_{BP}), and the between-region component (T_{BR}).

As part of assessing regional inequality in Indonesia, this study also uses spatial and another statistical analysis. The spatial analysis is used to capture the distribution of regional development, whether it is concentrated in specific areas or scattered among regions. Furthermore, this study also uses the ternary diagram[11], which associates regional disparities and sectoral composition in regional GDP. Those approaches are expected to give a more rigorous assessment of the pattern of the regional economy in Indonesia.

2. 5 Discussion

2.5. 1 Regional Disparity

Studies on the role of decentralization policy in the regional economy argue that the policy neither has a positive nor negative impact on economic development (see Hill & Vidyattama, 2014; Pepinsky & Miharja, 2011). Most of these studies suggest that regional disparity remains similar to pre-decentralization and unchanged. As part of examining regional economic patterns, this study estimates the Theil index, and it's decomposed from 1990-2014 by employing equation (3) and (5) in the previous section.

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[11] The original data of sectoral economic composition was classified into 9-sectors. However, Ternary diagram analysis limits the investigation into 3 groups in which the total should be equal to 100 percent. Therefore, this study reclassify the 9- sectors of economy into 3-sectors namely agriculture, industry, and service.

Agriculture sector already represents the sector itself, while industrial sector covers mining, manufacturing, construction, and utilities sectors. Meanwhile service sector covers trade, hotel, and restaurant; transportation and telecommunication; finance and business sectors; and public and other services sector.

As demonstrated in Figure 2. 5, this study finds that the Theil index stands between 0.40 and 0.52, showing high disparities among Indonesia's regions in their per capita income level. This study finds that the Theil index rose slowly in the early 1990s before starting to fluctuate after the Asian financial crisis. Although it reached one of its peak in 2001, Figure 2. 5 also shows a decreasing trend during decentralization.

Figure 2. 5: Indonesia Theil index 1990 – 2014
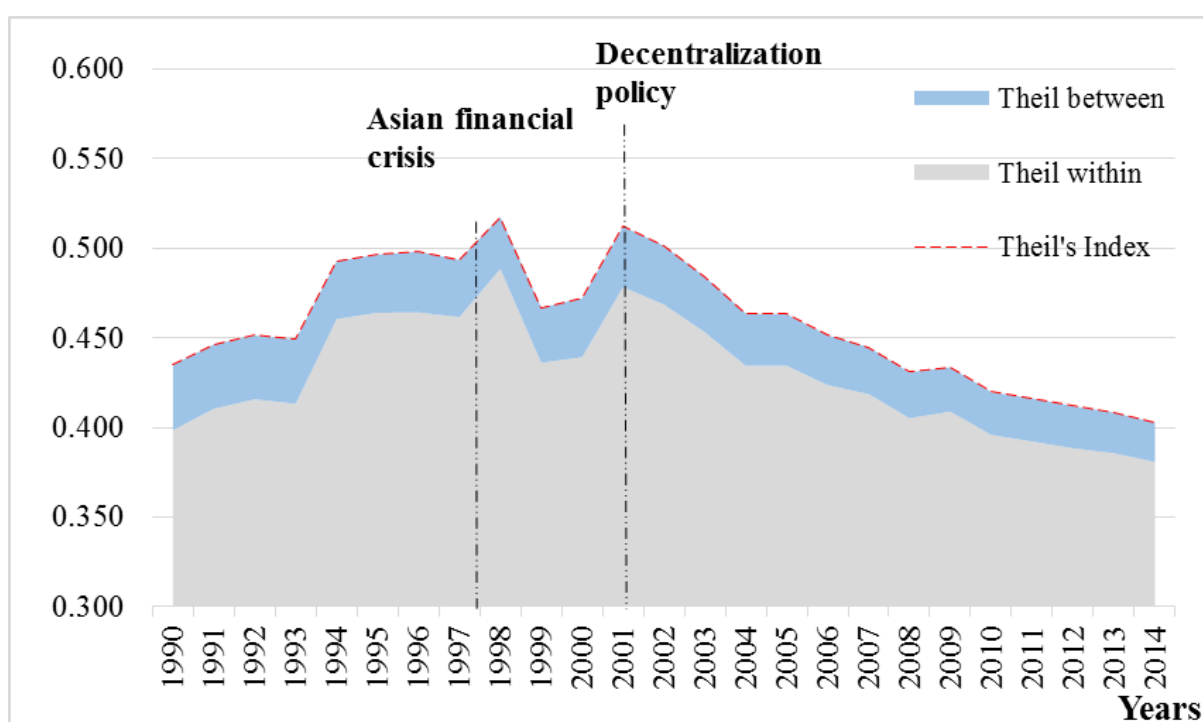
Source: Author's calculation from Indonesia Statistic Bureau publication

Decomposing Theil index into its component (between and within inequality), Figure 2. 5 shows that in the 1990s, the value of the Theil between fluctuates from 0.03 to 0.037. In contrast, it shows steady trends in the decentralization periods around 0.025. This study suggests that the movement of Theil between is associated with the change or regional GDP per capita in Sumatera, Kalimantan, and Papua islands, which mainly affected by the fluctuation of mining resources.

Meanwhile, this study suggests the fluctuation of Theil within before the

implementation of decentralization policy. Aside from the mining sector, the movement of Theil within are also affected by other factors such as the development of manufacturing industries, financial and business, and transportation and telecommunication sectors, which concentrated in particular regions. Moreover, this study finds that the Theil within contributes to at least 92 percent of total regional inequality. The finding implies that the rise of inequality within-region will raise the regional inequality level and vice versa. The finding corroborates studies by Akita (2003) and Yusuf et al. (2014), both studies show that inequality between provinces contributed only 7 percent to overall Indonesia inequality (also see Akita et al., 1999).

Since this study argues that Indonesian regional disparities are more affected by the inequality within-region rather than between-region, this study then applies the two-stage nested decomposition to calculate regional inequality (see equation 5). This study believes that this approach gives several advantages, such as how each region or island contributes to regional disparities, which region shows the most significant difference, and what factors may affect regional inequality patterns. Moreover, the result can be used as the first indicator, whether Indonesia's economic development is already spread evenly or still concentrated in particular areas.

As can be seen in Figure 2. 6, in the 1990s, Java-Bali presents a moderate level and starts to increase in 1993. This study suggests the role of manufacturing industries on the escalation of the Java-Bali inequality level, confirming a study by Akita et al. (2011). Although it shows small variation during the Asian financial crisis, the value remains stable after 2001. In general, this study argues that the role of manufacturing industries persist on affecting Java-Bali's inequalities in decentralization.

Figure 2. 6 Regional Theil index 1990 – 2014 by six main-islands
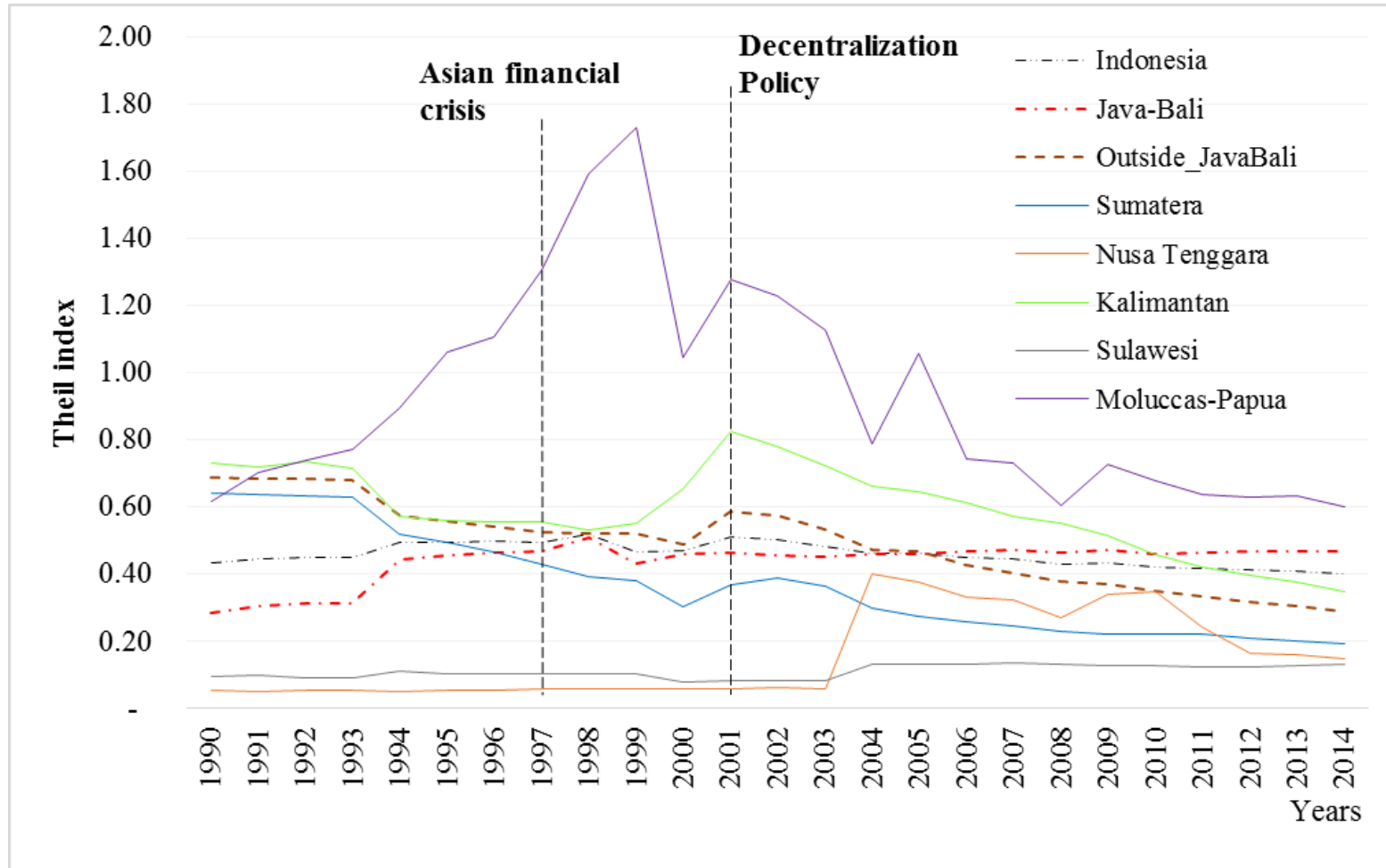
Source: Author's calculation from Indonesia Statistic Bureau publication

This study also finds that manufacturing sector contributes primarily to the regional economies of the greater Jakarta, the greater Surabaya, agglomeration areas such as Serang, Karawang, and Purwakarta of West Java, and districts with tobacco industry such as Kudus of Central Java, and Kediri and Malang of East Java. Meanwhile, the financial and business sector shows massive contributions to the economies of Jakarta and city-administered districts which act as the provincial capital city such as Bandung, Surabaya, and Semarang. The uneven distribution of manufacturing industries and the financial and business sectors also affect between-province inequality. This study finds that between-province inequality dominates Java's disparities rather than within-province (also see Table 2. 1).

However, this study suggests that the role of mining-sector in Java-Bali's is insignificant than the manufacturing and service sectors. The mining sector only contributes to less than five percent of total regional output and being cited by only six out of 120 districts as the prominent contributor in their economies. The finding corroborates to Akita et al. (2011), which shows the significant impact of manufacturing industries and the financial and business sectors in Java's inequality.

On the other hand, this study finds that outside Java-Bali shows a decreasing trend of regional inequalities for the past decades, with an exception in 2001. This study suggests different causes for these trends. This study argues that the reduction in the 1990s is affected mainly by the drop of mining output in the Aceh province of Sumatera islands. In comparison, in the 2000s, the declining trends are influenced primarily by the decentralization policy and the development of the agricultural sector in Sumatera and Kalimantan islands.

Further analysis in outside Java-Bali indicates that, in general, the high level of

the Theil indices in Moluccas-Papua, Kalimantan, and Sumatera are associated with the presence of mining resources and its refinery industries. The argument corroborates studies by Akita et al. (2011), Hill and Vidyattama (2014), and Sumarto et al. (2014), which argue that the mining sector had escalated the income of possessing regions above the national level yet caused significant differences in regional GDP per capita.

Table 2. 1: Two-stage nested Theil index

Two-stage decomposition		Years			
Islands	Components	1990	1996	2002	2014
Java-Bali					
	Within-Province	0.1190	0.1777	0.2052	0.2184
	Between-Province	0.1676	0.2880	0.2494	0.2491
	Total	**0.2867**	**0.4657**	**0.4546**	**0.4676**
Outside Java-Bali					
Sumatera	Within-Province	0.3283	0.2111	0.2187	0.1115
	Between-Province	0.3119	0.2536	0.1699	0.0823
	Total	**0.6402**	**0.4646**	**0.3886**	**0.1938**
Kalimantan	Within-Province	0.2111	0.1750	0.3351	0.1132
	Between-Province	0.5197	0.3821	0.4441	0.2357
	Total	**0.7308**	**0.5571**	**0.7791**	**0.3489**
Nusa Tenggara	Within-Province	0.0440	0.0472	0.0554	0.1307
	Between-Province	0.0094	0.0080	0.0061	0.0191
	Total	**0.0535**	**0.0552**	**0.0614**	**0.1498**
Sulawesi	Within-Province	0.0576	0.0813	0.0615	0.1032
	Between-Province	0.0370	0.0206	0.0207	0.0277
	Total	**0.0946**	**0.1019**	**0.0822**	**0.1309**
Moluccas-Papua	Within-Province	0.2227	0.5257	1.0072	0.4270
	Between-Province	0.3944	0.5809	0.2196	0.1751
	Total	**0.6171**	**1.1066**	**1.2268**	**0.6022**
Outside Java-Bali	Within-Province	0.296412	0.220907	0.279881	0.140419
	Between-Province	0.392184	0.322365	0.29482	0.149679
	Total	**0.6886**	**0.5433**	**0.5747**	**0.2901**
Indonesia					
	Within-Province	0.184366	0.19401	0.234854	0.189103
	Between-Province	0.250792	0.304253	0.266676	0.213714
	Between-region	0.036505	0.033926	0.032783	0.021873

Source: Author calculation from Indonesia statistic

This study finds that. First, most of those commodities are exported without any further processing. Second, the development of refinery industries also limited to contiguous districts, such as Lhokseumawe in Aceh, Dumai in Riau, or Balikpapan in East Kalimantan. Both factors restrict the benefit to particular areas since they create a less multiplier effect on the rest of economic activities, which later raise the regional GDP per capita gap between mining and non-mining regions.

Table 2. 1 also shows that in the 1990s, Kalimantan inequality is mainly affected by between-provinces inequality, caused by different sectors of the economy. As mentioned in the previous section, districts in East Kalimantan present high-level regional GDP per capita affected by abundant mining resources. In comparison, districts in West Kalimantan show a high dependency on the agricultural sector, which shows lower added-value that other economic sectors. On the other hand, the Theil decomposition in Sumatera and Moluccas-Papua indicate that within-province and between-province inequality show alike levels.

Moreover, Figure 2. 6 shows that, in the 1990s, Nusa Tenggara performs the lowest regional inequality than other islands. This study suggests several reasons—first, the absence of mining and large manufacturing industries in the Nusa Tenggara Islands. Second, a high dependency on either the agricultural or the public and other service sectors. This finding confirms a study by Akita et al. (2011), which shows the regional equality caused by the high share of agriculture that distributed evenly across Eastern Indonesia regions. Moreover, this study finds that Nusa Tenggara districts show identical agriculture production, especially in paddy and maize. These factors had reduced the possibility of Nusa Tenggara's districts to show higher regional GDP per capita level and then perform indifference regional GDP per capita level. This argument corroborates with

the finding in Table 2. 1, which shows that in the 1990s, both between-province and within-province inequality in Nusa Tenggara shows the lowest level than other regions.

Despite showing similar disparities level, Sulawesi districts indicate different outlines than Nusa Tenggara's in their economies. This study suggests that. First, unlike Nusa Tenggara, some of Sulawesi's possess mining resources such as nickel, asphalt, and other mineral resources, yet the value is not as large as Kalimantan and Sumatera islands. Hence, the gap between the mining-district and non-mining-district in Sulawesi is relatively narrower than other islands. Second, this study suggests that the development of Sulawesi's manufacturing industries in the 1990s is still limited to several districts such as Manado in North Sulawesi and Makassar in South Sulawesi. The size of this sector is not as considerable as Java and Sumatera's. Third, the contribution of the agricultural in Sulawesi's output remains significant. Although this study confirms a finding of Akita and Alisjahbana (2002), this study also finds that Sulawesi's agricultural sector shows different outlines than Nusa Tenggara, especially on the large shares of estate crop plantations such as cacao, copra, and clove. Nevertheless, these factors had increased the regional GDP per capita level of Sulawesi's districts than Nusa Tenggara but lessened the regional GDP gap between-districts. Moreover, those factors also preserve the low level of regional Theil index in Sulawesi.

Figure 2. 6 also shows various patterns of the Theil index movement in six-main islands during 1990s. This study suggests that the patterns were affected by regional characteristics. However, regardless of the high level of Moluccas-Papua disparities and also its rapid annual growth at 0.08 percentage points, this study suggests that, the contribution of Moluccas-Papua's in total Indonesian inequality may not as large as its within-island inequality. As the calculation of the Theil index considered the weight of

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population and regional output share, then the role of Moluccas-Papua's is minor than other islands since they only provide for less than 3 percent of total Indonesia output. On the other hand, this study suggests a significant role of Java-Bali's since their economies covers 60 percent of Indonesia's. The findings corroborate to studies by Akita (2003), Akita and Alisjahbana (2002), and Akita et al. (2011), which shows the large contribution of Java-Bali's in Indonesia's inequality.

Moreover, this study finds that Sumatera and Kalimantan's within-region encountered the contribution of Java-Bali's within-region disparities. During 1990-1996, both islands show the opposite direction of Java-Bali's trend by showing a decreasing trend in their inequalities. This study suggests that the fall of the Theil indices in Sumatera and Kalimantan islands were affected mainly by the development of estate crops plantation in palm oil and rubber. The expansion had increased regional output and GDP per capita level of the non-mining districts which later reduce the gap between mining and non-mining regions. Aside from that, the fall of Sumatera's Theil index might be associated with the fall of mining output, especially in Aceh. McCawley (2014) shows that in the past decades, the share mining resources in Aceh's output decrease dramatically from over 40 percent to under 20 percent, causing a minus 0.7 percent annual growth in Aceh economy.

Surprisingly, Figure 2. 6 shows that the Asian financial crisis did not largely increase Indonesia's inequality. As the crisis mainly hit construction, financial and business, and manufacturing sectors severely, and left the agricultural sector (Wie, 2000), it had decreased the income level of many urban areas then reduced the gap between angricultural and non-agricultural based districts. The argument corroborates to the finding in Figure 2. 6, which shows that most of the islands lessen its regional inequality

during the Asian financial crisis.

As demonstrated in Figure 2. 5, Indonesia Theil's index reaches one of its peak in 2001. Aside from the economic recovery that increases regional GDP level of many urban areas, this study suggests that the implementation of a decentralization policy, which started in 2001, as another factor affect Indonesia's regional inequality. According to the Law 22 and 25 (1999), the system did not only shift the authority on managing regional affairs to local government but also mandates the central government to allocate massive fiscal transfer to support to local government. This transfer includes the general fiscal transfer[12], specific transfer, and revenue sharing from taxes and natural resources.

Among those transfers, this study believes that revenue sharing from natural resources had escalated local government revenue of mining-based districts, thus affect the regional GDP per capita and regional inequality. This argument confirms studies by Hill and Vidyattama (2014), Sumarto et al. (2014), and World Bank (2003), which show that many mining-districts are able to generate more income from revenue sharing. Figure 2. 6 shows that during decentralization, mining-based regions such as Sumatera, Kalimantan, and Papua islands had risen its Theil index than non-mining based islands. The finding corroborates to Akita (2003), Akita et al. (2011), Hill and Vidyattama (2014), and Sumarto et al. (2014), which argue that the presence of mining or natural resources is likely increasing inequality between areas in Indonesia.

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[12] General fiscal transfer is also known as block-grant, which mainly being allocated by the central government to support the local government on delivering its essential services. Therefore, the general fiscal transfer is primarily used for wages and expenditure paid for the basic operation of local government.

Interestingly, this study also finds that Indonesia Theil index is diminishing since then. This study suggests several arguments for this phenomenon. First, the fall of mining output in Aceh's (see Hill & Vidyattama, 2014; McCawley, 2014). The decrease of Aceh's mining output does not only affect the regional GDP level of the mining-districts in Aceh but also reduce the difference of regional GDP per capita levels between mining and non-mining district in Aceh and Sumatera islands (see Table 2. 1). Second, the expansion of estate crops plantation, mainly in palm oil, in Sumatera and Kalimantan districts. The development of estate crop industries had significantly increased regional GDP per capita of the non-mining-district. The argument corroborates with the finding in Table 2. 1, which shows significant decreases in between-province and within-province inequality in Sumatera and Kalimantan islands.

Third, the implementation of decentralization policy. Although, at first it rose the regional inequalities in 2001, it was followed by several policies such as the allocation of general fiscal transfer by the central government. One of the aims of the transfer is to reduce regional inequality. According to the regulation, regions with neither mining resources nor large manufacturing industries may have larger share per capita allocation. Since the transfer takes the major share of local government revenues (Patunru & Rahman, 2014), an increase in allocation share will raise regional GDP per capita level of beneficiary regions.

Fourth, the decentralization was followed by another administration process, namely regional proliferation. At first, the policy is expected to bring the service delivery up to people, yet it is also followed by the distribution of resources endowment. With many of proliferated-district in Sumatera, Kalimantan, and Papua are mining-based regions, then the policy not only deliver the bundle of resources to other "new" region(s)

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but also reduces regional inequalities GDP per capita of many mining-districts. To sum up, the Indonesia Theil index decreases gradually and steady at around 0.40 in 2014.

Although Nusa Tenggara shows the lowest Theil index in the 1990s, it demonstrates a sharp increase in its regional inequality in 2004, with the index rose from 0.06 to 0.40. This study argues that the rise is affected mainly by the operation of copper and gold extraction in West Sumbawa district[13]. This study finds that the industry had boosted West Sumbawa's income level twenty times higher than the previous year[14], thus escalated Nusa Tenggara's theil index for more than sextuple. However, as the Indonesian law mandates the central government to transfer mining revenue not only to the possessing-district but also to other districts within the same province[15], other West Nusa Tenggara districts also receive an additional transfer from mining revenue in the following years. This transfer raises the regional GDP per capita level of non-mining district in West Nusa Tenggara and reduces regional inequality gradually since then.

Moreover, this study argues that the Nusa Tenggara case is a good example of the vulnerability of regional disparities affecting by mining sectors. As Figure 2. 6

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[13] West Sumbawa is a new district promulgated in December 2003, previously it was part of the Sumbawa district.

[14] It is not possible to estimate the regional income level of proliferated-region from its parent, especially for pre-proliferation years. Then this study assumes that there is an indifference regional income level between the new region and its parent before the proliferation process.

[15] Law number 33 the year 2004 on the Fiscal Balance between the central and local governments.

demonstrates the fluctuation of Nusa Tenggara's, this study associates the movement with the change of mining output. In 2004, the Theil index increased sharply by the start of mining exploration, but once the commodity price fell, regional inequality also diminished simultaneously. The result also confirms studies by Burke and Resosudarmo (2012), Yusuf, Komarulzaman, Purnagunawan, and Resosudarmo (2013) and Yusuf et al. (2014) which show that regional inequality in Indonesia was affected by commodities booming.

This study confirms that Indonesia's inequality decreases steadily in the past decade, standing at 0.40 in 2014, not to mention a lower level than 1990. Yet, this study argues that the result does not necessarily indicate that regional economic development already spread evenly in many Indonesian regions. This study suggests that the Indonesian government needs to be more cautious as several regions, namely Java-Bali and the Moluccas-Papua, still show a high regional disparity level with Theil index stand at 0.47 and 0.60 respectively.

Since Akita (2003), Akita and Alisjahbana (2002), and Akita et al. (2011) suggest that Java-Bali contributes a significant share in regional inequality, then the discussion on this area may insight the main factor affect Indonesia's inequality. This study confirms that in the 1990s, Java-Bali steadily increased its regional disparity. This study also suggests the rise was affected by the expansion of manufacturing industries and the growth of the financial and business sectors, especially in urban areas (see Akita et al., 2011).

Moreover, this study finds that regional inequality reached 0.47 points in 2001 and stabilized since then. This study also finds that Java-Bali's district diverges its regional economies. Districts with low region GDP per capita cannot catch-up with their

counterpart, which show rapid economic development. Table 2. 1 shows that between-province and within-province inequality in Java-Bali remain stable during the past decades. The findings also indicate that the development of Java is concentrated in particular regions, showing that the problem of regional inequality in Java-Bali remains preserved for the last decades.

On the other hand, this study also finds significant differences in regional GDP per capita in Moluccas-Papua Islands caused by the extractive industries. The finding corroborates to study by Resosudarmo et al. (2014) on the impact of the mining sector in Papua economies. While mining-districts are continuously showing a high regional GDP per capita level, other regions present the opposite direction. However, this study also finds that Papua's inequality moves simultaneously with the fluctuation of the mining sector output and commodity price.

As the mining-districts, namely Mimika, Teluk Bintuni, and Sorong, are located in the coastal area, this study suggests that the development of extraction industries does not necessarily involve the neighborhood areas. The finding corroborates to Hill and Vidyattama (2014), which argue that the neighborhood spillover effect of mining-district is limited, that is, does not certainly pull along its contiguous districts. In addition to that, the lack of infrastructure, especially in transportation, the absence of manufacturing industries, and the high dependency in the agricultural sector for non-mining districts also contribute to Papua's disparity. Therefore, without dealing with those issues, this study suggests that regional inequality in Papua will remain considerable over time.

As demonstrated in Table 2. 2, this study also confirms the previous arguments on the association between the composition of sectoral economies and regional inequalities. This study finds that in 1990, mining-provinces such as Aceh, Riau

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(including Riau islands), South Sumatera, East Kalimantan, and Papua (including West Papua) show high Theil index. A similar pattern is found in the manufacturing-based provinces such as West Java (including Banten) and East Java.

Table 2. 2: Provincial Theil indices 1990-2014

Regions	Province	Years			
		1990	1996	2002	2014
Sumatera	Aceh	0.66587	0.45327	0.65544	0.09285
	North Sumatera	0.06979	0.12979	0.10517	0.11277
	West Sumatera	0.11527	0.17197	0.17306	0.06469
	Riau	0.55639	0.32320	0.29978	0.19161
	Riau islands			0.15596	0.07149
	Jambi	0.02581	0.02965	0.09154	0.11483
	South Sumatera	0.31273	0.14303	0.14021	0.13054
	Bangka Belitong			0.00553	0.03339
	Bengkulu	0.04124	0.05709	0.05968	0.08622
	Lampung	0.04005	0.01224	0.01672	0.02589
Java-Bali	Jakarta	0.08801	0.07036	0.11002	0.15709
	West Java	0.09420	0.12106	0.17099	0.15249
	Banten			0.21641	0.36172
	Central Java	0.18927	0.18887	0.21023	0.19674
	Yogyakarta	0.03164	0.04234	0.07339	0.09788
	East Java	0.13750	0.36328	0.36842	0.34585
	Bali	0.02811	0.38958	0.06374	0.02771
Kalimantan	West Kalimantan	0.11150	0.11196	0.08337	0.07541
	Central Kalimantan	0.04778	0.04993	0.05874	0.01766
	South Kalimantan	0.09276	0.05151	0.07546	0.08816
	East Kalimantan	0.28460	0.24532	0.50787	0.15566
	North Kalimantan				0.01795
Nusa Tenggara	West Nusa Tenggara	0.04744	0.04021	0.02172	0.14763
	East Nusa Tenggara	0.03936	0.05630	0.09693	0.10619
Sulawesi	North Sulawesi	0.29861	0.32179	0.06328	0.08263
	Gorontalo			0.00912	0.02340
	Central Sulawesi	0.00724	0.00107	0.01381	0.03326
	South Sulawesi	0.04698	0.07171	0.08085	0.14401
	West Sulawesi				0.01774
	Southeast Sulawesi	0.02661	0.04421	0.06815	0.11024
Moluccas-Papua	Moluccas	0.30715	0.33138	0.13444	0.09537
	North Moluccas			0.01042	0.03675
	West Papua	0.70282	1.08327	0.07053	0.58414
	Papua			1.40789	0.46072

<div style="background:#cccccc; width:150px"> </div> proliferated region

Source: Authors calculation from Indonesia statistic 1990-2014

Meanwhile, agricultural-based regions such as Jambi, Bengkulu, and Lampung of Sumatera Islands, Jogjakarta, Bali, West- and East Nusa Tenggara, Central Kalimantan, and Central, South, and Southeast Sulawesi are showing low regional disparities. Despite showing a large share of the financial and business sector, interestingly, Jakarta province demonstrates a small Theil index. This study argues that Jakarta's districts perform identical regional GDP per capita level as they show similar characteristics and composition of its regional economy. Therefore, they minimize the possibility of having high within-province inequality.

Although Table 2. 2 presents that, in general, the patterns withstood in 1996, this study also argues several differences as follows. First, this study suggests that the rise of the Theil indices in West and East Java and North Sumatera are affected by the movement of manufacturing industries output. Second, this study finds the fall of theil indices in Riau and South Sumatera affected by the expansion of palm oil plantations. The development of palm oil cultivation had increased the share agricultural sector in regional output and raised regional GDP of non-mining districts. As a result, the regional GDP per capita difference between mining-districts and non-mining-districts decreased significantly. The findings corroborate to Akita et al. (2011) and Gordon and Resosudarmo (2018) on the role of manufacturing and agricultural sector in regional inequality.

This study finds that mining-provinces are continuously showing high Theil indices than other sectors-based regions, while agricultural-provinces show low regional inequality (see Akita et al., 2011; Gordon & Resosudarmo, 2018). Although Table 2. 2

indicates a sharp decrease in regional inequality in West Papua[16], this study argues that it was linked mainly to the proliferation process of West Papua from Papua province. At first, West Papua province only administered four districts with similar characteristics of the regional economic output. Hence, they indicate a similar regional GDP level to each other and then reduce regional inequality. As the proliferation process took into the district level, the number of West Papua's districts also increase rapidly, therefore the regional GDP per capita level become vary and rise regional inequality in West Papua. Still, compared to the 1990s, West Papua shows progress to spread its regional development in 2014.

To sum up, analyzing the Theil index at the provincial level suggests several facts on the association of sectoral composition in Indonesia inequality (see Table 2.2). First, despite having high Theil indices, the regional disparities of mining-provinces are fluctuating by the mining output movement. The expansion of mining production in West Sumbawa of West Nusa Tenggara in 2004 may raise within-province inequality dramatically, while the diminishing output of mining resources Aceh and West Sumatera provinces in the 1990s indicate the opposite results. Second, the fall of regional disparities in mining-province may come from the administrative procedure. The proliferation process followed by the allocation of natural resource endowment may induce or hinder regional economic development in the proliferated regions. This study suggests that the establishment of the new district in Riau islands, Central, East, and North Kalimantan had

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[16] West Papua was part of Papua province until 2003. Originally it only administered only four districts, namely Manokwari, Sorong, Fak-fak, and Sorong city. As part of the proliferation, by 2014, it supervised 13 districts.

reduced the regional GDP per capita gap among them.

Third, the development of non-mining sectors in mining-province also decreases regional inequality gradually. This study suggests that the expansion of the non-mining sector increases regional GDP per capita of non-mining districts and then reduces the differences in regional GDP per capita. The development includes the expansion of palm oil plantations in Riau and South Sumatera provinces and the development of manufacturing industries in East Kalimantan and Riau islands. Fourth, on the other hand, the development of manufacturing industries in the non-mining district, which concentrated in particular districts, may present the opposite result by increasing regional inequality. Unlike the expansion of large manufacturing that reduces regional disparities in mining-provinces, this study finds that industrial agglomeration in East and West Java and Banten had risen and maintained regional disparities in these provinces as many non-industrial areas left behind.

2.5. 2 The role of sectoral composition in regional GDP per capita

As the previous discussion shows that regional disparities are mainly affected by the sectoral composition, this study does further analysis to support the arguments. For such purpose, this study applies the ternary diagram that classifies regional output into three main sectors, namely agriculture, industry, and service[17]. Thus, this study associates the sectoral composition with the regional GDP level represent by quintile clusters. Unfortunately, sectoral economic data at the district level only available after 2001.

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[17] The industrial sector covers mining, manufacturing, construction, and utilities. Meanwhile, the service sector covers trade, hotel, and restaurant; transportation and telecommunication; finance and business sectors; and public and other services sector.

Hence this study will focus the discussion on these periods.

In general, Indonesia experiences sharp movement out of the agricultural sector in its economic output. Although the contribution of agriculture is already less than 20 percent in 1990, the size is continuously decreasing since then. By 2014, this sector only covers 14 percent of total Indonesian output. On the other hand, the industrial sector through manufacturing industry, was recorded as the primary contributor for economic growth and predicted to be an engine of the Indonesian economy in the early 1990s (Wie, 2000). Yet, being hampered by the Asian financial crisis, the role of this sector decreased in 1997 and gradually fallen since then. In 2002, the domination of the industrial sector in Indonesia's economy was surpassed by the service sector. By 2014, the share of the industrial sector only stands around 36 percent of total output.

However, regional patterns do not necessarily imitate the national trend. Analysis of sectoral composition at the regional level presents different outlines. Figure 2. 7 indicates that most of the Java-Bali districts show large shares of either service or industrial sector, shown by the large concentration of Java-Bali districts in the lower part of the ternary diagram. Meanwhile, outside Java-Bali districts show mixture patterns that combine three sectors. Furthermore, Figure 2. 7 also indicates several outlines as follows. Sumatera districts show diverge outlines that cover three sectors, while Kalimantan districts are located mainly in either industrial or service sectors. Lastly, districts in Nusa Tenggara, Sulawesi, and the Moluccas and Papua show large concentrations in either the agricultural or service sector.

According to Figure 2. 7, this study suggests the important role of agriculture as well as the industrial and service sectors in Sumatera economies. This study finds that districts grouped in the lowest quintile show large shares of the agricultural output. These

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Figure 2. 7: Regional economy sector composition by quintile and islands year 2002 – 2014
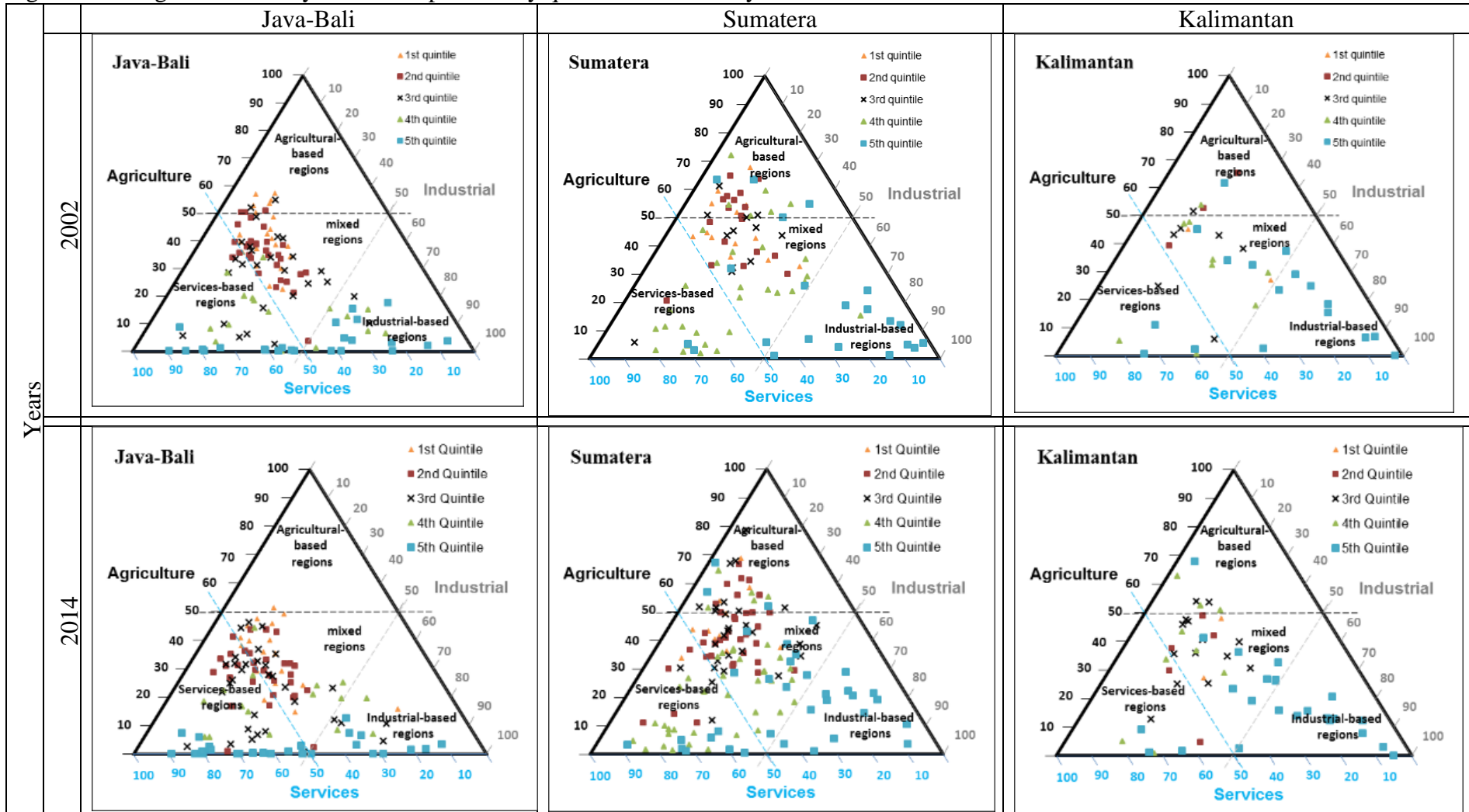
Figure 2.7 : Regional economy sector composition by quintile and islands year 2002 – 2014 (continued)
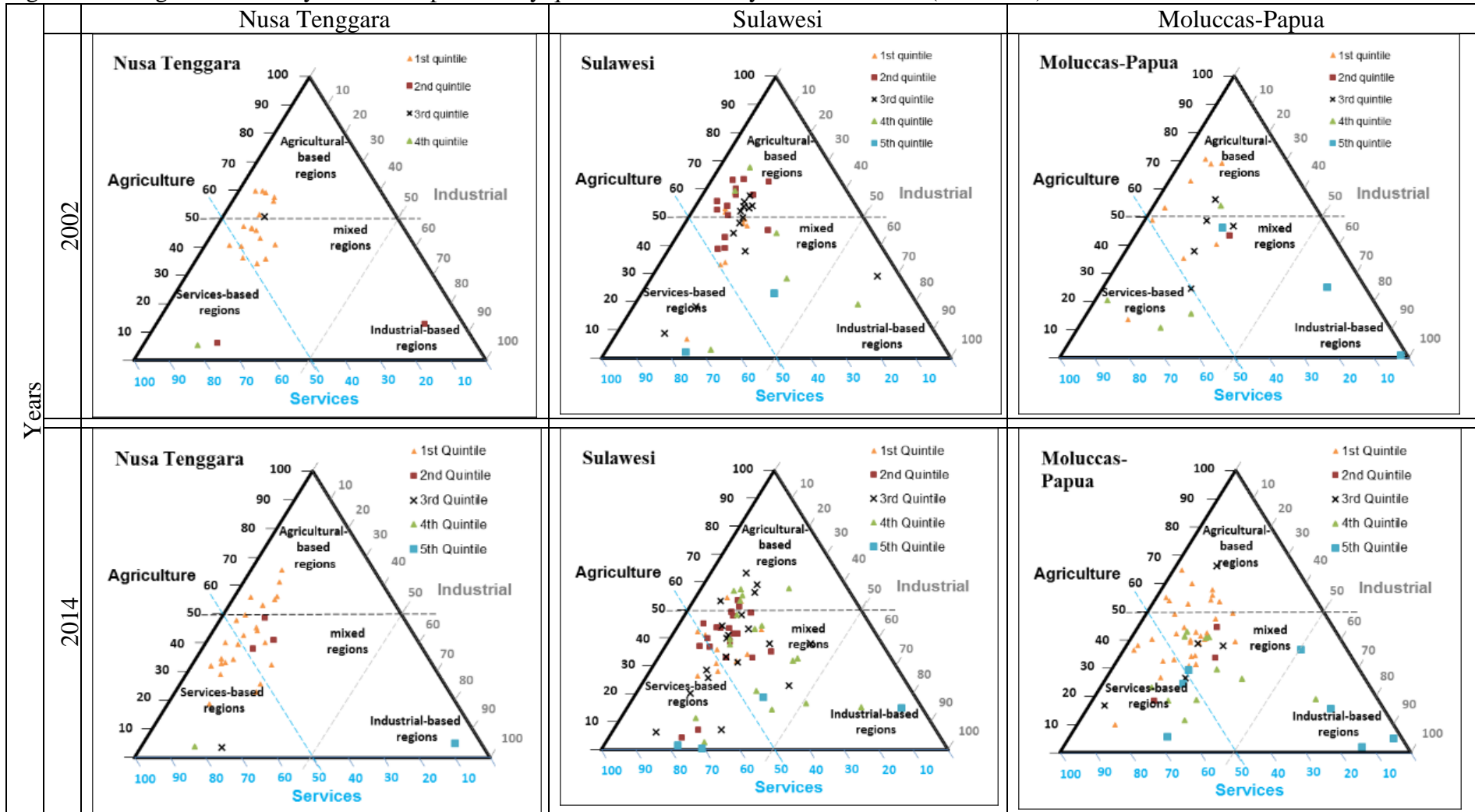
Source: Author's calculation based on Indonesia Statistic

regions are randomly scattered from Aceh to Lampung, with many of them are found mainly on the western coast of Sumatera. In contrast, districts grouped in the fifth quintile show significant shares of industrial output, especially mining resources. These districts are found on the east coast of Sumatera that includes districts in Riau, Riau Islands, and South Sumatera provinces. Meanwhile, service-based districts are associated with city-administered districts. It is important to note that some agricultural-districts in Sumatera also perform higher regional GDP per capita, affected by estate crop plantations in palm oil and rubber (see Table A2. 6). This study finds that the plantation raises regional GDP per capita for many districts in the southeastern part of Sumatera. This finding corroborates a study by Burke and Resosudarmo (2012). They argue that palm oil production, which the volume rose for quadrupled during 2000–11, had brought sizeable economic benefit in outside Java economies.

The findings which shown in Table A2. 2, Table A2. 3, Table A2. 4, and Table A2. 5 also confirm the domination of the manufacturing and mining sectors in Sumatera's industries. Surprisingly, despite the significant contribution of trade, hotel, and restaurant sector in its service output, this study also finds large shares of public service and other services in Sumatera's. The findings corroborate with the fact that Sumatera districts located in the lowest quintile are relying on this sector to support their economies.

This study also finds the remarkable role of the mining sector in Kalimantan's economy, which outstripped the manufacturing shares in the total industrial output. Moreover, the argument is supported by spatial data, which shows a notable role of the mining sector in sizing regional GDP per capita levels. Most of the mining-districts in Kalimantan are grouped in the fifth quintile. However, this study also finds that some agricultural-districts in Kalimantan are grouped in the fourth and fifth quintiles, showing

high regional economic development. This study also suggests the role of estate crop plantations, especially in palm oil. Table A2. 6 shows that Kalimantan is the second largest contributor to Indonesian palm oil production.

On the other hand, this study finds that most of Nusa Tenggara's districts are located in either first or second quintiles, indicating a low regional GDP per capita level. According to the ternary diagram, this study associates this phenomenon with two sectors, the large share of the agricultural and the public service and other services in Nusa Tenggara economies. This study finds that Nusa Tenggara indicates a similar trend to Java-Bali regions, which large percentages of food crops plantation such as corn and paddy. Meanwhile, the large share of the public service sector in regional output may indicate the presence of the Armey-Rahn curve problem. The finding corroborates Chobanov and Mladenova (2009) and Ekinci (2011) on the negative impact of government spending on economic growth. Moreover, the ternary diagram confirms the absence of abundant mining resources and large manufacturing industries. With those facts, an exception for West Sumbawa, none of Nusa Tenggaras' are grouped in the upper quintile (see Table A2. 3 and Table A2. 5).

This study finds that most of Sulawesi districts are located in the upper part of the ternary diagram, implying that many of them are heavily relying on the agricultural sector. Table A2. 6 shows that Sulawesi presents large shares of cocoa and copra production, a different cultivation trend compared to Sumatera and Kalimantan. As these crops present less value-added compared to palm oil and rubber, agricultural-districts in Sulawesi show less regional GDP per capita than Sumatera and Kalimantan. In term of industrial sector composition, Sulawesi shows a significant share of manufacturing though utilities sector also present a similar percentage in total industrial output.

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With many Moluccas and Papua districts are located on the left side of the ternary diagram, meaning that Moluccas and Papua regions are classified as either agricultural- or service-based district, this study finds a similar pattern in Moluccas and Papua islands. Districts with low regional GDP per capita are still associated with either the agricultural sector or service sector from government expenditure. Meanwhile, districts grouped in the fifth quintile are showing large shares of the industrial sector, especially from mining resources. Lastly, this study also finds non-mining districts that show high regional GDP per capita. This study suggests that these regions present large shares of service sectors. These regions includes Jayapura and Ambon. Both districts are also known as the provincial capital city.

Table 2. 3: Sectoral share of regional economy by quintile and islands year 2002 and 2014 (three-sectors)

Quintile	2002			2014		
	Agriculture	Industry	Service	Agriculture	Industry	Service
Q 1	46.96%	15.17%	37.88%	40.7%	15.7%	43.5%
Q 2	42.20%	20.31%	37.50%	35.5%	19.7%	44.8%
Q 3	37.79%	22.76%	39.45%	33.7%	22.4%	43.9%
Q 4	26.53%	32.21%	41.26%	26.5%	27.0%	46.5%
Q 1	16.36%	52.49%	31.15%	14.0%	46.7%	39.4%
Total	35.17%	27.26%	37.57%	30.1%	26.3%	43.6%

Source: Author calculation from Indonesia statistic 2002-2014

To complement previous analysis, this study also estimates the average contribution of economic sectoral in each quintile group. As demonstrated by Table 2. 3, this study suggests various outline on the change of sectoral composition in each quintile group. In general, Table 2. 3 confirms that in 2002, regions located in the lower quintile are heavily relying on the agricultural sector. On average, agriculture covers at least 47 and 42 percent of total regional output in the first and second quintile groups, respectively. Meanwhile, the share of this sector in the fifth quintile group is less than one-sixth of the total output. This study suggests that the pattern holds in 2014. Due to the diminishing share of this sector in Indonesia output, this study also finds that agriculture is only cited as the second contributor in the first and second quintile groups.

All in all, this study suggests the negative relationship between the agricultural sector share and regional GDP per capita, meaning that the percentage of agricultural decreases rapidly as the rise of regional GDP per capita level. This argument is supported by the scatter plot in Figure 2. 8, which indicates the negative association between the two variables during observation periods.

This study suggests a different pattern for the industrial sector. As demonstrated in Table 2. 3, this study finds that districts grouped in the first quintile show small shares of the industrial sector in its total output. The percentage gradually increases as the movement into the upper quintile group. The argument is also supported by Figure 2. 8, which shows the positive association between industrial sector share and regional GDP per capita level. However, Table 2. 3 also demonstrates that in 2014, the share of the industrial sector decreases by about five percent in the fourth and fifth quintiles, respectively. This study suggests that the fall is related to the role of the service sector in Indonesia output, which already surpassed the industrial sector for the last decades.

Figure 2. 8: The relationship between regional GDP per capita and sectoral-shares
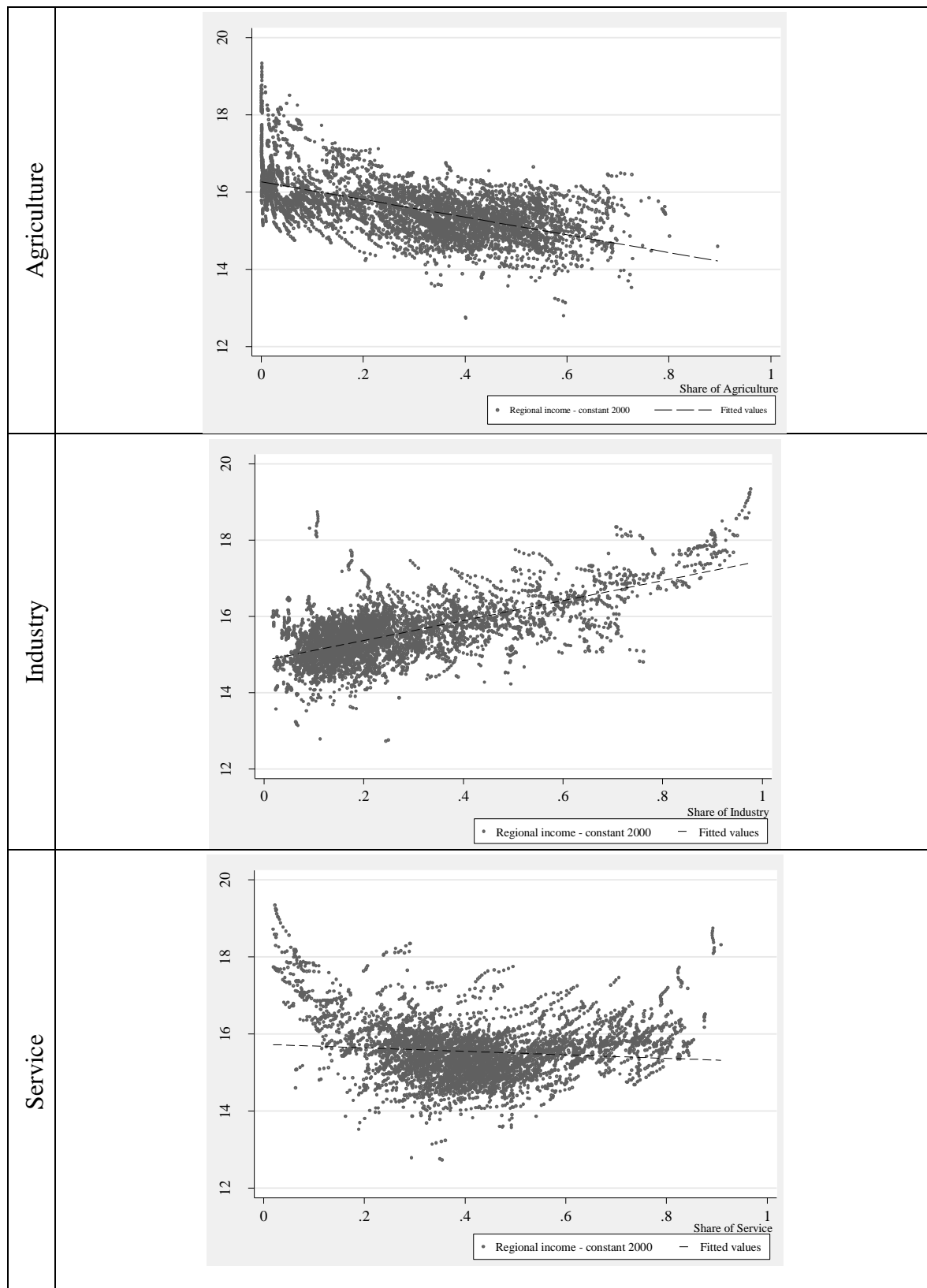
Source: Stata output

Moreover, this study finds that more than half of the industrial output comes from mining (see Table A2. 3 and Table A2. 4). This condition supports the previous argument on the remarkable role of the mining sector in sizing regional GDP per capita. Nevertheless, it also fluctuates in the response of commodity price volatility. During the commodity booming that occurred since 2005, the mining-district raise its regional GDP per capita. Yet, it shows a stagnant or decreasing trend by the end of the commodity booming. In 2014, this study finds that the role of the mining sector in the fifth quintile was shifted to the second position, behind the manufacturing sector, with the share covers around 40 percent of the industrial output in 2014.

Unlike the association of the other sectors that can be recognized easily through their share movement, this study suggests that the link between the service sector and regional GDP remains vague. As demonstrated in Table 2. 3, the share of this sector varies from one quintile to another quintile group with an uneven pattern. This study finds a slight decrease in the service sector share from the first quintile to the second quintile. Although it starts to increase in the next movement until the fourth quintile, this study finds that the share of this sector also decreases in the fifth quintile. Moreover, this study finds that the share of the service sector in the fifth quintile is lower than the first quintile level, indicating that the assessment on the relationship between the service sector share and regional GDP per capita meets several a challenge. This study also meets a similar problem in the scatter diagram (see Figure 2. 8).

Since the role service sector in Indonesia economic become significant in the past decade, this study suggests a further analysis in assessing the role of service sector in regional GDP per capita. For such purpose, this study disaggregates the service sector

Table 2. 4: Sectoral share of regional economy by quintile and islands year 2002 and 2014 (nine-sectors)

Quintile	2002									2014								
	Agri	Ind				Serv				Agri	Ind				Serv			
	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
Q 1	45.05%	2.85%	6.45%	0.50%	5.88%	15.88%	4.97%	4.13%	14.28%	40.74%	2.32%	5.95%	0.45%	7.02%	17.22%	5.18%	4.02%	17.10%
Q 2	42.04%	2.96%	10.84%	0.63%	4.67%	17.29%	5.05%	4.07%	12.46%	35.47%	2.31%	9.06%	0.76%	7.61%	18.88%	5.28%	5.55%	15.08%
Q 3	35.08%	4.30%	12.92%	0.99%	5.29%	18.51%	6.17%	4.45%	12.29%	33.69%	3.72%	11.04%	0.91%	6.73%	19.70%	6.03%	4.74%	13.44%
Q 4	24.49%	4.85%	17.59%	1.06%	6.30%	19.16%	8.47%	4.84%	13.24%	26.52%	4.17%	13.53%	0.85%	8.13%	19.22%	8.64%	5.54%	13.40%
Q 1	14.87%	26.35%	19.87%	0.95%	4.43%	15.96%	6.21%	5.01%	6.35%	13.99%	19.20%	20.44%	0.80%	6.22%	18.24%	7.78%	4.88%	8.45%
Total	14.87%	26.35%	19.87%	0.95%	4.43%	15.96%	6.21%	5.01%	6.35%	13.99%	19.20%	20.44%	0.80%	6.22%	18.24%	7.78%	4.88%	8.45%

Source: Author calculation from Indonesia statistic 2002-2014

into its components. As demonstrated in Table 2. 4, this study finds that. First, trade, hotel, and restaurant and finance and business sub-sectors show a similar pattern to the aggregate data. Second, this study finds a modest association between the other two sub-sectors and regional GDP per capita. The findings show that. First, there is a positive relationship between the transportation and telecommunication sector and regional GDP per capita, meaning that regional GDP per capita rise as the increase of this sectoral share. Second, a negative association between the public service and other service sectors and regional GDP per capita, indicating that regional GDP per capita decreases as the increase of this sectoral share.

This study suggests that the second finding may indicate the presence of the Armey-Rahn curve problem, which the negative impact of high shares of government spending on economic growth (also see Chobanov & Mladenova, 2009; Ekinci, 2011). Moreover, the finding shows that regions with high regional GDP per capita demonstrate less dependency on the public service sector to support their economic activities, implying a minimum role of government intervention through fiscal policy on accelerating regional economy.

2. 6 Conclusion

In the past decade, Indonesia's economic growth shows a steady rate at 5 percent annually, showing a similar pace to its economic performance before the Asian financial crisis. However, a different pattern emerged when one looks at the regional level. Despite the improvement of regional GDP per capita level during decentralization, this study finds that regional disparities remain preserved and becoming unsettled issues. By 2014, Indonesia's Theil index remains considerate at 0.40, with more than 90 percent is affected by within-regions inequality. Although Indonesia's disparities level return to the condition

in the early 1990s, this study finds various trends in six-main islands. The Moluccas and Papua show the highest disparity, followed by Java-Bali, Kalimantan, and Sumatera islands, while Nusa Tenggara and Sulawesi show the lowest regional inequality.

Therefore, rather than classified geographically, this study suggests that Indonesia's disparities are more affected by the sectoral composition. Among the sector of economies, this study cites mining resources as the main cause for high regional inequalities, yet the effect fluctuates depending on the output and commodity price volatility. Other sectors that affect regional disparities are the development of manufacturing industries, transportation and telecommunication, and financial and business sectors. Depending on the type and location, this study finds that manufacturing industries may reduce or raise regional inequality—the development of manufacturing industries in mining-provinces helps non-mining-districts to catch-up their counterparts while it may increase the regional gap in non-mining-provinces.

In general, this study suggests the positive relationship between the share of the industrial sector and the transportation and telecommunication sector and regional GDP per capita. On the other hand, this study suggests the opposite result for the agricultural and the public and other service sectors. In addition to that, this study also reveals that some agricultural-based districts may present high regional GDP per capita than the national average level. This study finds that these regions exhibit large estate crop plantations, especially in palm oil, rubber, and other high value-added crops. This finding indicate the role of high value-added crops in regional development. Rather than shift to other sectors such as industrial or service sector, agricultural-based regions in Indonesia may shift their crops to those commodities.

All in all, this study finds that, aside from Java-Bali, regional disparities show a

declining trend in the past decade, which affected by several factors such as the decentralization policy, fiscal transfer mechanism, or the development of non-mining sectors in Indonesia regions.

This study suggests that further analysis may consider examining the role of sectoral economies on regional GDP per capita through econometric modeling. This approach may capture an effect size of each sector in regional economies and disparities. It may seize other factors than sectoral compositions which affect regional disparities in Indonesia. Lastly, the approach may promote a comprehensive examination to answer the unresolved problem in Indonesia's economic development.

Chapter 3   Dynamics of Educational Attainment in Decentralized Indonesia,

2002-2014

3. 1 Introduction

During the past three decades, Indonesia has shown remarkable progress in improving the level of its educational attainment. The national primary school enrolment rate increased from below 70 percent in 1970 to above 90 percent in the mid-1990s. Tobias et al. (2014) attribute the improvement to the central government's policies, mainly by expanding coverage and restructuring school buildings, founding a reform-oriented institutional environment, and implementing constitutional commitment to allocate a large amount of the national budget to the educational sector. These performances continued after 1998 under the decentralization. By 2013, the primary, lower-, and upper-secondary enrolment rates had steadily risen to 96, 77, and 59 percent, respectively.

However, Indonesia still faces several challenges in enhancing its educational attainments. First, compared to other developing countries in Asia and Latin America, Indonesia still has a high rate of between-cycle dropouts in secondary school[18] (Di

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[18] Di Gropello (2006) defines school dropout into two categories, grade-by-grade dropout, and between-cycle dropout. The first definition explains the dropout across all grades regardless of the level of education, meaning that it includes the dropout within a certain level of education, such as primary or secondary level of education. Meanwhile, the second definition focuses on the dropout between the cycles or students who complete one level of education but does not continue to the upper level.

Gropello, 2006). Second, regional disparities in educational attainment remain considerable at both the provincial and district levels (see Jones & Pratomo, 2016; Lanjouw et al., 2001; OECD/Asian Development Bank 2015; Tobias et al., 2014).

Studies on factors affecting educational attainment in Indonesia suggest various determinants of educational attainment from different perspectives. Studies by Ramesh (2009), Saraswati (2012), and van de Walle (1992) expose the prominent role of the Indonesian government in enhancing educational attainment, primarily through education policies and budget allocation. Similar results are reported by World Bank (2013), which highlight the crucial role of the central and local governments' budget allocations in achieving successful educational outcome during decentralization. Meanwhile, Suryadarma et al. (2006a) point to household welfare as the foremost factor affecting Indonesia's low secondary enrolment rates. Aside from that, Jones (2003), Jones and Pratomo (2016), Parker (2009), and Rammohan and Robertson (2012) discuss the importance of social factors to educational attainment.

However, studies on the effect of decentralization policy, the shift of government authority on managing public services to local government, in education show different results. Kristiansen and Pratikno (2006) show that decentralization has hampered educational outcomes by increasing household spending on education and leading to regional disparities. On the other hand, Toi (2010) shows that a decentralization policy improves the quality of the educational environment and leads to higher test scores and

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This paper adopts the between-cycle dropout for a large proportion of students who complete primary education but do not enter lower-secondary education or complete lower-secondary education but do not enter upper-secondary education.

lower dropout rates. Though he also argues the adverse effect of decentralization that increases the disparity between regions.

Although Indonesia's decentralization has shifted the authority to manage and deliver education services to the district government, most of the studies on educational attainment rarely discuss the effect of the policy at this level. These studies mainly utilize either household (Lanjouw et al., 2001; Suryadarma et al., 2006a), or national (Tobias et al., 2014; World Bank 2013, 2014), or province-level data (Azzizah, 2015; Jones & Pratomo 2016; Suryadarma, Widyanti, Suryahadi, & Sumarto, 2006b). While Tobias et al. (2014) and Jones and Pratomo (2016) mention several districts in their papers, their discussions are quite limited. This study suggests that most studies have not offered a more in-depth analysis at the district level.

Moreover, unlike previous studies that narrowed their analysis on either primary or lower-secondary level education, further investigation can analyze factors affecting educational attainment at the upper-secondary level. Regardless of the presence of regional disparities and the rise in gender disparities in Indonesia's regions, this study finds few studies discuss these issues at the district level.

Hence, this study presents different approaches to examine factors affecting educational attainment. First, it uses district-level data from 2002-2014 that covers 497 districts. Second, it focuses on secondary education, both lower- and upper-secondary level. Third, it discusses the regional and gender disparities in education attainment that have arisen during the last decade. For such purposes, this study utilizes econometric, statistical, and spatial analysis to identify the determinants of regional educational outcomes and examines the factors affecting regional and gender disparities. Further, it also assesses how the implementation of decentralization, represented by local

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government policies that include education budget provision and school expansion, may affect and improve educational attainment.

This study starts with a literature review on the determinants of educational attainment. After that, it discusses the education system in decentralized Indonesian. It then presents the school enrolment data and methodology. Next, it discusses empirical results from regression analysis and the dynamics of regional educational attainment. Finally, it provides some concluding remarks.

3. 2 Literature Review

In general, literature attributes the school enrolment decisions of a household into two factors: supply-side and demand-side factors. From the supply-side, Duflo (2001) and the World Bank (2004) show that school expansion increases the enrolment rate. In addition to that, van de Walle (1992) argues that public spending on primary education increases the enrolment rate. Thus, he also suggests that an increase in the standard-of-living of households and a pro-poor public spending approach will have positive impacts on the enrolment rate. In line with that, Ramesh (2009) shows that during crises, government programs on education and health care helped meet the population's vital education and health care needs. Saraswati (2012) argues that an increase in public spending has a positive effect on the poor by improving their welfare through enrolment rate improvement. She shows that the impact of government spending on education for the poor varies among Indonesia's regions with a developing region demonstrates more efficiency than developed areas. Those studies emphasize the role of government policy in improving educational attainment, mainly through government budget allocation and subsidies that reduce the cost of attending school.

From the demand-side, Glewwe and Jacoby (2004), Sabates, et al. (2010),

Suryadarma et al. (2006a) argue that among household characteristics, the household's welfare shows a prominent effect on affecting enrolment rate. Aside from that, numerous studies also demonstrate the impact of social factors in educational attainment (Gnezzy, Leonard, & List, 2009; Jones, 2003; Machimu & Minde, 2010).

Studies on household characteristics identify different correlations to educational outcomes. Using Vietnam's living standard survey from 1980-1998, Glewwe and Jacoby (2004) confirm the positive association between change in wealth and change in demand for education. Meanwhile, Sabates et al. (2010) show that, although there is no single cause for school dropout, poverty appears to be the most dominant factor in educational attainment. It reduces the ability of households to pay school fees and be linked with the high opportunity cost to attend school[19] (also see Di Gropello, 2006).

A similar result was reported by Suryadarma et al. (2006a) that use a longitudinal dataset of household surveys. They show that household welfare has a significant impact on the low secondary enrolment rate in Indonesia. They also cite the effect of other socio-economic factors, such as religion, employment opportunities, and gender on educational outcomes. Utomo, Reimondos, Utomo, McDonald, and Hull (2014) argue that household income's generated from child employment also affects educational attainment. An early school dropout may be seen as potential workers. Therefore the decision to send children to school is also affected by the opportunity cost of the children attending school.

In addition to supply and demand factors in education, literature has also identified

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[19] The opportunity cost to attend school is defined as money spend on the education sector or a loss of household income as the children come to the school and do not enter the unskilled labor market.

socio-culture factors that affect educational attainments, such as gender and kinship culture. While previous studies on the determinants of educational attainment assume that both boys and girls have equal opportunity to attend school, some studies note the relative impact of culture and gender on educational attainment. Based on a comparison between one tribe in India and another in Tanzania, Gnezzy et al. (2009) show that the matrilineal family system gives women better opportunities to have higher education and jobs. Machimu and Minde (2010) show that women from a matrilineal family in Tanzania attain higher education levels since they have a more influential position in deciding property rights.

In the case of Indonesia, Rammohan and Robertson (2012) discuss the role of kinship norms on gender differences in educational attainment. They argue that ethnic groups with strong patrilineal norms will prioritize sons; for example, the Bataks in North Sumatera and the Balinese, therefore girls from these regions tend to have lower educational outcomes. On the other hand, Minangnese women in West Sumatra, one of the world's largest matrilineal ethnic groups, are found to have higher access to education and higher attainment level than for men (also see Parker, 2009). Interestingly, Jones (2003) shows that the Madurese community traditionally arrange their daughters to marry as soon as they finish primary school, leaving female members to drop out of school without having a possibility of furthering their formal education.

Aside from those socio-culture factors, Gylfason (2001) discusses the impact of natural resources on education. He argues that nations or regions with abundant natural resources tend to neglect the development of their human resources. These regions consider natural resources as their most valuable asset and may inadvertently and perhaps even deliberately underrate the need for sound economic policies, including good

education policies. Alvares and Vergara (2016) also find lower educational attainment in regions with high export of natural resources. They show that the high labor demand in these natural resource-rich areas discourages young people from continuing their studies.

Meanwhile, studies on the effects of decentralization show mixed results. Kristiansen and Pratikno (2006) highlight the negative consequences of decentralization in the Indonesian education sector. They warn that decentralization may create a lack of transparency and accountability in government spending on education, increase household spending on education, and lead to geographical disparities. On the other hand, Toi (2010) shows that a decentralization policy that increases the school budget improves the quality of the educational environment and leads to higher test scores and lower dropout rates. Though he also argues the adverse effect of decentralization that increases the disparity between regions.

The result in line with study by Gallego (2010) and Jeong et al. (2017). While Gallego finds a positive and significant impact of political decentralization on more advanced levels of schooling in fifty former British colonies, Jeong et al. (2017), using local education government level (LEA) data from Korean education statistic yearbooks, also present a positive impact of fiscal decentralization in student outcomes. These studies show that the effect of decentralization policy in education attainment may differ, depending on how the political institution improve local government accountability.

Furthermore, it is also important to note that Indonesia's regions still face educational disparities. Azzizah (2015) and Suryadarma, et al. (2006a) suggest the presence of educational attainment disparities between Western and Eastern part of Indonesia. Moreover, Jones and Pratomo (2016) and Kristiansen and Pratikno (2006) argue the presence of regional inequality between and within Indonesia's provinces.

Meanwhile, Suryadarma et al. (2006b) discuss ethnic inequality and the gap between urban and rural areas (also see Jones, 2003; Parker, 2009; Rammohan and Robertson, 2012).

Considering the gender disparities in Indonesia, many studies suggest the nearly universal gender neutrality in educational attainment in Indonesia (such as Grant & Behrman, 2010; Hsin, 2007; Jones & Pratomo, 2016). However, those studies utilize national-level data on their analysis. Therefore, similar to the presence of regional disparities, different results may emerge once the focus changed to the regional level.

All those studies demonstrate different factors affecting educational outcomes, from supply and demand-sides. The studies also point to the presence of educational disparities in Indonesia's regions and gender.

3. 3 Education System in Decentralized Indonesia

From here, this study will discuss the education system in Indonesia and the structural changes after the implementation of decentralization. Unlike countries that administer their education system through one ministry, Indonesia's education system is managed by the Ministry of Education and Culture (MoEC) and the Ministry of Religious Affairs (MoRA). Prior to decentralization, both ministries not only set the policies, national curriculum, and standards but also manage the education system and delivery. Although the MoEC manages public (or secular) schools and the MoRA supervises Islamic-based schools or known as *a madrasah*, the two ministries establish a similar compulsory curriculum for both types of schools. The main difference between these two schools is that the *madrasah* emphasizes religious content for its pupils (Suryadarma et al., 2006a; World Bank, 2013).

The implementation of decentralization policies, by the establishment of Laws in

Local Government in 1999 (Law 22/1999 and Law 25/1999), shifted the authority for managing local affairs and delivering services away from the central government to local governments. The jurisdiction includes the power to provide education services, both at the primary and secondary levels of public/secular schools. However, the law preserves authority over religious affairs at the national level, hence the power to manage *madrasah* is still centralized and controlled under the MoRA.

Figure 3. 1: Indonesia's education system in the decentralization periods

Age	School year	Education level	Education delivery	
			Decentralized	Centralised
23 or above	19			Master and Doctoral
22	18	Higher Education	-	Undergraduate (both general & Islamic and vocational and academic)
21	17			
20	16			
19	15			
18	14	Secondary Education	Upper-secondary school both general and vocational (SMA & SMK)	Islamic Upper-secondary school both general and vocational (MA & MAK)
17	13			
16	12			
15	11		Lower-secondary school (SMP)	Islamic Lower-secondary school (MTs)
14	10			
13	9			
12	8	Basic Education	Elementary school (SD)	Islamic Elementary school (SD)
11	7			
10	6			
9	5			
8	4			
7	3			
6	2	Early Childhood Education	Kindergarten (TK)	Islamic Kindergarten (TK)
5	1			

(Public and Private Institution)

Source: Extrapolated from the Ministry of Education and Culture of Republic of Indonesia (2013); *Overview of the education sector in Indonesia 2012 – Achievement and challenges*, as cited in OECD/Asian Development Bank (2015); World Bank (2013).

As demonstrated in Figure 3. 1, there are divisions of education delivery during

decentralization. Previously all of the tasks are managed by two ministries. Yet, this study suggests that the decentralization policy has not changed the curriculum system much. It continues to be managed and controlled by the MoEC and the MoRA. Moreover, the role of the central government also remains significant in supporting education, especially in providing massive budget transfers to local governments. These transfers include allocations of specific grants for education (*Dana Alokasi Khusus – Pendidikan*), school operating grants (*BOS*), and other financial supports. This study finds that the general fiscal transfer or block grants (*DAU*) that act as the primary source of local government revenue is primarily allocated based on the number of local civil servants. This study finds that the number of teachers takes the majority of total local public servants).

While the central government focuses on setting the curriculum and educational standard, the local government has the immense authority of delivering education services. The local governments determine the budget provision and other technical policies in education. This study finds that the local governments fully manage the decision on school restructuring and expansion, school facilities provision, and teachers/education staff recruitment and payment.

Table 3. 1   Share of education expenditures by the level of government and level of education, 2009

	Central	Province	District
Primary	26 *	3	71
Secondary	41	6	53
Higher	100	-	-

* Including school operating grants/bantuan operasional sekolah of around 16 percent

Source: World Bank (2013)

As a result, local governments have to bear most of the education expenditures for the provision of both primary and secondary level education (see Table 3. 1). Moreover, according to annual local government financial reports, this study finds that teacher salary takes a significant share of education expenditure and a large proportion of total local government spending.Interestingly, with more than 85 percent of Indonesia's population registered as Moslem, an OECD/ Asian Development Bank report (2015) shows that by the end of the 1990s, only less than 15 percent of pupils attended religious schools under the MoRA. This study finds a similar trend in 2014. According to *Susenas* and *Podes* data (2014), this study finds that the secular school administers more than 85 percent of schools and teaches more than 90 percent of pupils. These findings also corroborate a study by Tobias et al. (2014), which highlights that more than 80 percent of teachers are working under the secular schools.

This study also finds numerous private schools in Indonesia. World Bank (2010) shows that in 2007, the private school covers about 48 percent of total institutions, providing services for at least 31 percent of the pupils and employing 38 percent of the teachers for both primary and secondary education. However, this study finds that a massive public school expansion by local governments had reduced the share of private schools. By 2014, the private school only provide for 34 percent of total educational institutions (*Podes*, 2014). Still, the private schools also need to follow the national curriculum, regardless of the type of school, either secular or madrasah.

Table 3. 2 presents the data of population, pupil, number of schools, and the average distance to the nearest school. Table 3. 2 shows that the composition of Indonesia's school-age population has not changed much since 2000. Yet, this study finds a rapid increase in the number of students enrolled in secondary schools since 2002.

Among many factors, this study suggests the massive school expansion at secondary education as the main reason for the rise of the enrolment rate. The school expansion covered both urban and rural areas had reduced the average distance to schools from pupil residents. It then increases the opportunity for children, especially the poor, to access education. This finding is similar to Duflo (2001), which shows the effect of the enormous expansion of the school in the 1970s to the rapid increased of educational attainment in primary education during the Suharto administration.

Table 3. 2   Distribution of population, pupils, education institutions and the average distance between schools by the level of education and age, 2002 – 2014

School level	Age	population (millions)	Students (millions)	Number of institution	Average distance (km)
Year - 2002 *					
Primary	7 - 12	24.50	22.72	166,633	
Lower-secondary	13 - 15	11.20	6.91	31,462	
Upper-secondary	16 - 18	11.82	4.51	17,139	
Higher	19 - 22	14.15	1.32	2,472	
TOTAL		61.67	35.46		
Year - 2011					
Primary	7 - 12	27.93	25.40	162,102	8.71
Lower-secondary	13 - 15	12.38	8.43	48,286	7.98
Upper-secondary	16 - 18	11.50	5.51	29,498	12.74
Higher	19 - 22	14.37	2.07	3,945	
TOTAL		66.18	41.40		
Year - 2014					
Primary	7 - 12	28.11	27.09	162,102	8.68
Lower-secondary	13 - 15	13.16	10.19	48,286	7.42
Upper-secondary	16 - 18	11.53	6.82	29,498	11.83
Higher	19 - 22	14.65	3.43	3,945	36.45
TOTAL		67.45	47.54		

Used Podes 2003 to estimate the number of school institutions in 2002.

Source: Author's calculation from Susenas 2002, 2011, and 2014 and Podes 2003, 2011,

and 2014.

3. 4 Secondary School Enrolment in Indonesia

Tobias et al. (2014) suggest that Indonesia has made substantial progress in improving educational outcomes since 1970 (also see Duflo, 2001; World Bank, 2013). The implementation of six years compulsory education policy, followed by the expansion and restructuring of school-building and infrastructure during the Suharto administration, was acknowledged as the world's largest documented school-building initiative (Duflo, 2001; Tobias et al., 2014). As a result, the national primary school enrolment rate increased significantly and has remained above 90 percent since the 1990s. However, this study finds that the secondary level does not necessarily resemble the achievement of primary education. As demonstrated in Figure 3. 2, this study finds that the enrolment rate in both lower- and upper-secondary levels dropped between one-third and one-half compared to the previous education level, respectively.

Among the reasons for those phenomena, this study suggests that there is a lack of full commitment from the central government in supporting the policy through budget allocation and law enforcement. Although Suharto's administration initiated nine-year compulsory education in 1994, that mandated children to attend school until age fifteen, there are no penalties faced by parents for failing to enroll their children in school (Hsin, 2007).

Therefore, as seen in Figure 3. 2, the lower-secondary enrolment only shows a small improvement since 1994. Even a decade after the campaign, educational attainment grew less than one percent annually. Moreover, the gap in the enrolment rate between education levels remained stagnant over time. This finding confirms a study by Di Gropello (2006) that highlights the high between-cycle dropouts in Indonesia among developing countries. While he argues that the lack of access to the next education cycle,

particularly in rural and remote areas, as one possible reason, this study suggests that the limitation is not only related to physical accessibility. It also includes cost constraints that prevent pupils from entering secondary school.

Figure 3. 2: Indonesia's net enrolment rate - primary and secondary education

Source: BPS 2017 (from https://www.bps.go.id/linkTabelStatis/view/id/1525)
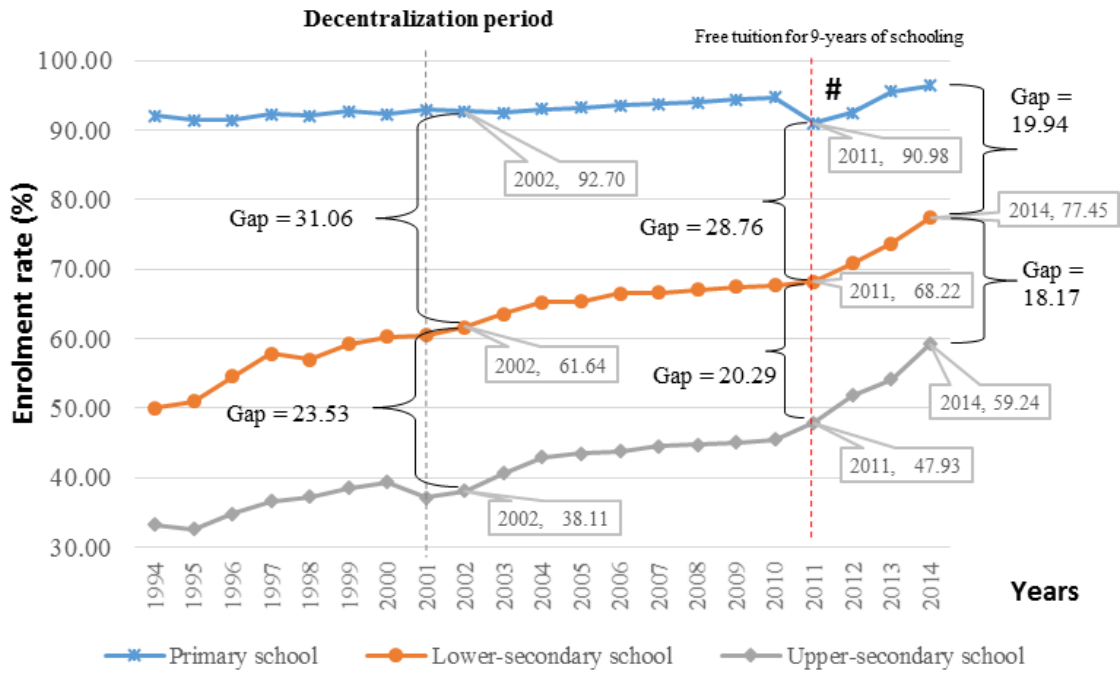
Table 3. 3, this study finds that, in 2009, more than 58 percent of between-cycle dropouts at both the lower- and upper-secondary school levels positively correlate with cost constraints. In addition to that, working and education sufficiency[20] are mentioned as the second and third largest reasons, respectively. These findings confirm Suryadarma, et al. (2006a), who demonstrate a similar cause of low enrolment rates in secondary

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[20] Susenas defines education sufficiency as a student's or parent's perspective that students already received enough education. Therefore, they are not pursuing a higher level of education.

schools. Furthermore, this study also finds that other factors, such as marital status, the distance between home and school, and economic conditions, have a contribution to the decision of not attending school.

Table 3. 3   Reasons for not continuing to secondary school

Reasons	2009		2014	
	Lower	Upper	Lower	Upper
	all	all	all	all
Cannot afford the cost	58.75	58.83	41.34	43.54
Working	6.36	11.88	7.17	14.97
Married	0.58	4.09	1.37	7.93
Education sufficiency	3.12	6.59	4.16	8.03
Ashamed (economic factor)	2.06	1.08	1.55	0.81
Too far (distance)	3.20	1.95	3.83	1.58
Difable	1.46	0.63	2.08	0.65
Waiting for enrolment	0.68	1.61	-	2.27
Not accepted	0.52	0.62	0.13	0.28
Others	23.25	12.72	38.37	19.94
TOTAL	100.00	100.00	100.00	100.00

Source: Author's calculation from Susenas 2009 and 2014

As Figure 3. 2 shows that the enrolment rates in both levels of secondary school increased sharply in 2011, it seems to be plausible to claim that success in increasing the secondary level enrolment rates at the national level was achieved after the implementation of a free-tuition program for nine-year compulsory education in that year. Moreover, the program also seems to gradually reduce the number of between-cycle dropouts, citing costs as the main constraint for not continuing school at the secondary level from 2009 to 2014 (see Table 3. 3).

However, this study still highlights the costs-constraint as the main factor cause of school dropouts in secondary school. Table 3. 3 shows that, in 2014, more than 40 percent of respondents cite this topic in their dropout cases. However, *Susenas* data does not include any detail information on the type of additional costs carried by the

households. Therefore, this study surmises that the cost constraint is more or less related to non-operational expenditures, such as transportation, other school materials, and pocket money. The findings corroborate to Al-samarrai et al. (2014), which shows that the free-tuition program may leave families, especially the poor, another cost burden.

The argument is also confirmed by district data that show different results in educational attainment among Indonesian regions. Hence this study suggests that the free-tuition policy does not automatically enhance the regional school enrolment rate but rather depends on specific conditions.

Interestingly, this study also finds other factors contributing to high between-cycle dropouts, such as marital and employment status (see Table 3. 3). Although this study finds that the general data only considers marriage as the fourth cause of dropout, analysis on a gender basis shows a significant difference between boys and girls. This study finds that marriage is only cited by one percent of boys but cited by more than 16 percent of girls (see Table A3. 1).

Moreover, this study suggests that improving educational attainment is not affected solely by the free-tuition policy. It also should be linked to several factors, such as school expansion, which increases opportunities for children to attend school, gender bias, and even socio-culture conditions of Indonesia's regions. This study will discuss these issues in the following sections.

3. 5 Data and Methodology

3.5.1 Data and sample

This study applies data from 497 districts years 2002-2014 for statistical and spatial analysis. However, this study finds some limitations on the data of local budget and expenditure. Hence the econometric analysis only covers data of years 2004-2013.

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Moreover, this study excludes several districts, such as districts in the greater Jakarta, since they are not decentralized and managed by a provincial government and around 20 districts in the Eastern part of Indonesia, due to the unavailability of data.

Table 3. 4   Variables and data resources

No	Variable	Sources	Level
1.	Enrolment rate (Total)	BPS and INDODAPOER	District
2.	Enrolment rate (Gender basis)	*Susenas*	Individual
3.	Reasons for leaving school	*Susenas*	Individual
4.	Households expenditure on education	*Susenas* and INDODAPOER	District
5.	The number of schools in each district	*Podes*	Village
6.	The average distance between the village without a school and the nearest school	*Podes*	Village
7.	Central government transfers for education expenditure	Ministry of Finance	District
8.	Local government expenditures on education	Ministry of Finance	District

The dataset covers both macro and micro-level socio-economic indicators. This study collects macro-level data from the Central Statistics Bureau (Badan Pusat Statistik/BPS), the World Bank's Indonesia Database for Policy and Economic Research (INDODAPOER), and the Ministry of Finance (MoF). Meanwhile, micro-level data are estimated from household and village surveys by BPS, namely core *Susenas* (National Socio-Economic Survey) and *Podes* (Village Potential). Core *Susenas* is an annual cross-section micro-level data that presents household and individual conditions in Indonesia while *Podes* shows the availability of and accessibility to village infrastructure. Since core *Susenas* and *Podes* represent household and village level data, respectively, this study estimate district level through several steps (see Table A3. *2*).

3.5.2 Methodology

The econometric model covers both supply-side and demand-side factors of educational attainment. Based on the literature review, this study develops the model as follows:

Model 1

$$Lower\text{-}secondary_{it} = \alpha + \beta_1 \, Primary_{it} + \beta_2 \, Dakeduc_{it} + \beta_3 Educexp_{it} + \beta_4 Householdexp_{it} + \beta_5 school_{it} + \beta_6 distance_{it} + \beta_7 free\text{-}tuition_{it} + \beta_8 region_{it} + \varepsilon$$

Model 2

$$Upper\text{-}secondary_{it} = \alpha + \beta_1 \, Lower\text{-}secondary_{it} + \beta_2 \, Dakeduc_{it} + \beta_3 Educexp_{it} + \beta_4 Householdexp_{it} + \beta_5 school_{it} + \beta_6 distance_{it} + \beta_7 free\text{-}tuition_{it} + \beta_8 region_{it} + \varepsilon$$

Where

Upper-secondary	:	Net enrolment rate at upper-secondary level (Ln)
Lower-secondary	:	Net enrolment rate at lower-secondary level (Ln)
Primary	:	Net enrolment rate at the primary level (Ln)
Dakeduc	:	Central government transfer in education sector per capita (Ln)
Educexp	:	Local government expenditure in education sector per capita (Ln)
Householdexp	:	Households expenditure in education sector per capita (Ln)
School	:	Number of either Lower- or Upper-secondary schools (Ln)
Distance	:	The average distance of the school from the village-km (Ln)
Free-tuition	:	Dummy variable of free-tuition policy. It shows 1 for each year after 2011 and 0 for otherwise
Regions	:	Dummy variable of regions

Aside from the econometric analysis, which examines the role of each

independent variable on the enrolment rate, this study assesses other factors that not included in the model, such as kinship and gender through statistical and spatial analysis. Moreover, statistical and spatial analysis seeks to examine the patterns and factors that affect regional and gender disparities.

Regarding the measurements of regional gender disparity, this study adopts the concept of gender parity index (GPI) by UNESCO which calculated the disparity level by dividing an indicator value of unit measurement for females by the same indicator value for males[21]. However, most research in this topic only defines gender disparity as the different level of outcome between boys and girls without any further explanation. This study finds that the parity among them is found rarely in many observations. Therefore, this study suggests the need to quantify and clarify in which level gender disparity should be treated carefully, emphasizing the necessity of certain level measurement. For such purpose, this study proposes a simple definition for the presence of gender disparity using the average standard deviation of observation data[22]. This study

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[21] $\text{GPI}_k = Female_k / Male_k$

Where k = measured indicator

This study interprets GPI equal to 1 as an indicator of parity between boys and girls. At the same time, a value less/greater than 1 shows a signal for the disparity that favors boys or girls, respectively. In contrast, this study suggests an opposite interpretation for an indicator that should ideally approach 0.

[22] For a consistency and comparability process, this study uses the average standard deviation of the enrolment between gender in both lower- and upper-secondary education for the year 2002 and 2014.

suggests the emergence of gender disparities if the enrolment rates difference between boys and girls is more than five percent in both directions in each level of education, lower- and upper-secondary school.

3.5.3 Descriptive Statistic

Table 3. 5   The descriptive statistic

Variable	obs	Mean	Max	Min	St.dev
Enrolment rate - Upper-secondary	4,900	46.674	87.85	1.35	14.556
Enrolment rate - Lower-secondary	4,911	65.701	95.71	3.76	12.507
Enrolment rate - Primary	5,351	93.197	100	6.6	6.902
Number of schools - Lower-secondary	5,434	83.589	688	2	76.891
Average distance (km) - Lower-secondary	5,431	7.46	86.75	0	10.599
Number of schools - Upper-secondary	5,434	46.828	406	1	46.961
Average distance (km) - Upper-secondary	5,434	13.87	99	0	15.667
Specific transfers for education (Ln)	3,952	10.609	14.21	5.5	1.154
Local expenditure on education (Ln)	4,785	13.08	17.24	6.81	0.82
Households expenditure on education (Ln)	4,886	11.96	14.59	8.98	0.778
Free-tuition policy	5,434	0.182	1	0	0.386
Java-Bali districts	5,434	0.257	1	0	0.437
Western districts	5,434	0.672	1	0	0.47
Mining districts	5,434	0.158	1	0	0.365
Sumatera districts	5,434	0.304	1	0	0.46
Kalimantan districts	5,434	0.111	1	0	0.315
Sulawesi districts	5,434	0.146	1	0	0.353
Nusa Tenggara districts	5,434	0.061	1	0	0.239
Moluccas-Papua districts	5,434	0.121	1	0	0.327

Source: Stata output

3. 6 Discussion

3.6. 1 Empirical results

Table 3. 6   Determinants of school enrolment

Dependent variable	Lower-secondary enrolment			Upper-secondary enrolment		
	With district FE	Without district FE		With district FE	Without district FE	
	1	2	3	4	5	6
Primary enrolment rate	.22614982**	.93232818***	.97154946***			
	0.0910831	0.1139873	0.1187251			
Lower-secondary enrolment rate				.55835814***	1.0214747***	1.0161723***
				0.0679453	0.0450275	0.0447405
Special fund on education	0.0049246	0.00257757	0.00084266	.01706701***	0.00656206	0.0034254
	0.0064878	0.0044336	0.0043505	0.0060114	0.0054262	0.0055829
Local expenditure on education	-0.01339036	0.0084942	0.01005528	0.00414861	.05320669***	.05649291***
	0.0085851	0.0067845	0.0068512	0.0091727	0.0096772	0.0101245
Household expenditure on education	.05847127***	.0738578***	.07074569***	.07385679***	.104376***	.10048747***
	0.0196894	0.0073572	0.0073228	0.0150015	0.0087491	0.0086874
Number of school	.05234333**	.03010951***	.03270952***	.05490763**	-.02223653***	-.01774185**
	0.0264809	0.0055836	0.0054337	0.0222207	0.0074322	0.007247
Average distance-km	-.02644855***	-.05976629***	-.05986801***	-0.03600845	-.07821347***	-.08354172***
	0.0097834	0.0050484	0.0048206	0.0224764	0.0056337	0.0056336
Free-tuition policy	.03077581***	-0.01174729	-0.01263151	.05614074***	-.02052657*	-.02100013*
	0.011519	0.0099655	0.0100124	0.0092565	0.0110296	0.0110353
Java-Bali districts		-.04650144***			-.02052657*	
		0.0094071			0.0103569	
Western districts		.07701***			-.04064943***	
		0.0086151			0.0100293	
Mining districts		-.0164047**			-.01734588*	
		0.0079791			0.0102756	
Sumatera islands			.06645998***			.13228067***
			0.0081615			0.0097786
Kalimantan islands			-0.00869625			.06647689***
			0.0129853			0.0157992
Nusa Tenggara islands			-.10240823***			.11837506***
			0.0144335			0.021122
Sulawesi islands			-0.01211171			.13952466***
			0.0106618			0.0124238
Moluccas Papua islands			0.00929156			.2264374***
			0.0168033			0.0189566
Constanta	2.4138878***	-1.1399959**	-1.2783067**	0.33319049	-1.1399959**	-2.2679948***
	0.472113	0.5288183	0.5536704	0.2837235	0.1900382	0.1941297
Year fixed effect	Yes	-	-	Yes	-	-
District fixed effect	Yes	-	-	Yes	-	-
Clustered standard error	Yes	-	-	Yes	-	-
R²	0.7048	0.4688	0.4834	0.7628	0.6257	0.6317
Number of obs	3,815	3,821	3,821	3,812	3,812	3,812

Notes: * p<.1; ** p<.05; *** p<.01. Robust standard error

Source: Stata output

Table 3. 6 presents the results of the econometric estimations[23]. This study finds

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[23] The Hausman test shows that FE model is more appropriate for estimating the

econometric model (see Figure A3. 4)

that the enrolment rates in the prior education level, such as the primary level for lower-secondary and lower-secondary for upper-secondary, show positive and statistically significant estimation. With all other variables being equal, the estimation value of prior education in columns 1 and 4 may indicate the turnover rate between the school level, which around 77 and 43 percent for lower- and upper-secondary schools, respectively. These results are also suggesting the higher between-cycle dropout rates in the Indonesia regions, confirming the study by Di Gropello (2006), which highlights the phenomenon of between-cycle dropouts in Indonesia.

This study finds that the free-tuition policy shows a positive impact on regional enrolment rates at both education levels. However, from the supply-side perspective, the finding suggests that the estimation of variable *free-tuition policy* is smaller than the variables *number of schools* and *average distance to school* (also see Figure A3.5). Considering the huge budget provision provided by the central government, the finding may indicate that the implementation of the policy per se may not necessarily increase the enrolment rate as much as the Indonesian government expectation, especially for the lower-secondary level, which supposed benefits largely from the policy.

This study suggests that the design of government support through a school operating grant in which each student received equal money regardless of his/her residency may diminish the effect of the program[24]. The program also leaves what Al-

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[24] This study finds that Indonesia regions show significant price differences and variations of the initial endowment for its education and infrastructure. Hence, the same amount of grant may not cover the student financial needs, especially for a

samarrai et al. (2014) describe as "another cost burden for households" for attending the school. This argument corroborates with the *Susenas* data in Table 3. 3, which still mentions cost constraints as the main reason for school dropout in 2014. Therefore, this study suggests the need to reexamine the scheme and procedure, especially by considering the regional differences in designing the program. However, this study finds that the effect of this policy is higher at the upper-secondary school, although the program does not cover the whole school operational cost in this level.

Surprisingly, this study presents that local expenditures on education (*Educexp*) does not affect the enrolment rate at secondary levels. The results seem to contradict with many previous studies that show the positive effect of government expenditures on educational attainment (see van de Walle, 1992; Ramesh, 2009; Saraswati, 2012; World Bank, 2013). This study suggests two possible reasons to explain these findings. First, the government expenditure may include the payment for public officers that not directly linked to the delivery of education services. Second, it is hard to associate the relationship between those two variables since they are randomly scattered. Figure A3. 1 and Figure A3. 2 show that there are regions with higher education expenditures per capita that present either lower or higher enrolment rates and vice versa. As a result, the econometric estimation shows statistically insignificant results. This study also finds a similar result correspond to specific transfer on education (*Dakeduc*), which only shows a positive association on the upper secondary level.

Meanwhile, this study suggests the prominent role of household expenditure on

student in rural or remote areas such as Eastern Indonesia since they show the higher cost of education.

education in affecting educational attainment at both levels. In each column, household expenditure shows a positive and statistically significant estimation for both lower- and upper–secondary levels. These findings confirm studies by Glewwe and Jacoby (2004), Sabates et al. (2010), and Suryadarma et al. (2006a).

In comparison, this study finds that household expenditure on education per se is more elastic compared to other variables. These results emphasize the role of demand-side factors in educational attainment. It also corroborates with the fact that many households still need to pay other education expenditures such as transportation fees and additional costs to attend the school. Moreover, this result also confirms a study by Di Gropello (2006), which argues that many school dropouts are related to the addition of direct and indirect private costs.

This study finds that the higher elasticity of household expenditure in the upper-secondary level also comes with the fact that the governments do not cover all the school operational costs for this level. Furthermore, the decision to attend school in the upper-secondary school may be related to other factors, such as marriage and the demand for the unskilled labor market. This study suggests that the latter factor is linked to the concerned of Di Gropello (2006), Sabates et al. (2010), Suryadarma, et al. (2006a) and Utomo, et al. (2014) on the effect of opportunity cost on school dropout.

This study finds a positive impact of decentralization in the regional enrolment rate. Columns 1 and 4 show that the number of schools presents a positive and statistically significant estimation in both levels of education. At the same time, variable distance only shows its positive effect on the lower-secondary level. The combination of both variables shows higher elasticity compared to other supply-side and demand-side factors, highlighting the role of decentralization policy on increasing pupil's opportunity and

accessibility to attend school.

To fully understand the dynamics of educational outcomes in Indonesia, this study then utilizes dummy variable regions. Since the dummy variable regions are time-invariant for all observation periods, then the use of the previous model omits these variables. Therefore, this study applies models in Column 2, 3, 5, and 6. Columns 2 and 5 show that the variable Java-Bali shows a negative and statistically significant estimation, indicating that, on average, Java-Bali regions have a lower enrolment rate in secondary school compared to outside Java-Bali. The results correspond to Oey-Gardiner (1991), which showed that children living in Java are not necessarily better off than those elsewhere in Indonesia's regions. Thus, this study indicates those results with several factors. First, the educational attainment in the Java-Bali areas is highly dispersed, with some districts have high enrolment rates while others show the opposite results (see *Figure 3. 5*). Second, Java-Balis' demonstrate more substantial turnover rates, either from primary to lower-secondary or from lower-secondary to upper-secondary, indicating higher between-cycle dropouts in secondary school than other islands. Lastly, outside Java-Bali regions demonstrate more significant improvement in educational outcomes, especially for districts in Sumatera, East Kalimantan, Sulawesi, and West Nusa Tenggara.

Despite the low enrolment rates in Java-Bali, the regression results show that dummy variable Western in Column 2 has a positive and statistically significant estimation, meaning that the Western part shows higher educational attainment than the Eastern region at the lower secondary level. This study argues that the result comes from the achievement of Sumatera's and East Kalimantan's districts in maintaining their high enrolment rate in lower-secondary schools. The finding also was supported by the fact that districts in Papua and East Nusa Tenggara consistently show low enrolment rates.

However, this study finds the opposite result in the upper-secondary level, with the eastern regions demonstrating higher outcomes than the western regions. This study argues the high level of between-cycle dropouts in Java and Sumatera's districts as the main reason for this result. The presence of a large concentration of industrial agglomeration and large estate-crop plantations in both areas had created high demands for unskilled-labor then increase the opportunity cost to attend school.

This study also finds robust results in six-main islands. Using Java-Bali Island as the control variable, Column 3 and 6 show that Sumatera districts consistently show higher educational attainment at both lower- and upper-secondary schools. The finding of Sumatera's upper-secondary school is quite impressive, especially with the fact that these regions also show large shares of between-cycle dropouts. This study suggests that Sumatera indicates a higher initial enrolment rate lower and indicates a lower between-cycle dropout than Java-Bali.

In contrast, Nusa Tenggara regions show lower outcomes at the lower-secondary level. Although West Nusa Tenggara districts show significant improvement for the past decade, their counterparts in East Nusa Tenggara are striving to improve the enrolment rate. Moreover, due to the high share of between-cycle dropout in Java-Bali, this study finds that other regional groups indicate a higher enrolment rate at the upper-secondary level.

Lastly, this study also examines the relationship between the presence of the mining sector and school enrolment. This study finds that districts with an abundance of mining sectors tend to have a low enrolment rate at both the lower- and upper-secondary levels. The expansion of mining extraction may decrease the enrolment rate by increasing the demand for labor, then raising the opportunity cost of attending school. These results

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corroborate Gylfason (2001) and Alvares and Vergara (2016), which show the negative impact of natural resources on educational outcomes.

However, this study finds some exceptional cases of mining-districts in East Kalimantan, Riau, and Aceh districts. These districts successfully maintain their educational attainment above the national average. Two main reasons suggested for this phenomenon. First, these districts already have high attainment rates before decentralization. Second, these districts demonstrate high public expenditures on education, which spend on school expansion and restructuring. This study finds that, in general, the number of schools rises to the national level or even higher. This study argues that this finding answers the concern of Gylfason (2001) on how natural resource-based regions should diminish the negative impact of natural resources on educational outcomes.

3.6. 2 Regional Disparities

In addition to econometric analysis, which examines the determinants of school enrolment, this study also investigates the presence of regional and gender disparities in Indonesia districts. Although this study emphasizes the use of district-level data, it is also essential to expand the discussion to the provincial-level. The results may clarify whether regional disparities are scattered randomly across Indonesian, or it occurs in particular provinces.

3.6.2. 1 Lower-secondary level education

a. Provincial-level

As demonstrated in Figure 3. 3, this study finds that in the early stages of decentralization, regional enrolment rates vary from 78.7 percent in Aceh to 38.6 percent in East Nusa Tenggara, with the Papua islands also demonstrate low outcomes. Moreover, Figure 3. 3 shows that only 13 of the 33 Indonesian provinces have enrolment rates higher

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than the national rate. Except for North Sulawesi, provinces with high enrolment rates are located in Western Indonesia.

Yet, the statistical analysis also confirms the presence of a low enrolment rate in Java-Bali. This study finds that in 2002 West Java and Banten provinces have lower educational attainment than the national level[25]. The findings reveal that, despite the focus of Indonesian development efforts in Java-Bali, especially during Suharto's administration (see Booth 1998; Hill 2000) and likewise in early decentralization (Juoro, 2013), Java-Bali's are not necessarily better off than other regions.

Figure 3. 3: Lower-secondary enrolment rates by province, 2002-2014
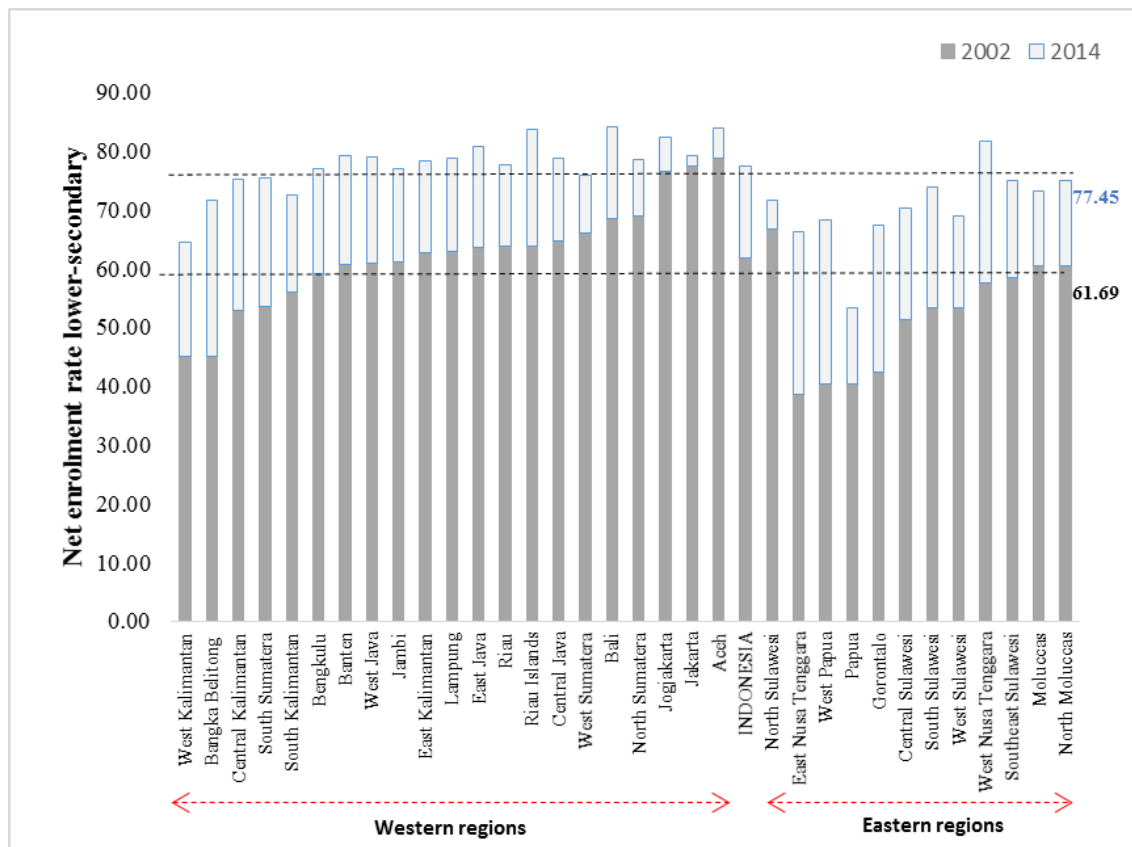
Source: Author's calculation from Susenas 2002-2014

Although the introduction of school operation grants (*bantuan operasional*

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[25] Banten was part of West Java provinces until October 2000.

sekolah or BOS) in 2004 has successfully maintained the primary school attainment rate above 93 percent, this study finds that the program only slightly improves the enrolment rate at the lower-secondary level, with the pace of 1 percent annually since 2002. This study finds that the implementation of nine years compulsory education program in 2011, followed by the free tuition program, seems to improve the Indonesian enrolment rate from 68.2 percent in 2011 to 77.5 percent in 2014.

In general, the finding surmises the regional convergence in educational attainment. Regions with low initial enrolment rates increase largely than regions with the high initial enrolment rates. However, Figure 3. 3 also shows different results in educational attainment in 2014. Due to their initial level, this study finds that the Western provinces maintain their enrolment rates, while most of the Eastern provinces show low enrolment rates than the national average level. The difference between the highest and the lowest provinces persists at 32 percent, between Aceh (85.2 percent) and Papua (53.4 percent). Further analysis shows that the gap between the western and eastern provinces at the lower-secondary level remains open (see Table A3. 4), showing the unsettled issue of regional disparities in Indonesia.

Moreover, this study finds that half of the Eastern provinces exhibit a large gap with more than seven percentage points below the national average level. Aside from their low initial level, this study suggests two possible reasons. First, East Nusa Tenggara, West Papua, and Papua provinces show a shortage of school building and education facilities and lack of infrastructures such as proper road and transportation facilities. Lastly, those provinces show a high poverty incidence, causing a burden for households to bear additional costs of education and creating higher opportunity costs of schooling.

All in all, the findings suggest that the free tuition program increases the

enrolment rate at lower-secondary schools. Yet, this study finds different results among

Indonesia regions, showing that regional disparities remain unsolved in decentralization.

b. District level

Figure 3. 4: Regional disparities in lower-secondary enrolment rates – district-level data
(2002 – 2014)
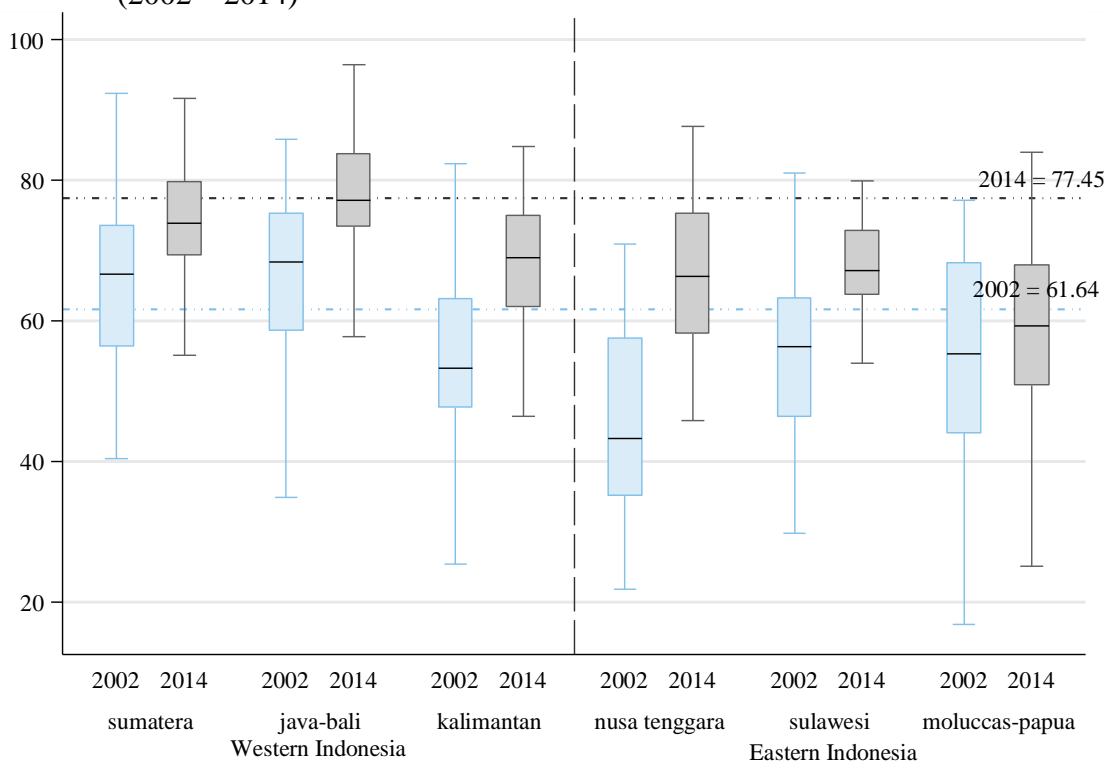
Source: Author's calculation from Susenas 2002-2014

Figure 3. 4 shows that similar to province-level data, the Western districts tend to

show higher enrolment rates than the Eastern districts. Furthermore, analyzing the district

data on six-main islands, this study also confirms the presence of regional disparities in

each region. In Sumatera, the enrolment rate varies from 40.4 to 92.4 percent. This study

also finds a similar pattern in Java-Bali, which range from 19.2 to 85.8 percent.

Kalimantan shows wide variations from 25.3 to 82.3 percent. Despite showing a low

enrolment rate, Eastern districts also possess considerable variations. In Sulawesi, the

enrolment rate diverges between 29.8 and 81.1 percent, while Nusa Tenggara's varies

from 21.8 to 71.0 percent. Lastly, Moluccas and Papua also show some variety from 16.8

to 77.1 percent. These results confirm studies by Jones and Pratomo (2016), Lanjouw et al. (2001), Tobias et al. (2014) on the regional disparities issue that emerge not only between western and eastern regions but also within island and province in Indonesia.

Although the general pattern on regional disparity among districts still holds in 2014 with a gap of more than 40 percent between the highest and the lowest, this study also suggests the presence of a conditional convergence process within six-main islands. Figure 3. 4 presents that the gap among districts become narrower except for Moluccas and Papua. Among Indonesia regions, Sulawesi shows the most rapid convergence process followed by Java-Bali and Kalimantan. The wide dispersion in Nusa Tenggara is affected by the different results between the west and east parts of the islands. This study finds that districts in West Nusa Tenggara successfully improve their educational attainment rapidly, while their counterparts in East Nusa Tenggara are struggling to increase their educational attainment.

As part of assessing regional disparities, this study then utilizes spatial data. Figure 3. 5 shows several patterns of educational attainment. Districts with high enrolment rates in the Western part of Indonesia are located mainly in Aceh, the Northern and Western parts of Sumatera, scattered areas of Java-Bali, and several regions in Central and East Kalimantan. Meanwhile, in the Eastern part of Indonesia, these districts are found either in West Nusa Tenggara provinces or city-administered districts or some municipality-administered districts close to a provincial capital city.

With regards to Java's districts, Figure 3. 5 highlights that district with low educational attainment in Banten and West Java provinces are located primarily in the southern part of both regions. These areas are well known for being mountainous and lacking transportation infrastructure, making student accessibility to schools a challenge.

Moreover, Jones (2001) argues that Banten and West Java are notable for higher rates of child-marriage, causing students, especially girls, to leave school at a younger age. The massive school expansion and restructuring in the last decade had improved the educational attainment significantly in Banten and West Java.

Yet, due to the low initial condition, their enrolment rates remain below the national level. Meanwhile, this study finds that districts with low educational outcomes in East Java are mainly located either in the Madura islands or in the Northeast part of East Java, which coincidentally shows a large concentration of Madurese, such as Bondowoso, Probolinggo, and Pasuruan. The findings corroborate to studies by Jones (2001, 2003) and Nooteboom (2015). This study suggests two possible reasons for this issue. First, significant dropout phenomena caused by the practice of child marriage, especially for the girl. Second, the perception of Madurese on education, which perceives the educational spending as a consumption rather than investment (see Nooteboom, 2015). This study will discuss Madura as a case study.

Moreover, Figure 3. 5 presents that districts with high enrolment rates in Sumatera islands are located in Aceh, Riau, Riau island provinces, and districts in the western coastal area. In contrast, districts with low enrolment rates are mainly located in the eastern coastal areas. This study suggests that the high enrolment rate in Aceh, Riau, and Riau islands is affected by the school expansion programs, that supported by a huge local expenditure in education (see Table A3. 3). The program increased the number of schools and reduced the distance of the nearest school during the past decade. Moreover, the program also improves school accessibility and raises the opportunity for pupils to attend school. This study also discusses Aceh as a case study in the following section.

Figure 3. 5: Regional patterns in secondary enrolment, 2014

Lower-secondary enrolment

National level = 77.45
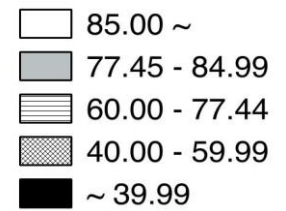
85.00 ~
77.45 - 84.99
60.00 - 77.44
40.00 - 59.99
~ 39.99

Upper-secondary enrolment

National level = 59.18

☐	75.00 ~
▨	59.18 - 74.99
▦	45.00 - 59.17
▥	30.00 - 45.00
■	~ 29.99
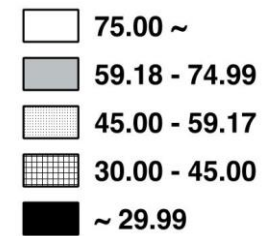
Source: Author's calculation from *Susenas* 2014

This study finds similar cases in East Kalimantan's districts, which show abundant natural resources. However, this study finds that most of the districts in West Kalimantan have lower enrolment rates compared to other Kalimantan's. This study suggests the low enrolment rate in West Kalimantan is related to the higher poverty rates, modest economic growth, and poor infrastructure, which reduces the opportunity for pupils to have better access to school.

This study highlights the success of West Nusa Tenggara province and its districts on increasing educational attainment. Despite its lower initial condition before decentralization, West Nusa Tenggara has successfully promoted a massive improvement in educational attainment by having an annual growth rate at two percentage points from 2002 to 2014. This study suggests that this performance comes from a high commitment of local government in allocating budget to the education sector. This study finds that the number of schools increased rapidly from 734 in 2003 to 1,473 in 2014 (see Table A3. 3). Moreover, the school expansion is not only concentrated in urban areas but also covers rural and remote areas. Therefore, as demonstrated in Table A3. 3, this study finds that the average distance between the nearest school and the village without school decrease for more than half of its initial length by 2014. This policy answers the concern of Di Gropello (2006) that expanding school in rural areas may solve the problem of the high rate of between-cycle dropout phenomenon.

Lastly, Figure 3. 5 shows that most of the Eastern districts are still suffering from low enrolment rates, with only 26 of 164 districts show enrolment rates higher than the national rate in 2014. Aside from districts in West Nusa Tenggara, districts with high educational attainment are found in the following regions Bolaang Mongondow and Tomohon in North Sulawesi; Morowali and Poso in Central Sulawesi; Barru, Bone, Tana

Toraja, North Toraja, Palopo, and Pare-pare in South Sulawesi; Konawe, North Buton, and Bau-bau in Southeast Sulawesi; Southwest Moluccas and South Buru in Moluccas; and North Halmahera and Ternate in North Moluccas. Meanwhile, districts in Papua, West Papua, and East Nusa Tenggara consistently exhibit a low enrolment rate.

This study suggests that the low enrolment rate districts in Papua and East Nusa Tenggara are associated with several factors. First, Eastern Indonesia has fewer schools and faces geographical disadvantages such as poor infrastructure and lack of accessibility that result in a lengthy travel distance between villages without a school to the nearest school. This argument is supported by *Podes* data of 2014, which demonstrates that some districts in Papua and East Nusa Tenggara show long distances for more than 100 km.

Second, the average budget allocation for education per pupil in Eastern Indonesia, except for Papua, is relatively lower compared to the average Indonesia level. Third, most of the districts also have a high poverty incidence, causing a burden for households to bear additional costs of education and creating higher opportunity costs of schooling. The last argument is backed with *Susenas* data in Table 3. 3. Among several causes, cost-constraint covers more than 40 percent of dropout cases in 2014.

All in all, the combination of local government budget shortage, the limited number and coverage of schools, the long distances to the nearest school, and the higher poverty incidence has contributed to reducing opportunities for pupils in Eastern Indonesia to access education.

However, this study still finds similar associations for the low enrolment rates in Western Indonesia. For example, the higher poverty rates in Madura districts, the lack of school availability and accessibility in Banten province, or the combination of those factors in southern Java areas, Bengkulu, and other western districts.

3.6.2. 2 Upper-secondary level education

a. Provincial-level

Comparing Figure 3. 3 and Figure 3. 6, this study finds that in 2002 provinces with low enrolment rates at the lower-secondary level tend to have similar outcomes at the upper-secondary level and vice versa. This study argues that only 13 and 18 out of 33 provinces demonstrate high educational attainment compared to the average national level in 2002 and 2014, respectively. Yet, this study does not infer that Indonesia has made tremendous gains at the upper-secondary level as Indonesia still meets a challenge in reducing between-cycle dropout at the upper-secondary level.

Figure 3. 6: The upper-secondary enrolment rates by province, 2002-2014
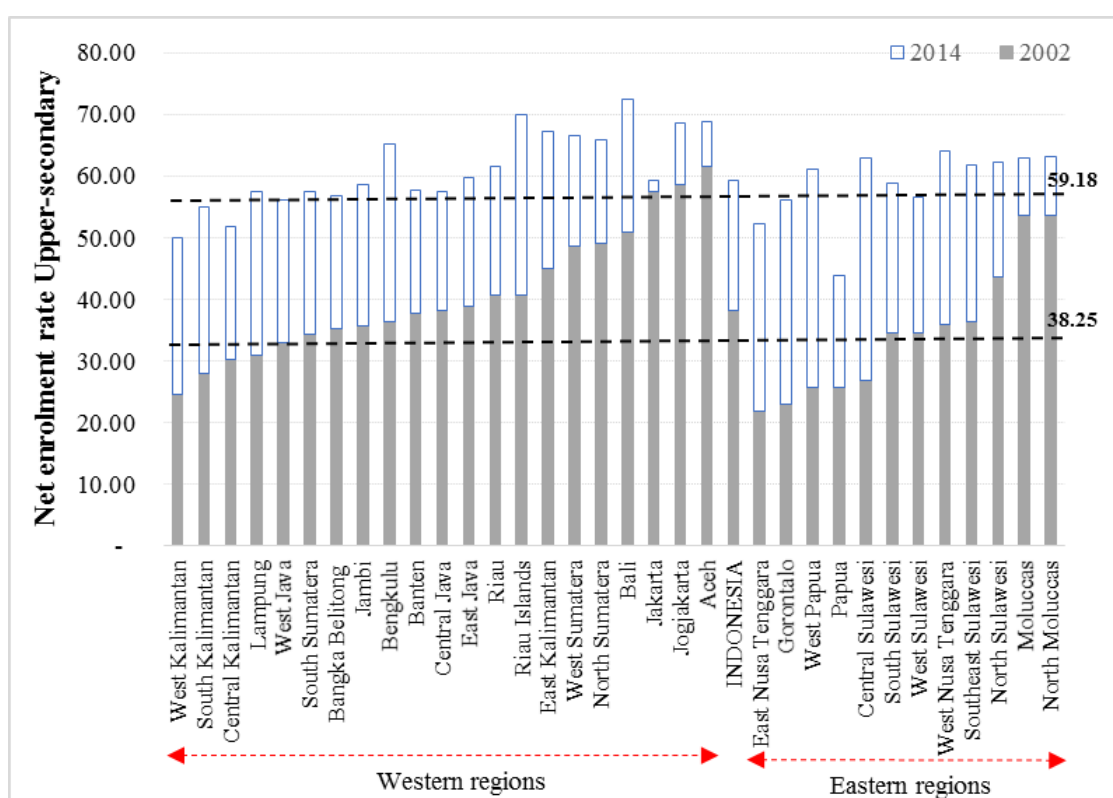
Source: Author's calculation from Susenas 2002-2014

Among provinces in the western regions, Aceh, Riau, Riau Islands, North and West Sumatera, Bali, Jogjakarta, East Java, Jakarta, and East Kalimantan consistently

show high educational attainment than the average national level at both secondary levels. Meanwhile, Central Java and Lampung provinces fall their attainment rate as both regions face significant between-cycle dropout to upper-secondary school.

This study finds that the combination of a higher rate of between-cycle dropouts in Western Indonesia and a lower rate of between-cycle dropouts in Eastern regions had reduced the gap between the western and eastern regions (see Table A3. 4). This study finds that Eastern provinces, namely West Nusa Tenggara, North Sulawesi, Central Sulawesi, Southeast Sulawesi, Moluccas, North Moluccas, and Papua, have higher educational attainment than the average national level.

b. District level

In general, this study finds similar patterns in Indonesian districts. This study associates the lower enrolment rates at the upper-secondary level with a high level of between-cycle phenomena caused by several reasons, such as cost constraints, the decision to work or marry, perception of education sufficiency, and other factors (see Table 3. 3 and Figure A3. 1).

Unlike the lower-secondary school, which supported by the free-tuition policy that cover the entire operational school costs, this study finds that the government only allocate partial subsidy for upper-secondary education. It indicates that households need to spend more money to support their children to attend upper-secondary school. Therefore, *Susenas* data in Table 3. 3 shows that between-cycle dropout citing cost as the main reason in upper-secondary is higher than lower-secondary school.

This study finds that the enrolment rate difference between the lowest and the highest districts stand around 75 and 50 percent in 2002 and 2014, respectively. It shows that the gap between districts remains significant, even in Western regions. Figure 3. 7

indicates that the difference decreases slightly during decentralization except for two regions, Moluccas and Papua and Kalimantan. This study argues that Moluccas and Papua islands show a consistently broad dispersion of district-level data. In contrast, due to large between-cycle dropout, Kalimantan islands unexpectedly increase the distribution of its outcome.

Figure 3. 7: Regional disparities in upper-secondary enrolment rates by district (2002 – 2014)
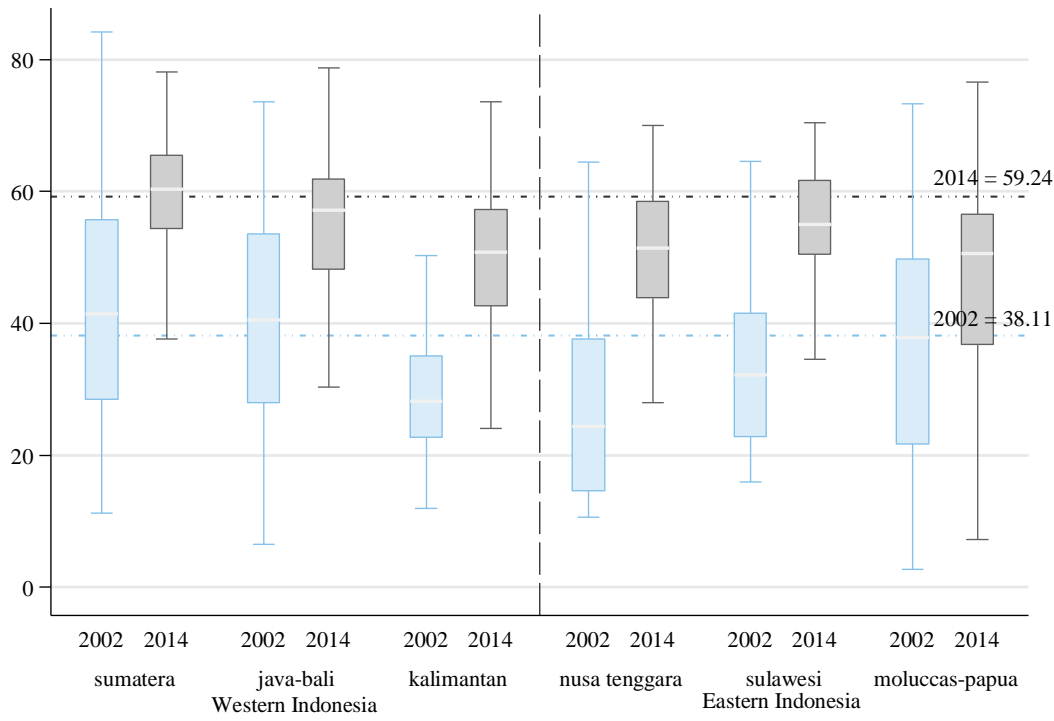
Source: Author's calculation from *Susenas* 2002 - 2014

Moreover, in the case of Java-Bali islands, this study find a similarity between lower-secondary and upper-secondary patterns. Districts with low upper-secondary attainment in Java are still located in the southern part of West Java and Banten provinces, the northern part of Central Java, and the northeast part of East Java, including Madura's districts.

Furthermore, this study associates the large between-cycle dropout in Java-Bali

with the presence of industrial agglomeration. This study finds labor-intensive industries in several regions, such as the greater Jakarta area and its surrounding areas such as Serang, Sukabumi, Karawang, and Purwakarta; the greater Surabaya; and tobacco-production districts namely Kudus and Kediri. These industries demand many unskilled-labor, creating higher opportunity costs for attending school. Since the pupil can generate revenue for themselves or their families, they may decide not to participate in the school and enter those labor markets. This study also finds similar phenomena in Riau, Jambi, South Sumatera, and West and Central Kalimantan. These provinces are well-known for having large palm oil and rubber plantation, a sector that provides abundant employment opportunities for unskilled labor (see Table A2. 6).

On the other hand, this study finds that West Nusa Tenggara also demonstrates the most exceptional improvement at the upper-secondary level. This study suggests similar reasons, including the local government's commitment to allocate the budget on education and expand the number of schools. As demonstrated in Table A3. 3, the number of schools in West Nusa Tenggara had increased from 378 to 951 units while the average distance had been reduced quarter from 7.88 km to 6.07 km.

Since a district with a low enrolment rate at the lower-secondary level tends to show similar performance at the upper-secondary level, this study suggests the similar reasons for the presence of regional disparities. As can be seen in Figure A3. 2, districts with lower education attainment could be linked to a lack of infrastructure and facilities and poor economic development. Aside from that, this study also finds several factors that affect the enrolment rate in upper-secondary schools such as educational perception and child-marriage in Madurese districts and child-marriage and school accessibility in West Java and Banten provinces.

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3.6.2. 3 The achievement of Aceh's districts: A commitment of the local government

This section discusses the case study of Aceh explicitly. There are two reasons for highlighting Aceh as a case study. First, the political and military conflict that occurred between the central government and separatist movements colored the local situation in Aceh from 1976-2005. Second, despite those conflicts, Aceh is the province, other than Jakarta, which its districts had successfully maintained educational attainment over decades.

Although the nearly 30-years conflict had destroyed and damaged more than 600 schools and left more than 55,000 children with reduced educational opportunities (Shah & Cardozo, 2014), this study finds that the enrolment rates of Aceh's district at the lower-secondary level are rank second behind Jakarta province. Moreover, Aceh also shows the highest enrolment rate at the upper-secondary level. The Eurotrends report (2009) shows that the higher education attainment in Aceh is a result of the strong commitment of local community leaders and school principals to keep schools remain open and the willingness of parents, students, and teachers to continue attending school under adverse circumstances. Meanwhile, Parker (2009) argues that the implementation of fervent Islamic culture in Aceh has caused a higher level of female educational access and attainment, undeniably affecting the general enrolment rate level.

In addition to that, despite the massive earthquake and tsunami that hit Aceh in 2005, Aceh remains one of the few provinces which consistently achieves higher educational attainment at both provincial and district levels after 2005. The community and donors mobilization of funds has been used to support education, including to restore school infrastructure.

In 2006, almost all of Aceh's districts demonstrated a higher enrolment rate compared to the national level for both lower- and upper-secondary schools, except for Nagan Raya district. As shown in Figure 3. 8, this pattern holds in 2014, with Nagan Raya and Aceh Tamiang districts having slightly lower performance compared to the national rate at the lower-secondary level.

Figure 3. 8: Aceh's enrolment rates compared to Indonesia, by district (2006-2014)
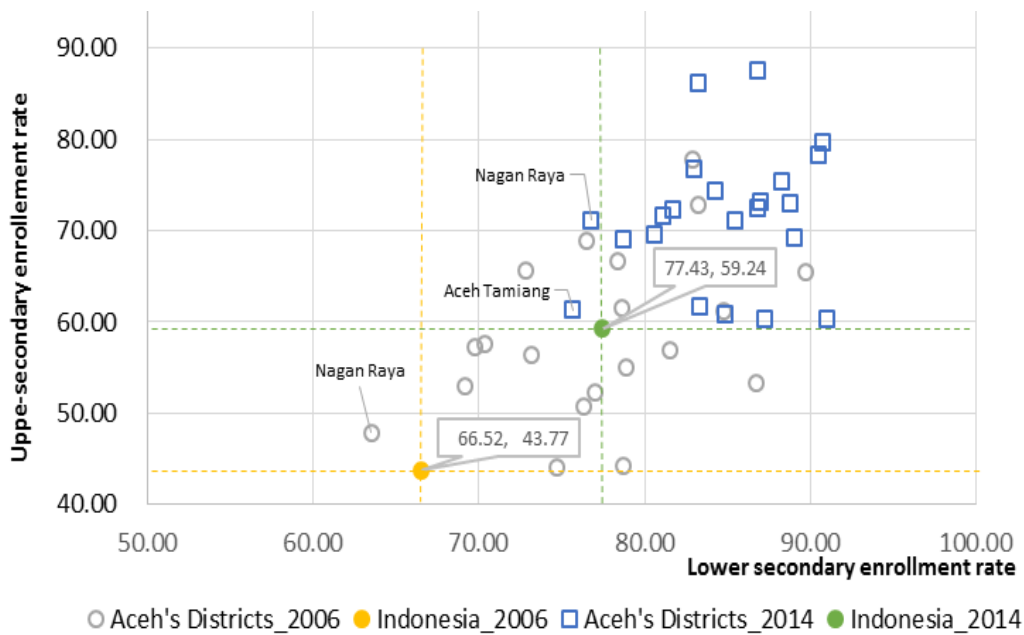
Source: Author's calculation from Susenas 2006 and 2014

With all of its challenges and educational achievements, it is interesting to observe how Aceh preserves its accomplishments. This study suggests that aside from the high commitment of the Acehnese to education, local institutions also contribute to the sustainable success of its educational attainment, especially in the post-tsunami and post-conflict period.

This study argues several factors affect the high enrolment rate in Aceh. First, a large number of international funds for Aceh's reconstruction. The fund had bolstered the education system's resilience after the tsunami (Eurotrends, 2009). Second, the

establishment of Law No. 11 the Year 2006 on the Government of Aceh. It grants sweeping powers to Aceh's to manage and govern its affairs more than other regions in Indonesia. The law also bestows Aceh with additional natural resources revenues, providing Aceh with a vast reserve to finance its programs. The availability of (large) local income to support local activities had been mentioned by Manor (1997) as the essential factor in implementing decentralization.

Third, the Aceh government is required to allocate at least 30 percent of its additional revenues for the educational sector. Lastly, the Aceh government established local law (Qanun No. 5 the Year 2008) that mandates all children aged 7 to 18 to attend school without any exception. Moreover, this study finds that the government of Aceh provides twelve years free education program from the primary until upper-secondary school. This study suggests that those factors had allowed Aceh districts to maintain their educational attainment successfully.

Moreover, this study also finds that the Aceh government commitment is not limited to physical support such as school expansion and school operating costs. They also support the teachers to deliver education services in rural areas by providing special incentives for teachers who serve in rural and remote areas. It is not surprising that Aceh records the second highest education expenditure per capita in Indonesia, more than twice the national average (World Bank, 2008).

3.6. 3 Gender Disparities

3.6.3. 1 The rise of gender disparities

While studies on regional disparities in Indonesia are easily found (for example Jones & Pratomo, 2016; Lanjouw et al., 2001; OECD/Asian Development Bank, 2015; Tobias et al., 2014), this study suggests that study on gender disparities in educational

attainment, especially at the district level, is quite limited. Moreover, studies on gender disparities in education mainly present that Indonesia already demonstrates nearly universal gender neutrality (see Grant & Behrman, 2010; Hsin, 2007; Jones & Pratomo, 2016). Those studies seem to correspond to Figure 3. 9, which shows that the difference between boys and girls at both the lower- and upper-secondary level became narrowed since 2001. Figure 3. 9 also indicates that the girls show a slightly higher enrolment rate compared to male students at both levels.

Figure 3. 9: Indonesia's enrolment rate secondary level – gender basis
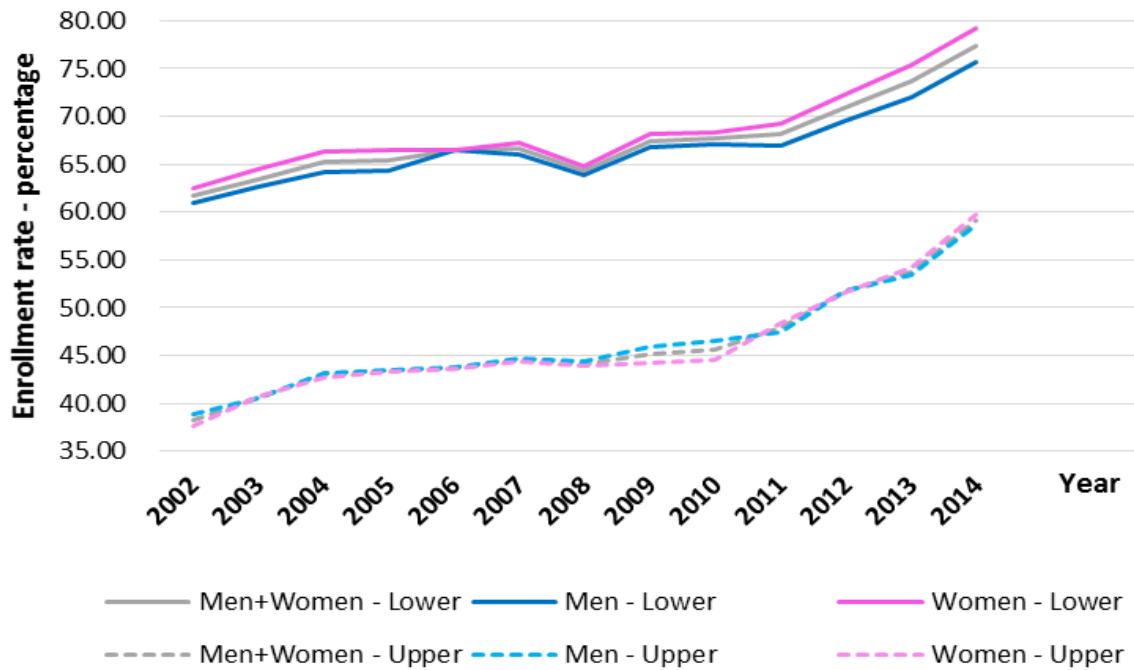
Source: BPS 2002-2014

However, similar to the previous section, discussing disparities issue at the district level reveals different results. *Susenas* data on gender-based enrolment rate shows that the difference between boys and girls ranges from minus 10 to 20 percentage points, a positive value indicating educational attainment that favors boys over girls.

As demonstrated in Figure A3. 3, this study finds that in 2002 girls in Aceh, West

Sumatera, East Kalimantan, Bangka Belitung, and Southeast Sulawesi provinces show higher enrolment rates at lower-secondary schools. During the past decade, only West Sumatera province consistently shows the gender disparity which favors girls in 2014, while other regions close the enrolment gap between girls and boys. However, this study also finds that Riau, Lampung, Jambi, Central Kalimantan, South Kalimantan, West Kalimantan, and East Nusa Tenggara emerge the gender disparities that favor girls over boys. These results suggest that Indonesian provinces show different paths recently.

Moreover, using *Susenas* data of the upper-secondary level, this study finds that West Sumatera, East Kalimantan, and Southeast Sulawesi consistently demonstrate a gender inequality in enrolment rates that favored girls in 2002. This phenomenon also arose in Bengkulu, Gorontalo, and North Sulawesi. This study suggests that the gender disparity favors girls over boys at upper secondary is affected by the higher between-cycle dropout of boys, primarily for work.

On the other hand, this study finds that Bali and Jakarta demonstrate the opposite direction by showing higher enrolment rates for boys. The gaps between boys and girls in Bali and Jakarta were more than 9 and 14 percent respectively in 2002 and remain similar in 2014.

This study argues that gender disparities in both provinces are affected by the higher between-cycle dropout for girls affected by the availability of the female unskilled-labor market. The presence of labor-intensive manufacturing industries such as foods, textiles, garments, and apparel and the growth of the service sector in the greater Jakarta areas raise between-cycle dropout citing work for girls in Jakarta. These sectors, which often employ young women, provide a lot of job opportunities, such as blue-collar worker, waitress, maid, or servant. Meanwhile, the development of the tourism sector in Bali

provides girls similar opportunities to enter the labor market and quit school. These arguments had been supported by *Susenas* data in 2014 that show more than 32 and 45 percent of girls in Bali and Jakarta cite working as their main reason for not continuing their study to the upper-secondary level.

As demonstrated in Figure 3. 10, the gender disparities at the district-level are more dispersed. This study also finds that more than half of Indonesia's districts show gender disparities favor girls over boys, while only less than a quarter of them preserving gender parity in education in both the lower or upper-secondary levels. The findings confirm a study by Grant and Behrman (2010) that reveals higher educational attainment for girls in Indonesia.

Unlike the presence of regional disparities that can be easily associated with the regional economy or geographical conditions, this study finds that gender disparities are distributed randomly among Indonesia's districts. Therefore, this study suggests that gender disparities are likely associated with socio-conditions, such as kinship, norms, fervent religious culture, and education perception applied in particular regions.

This study finds that districts with a high concentration of Minangnese, one of the largest matrilineal ethnic groups in the world, show higher gender disparities that favor girls. The Minangnese districts are located mainly in West Sumatera and several parts of Riau, Jambi, North Sumatera, and Bengkulu. This finding in line with studies by Parker (2009) and Rammohan and Robertson (2012). Aside from that, this study also suggests that gender disparities in these regions are linked to the performance of fervent Islamic cultures (Parker, 2009). The similar effect of the religious culture in educational attainment also finds in Aceh and Gorontalo (Kimura, 2007; Parker, 2009; and Sakai & Fauzia, 2013).

Figure 3. 10: Gender disparities in secondary education, by district (2014)

Lower-secondary level

Legend
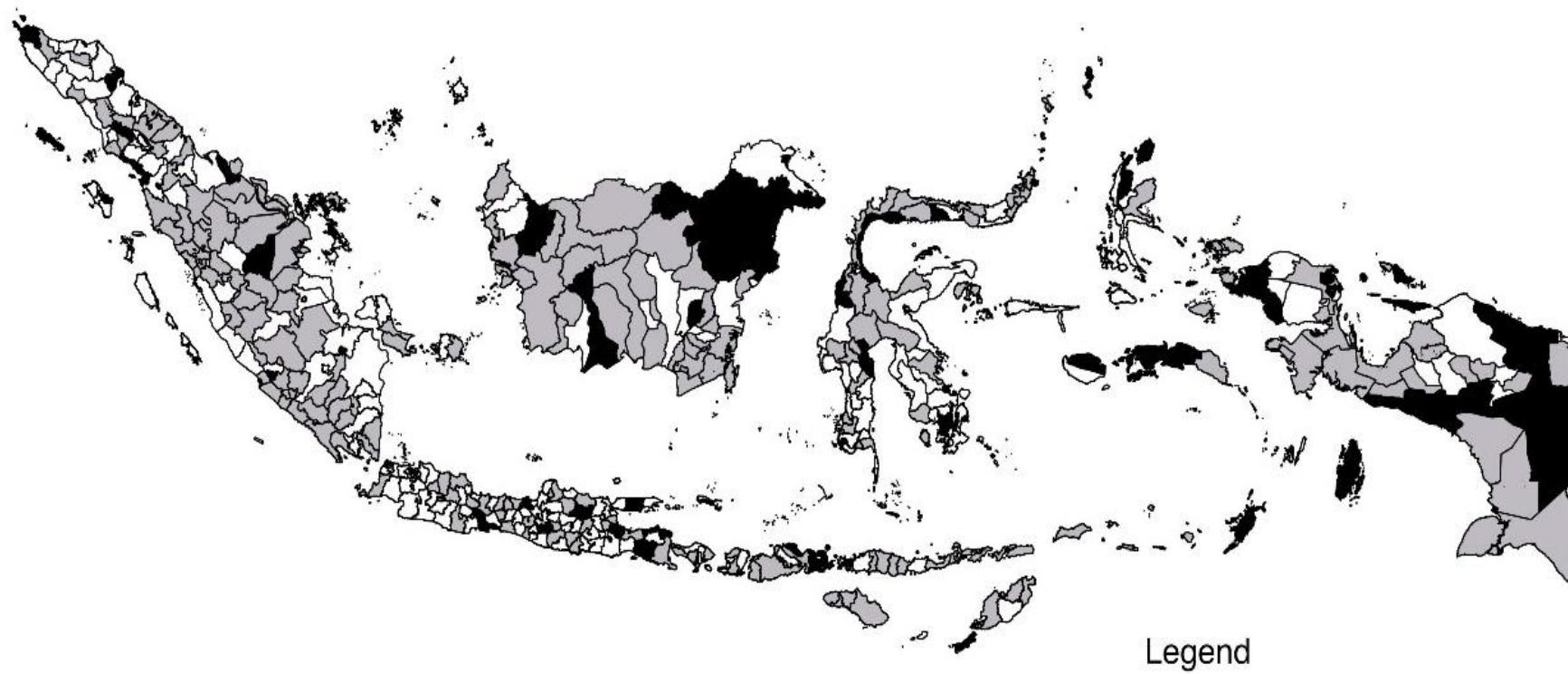
Upper-secondary level
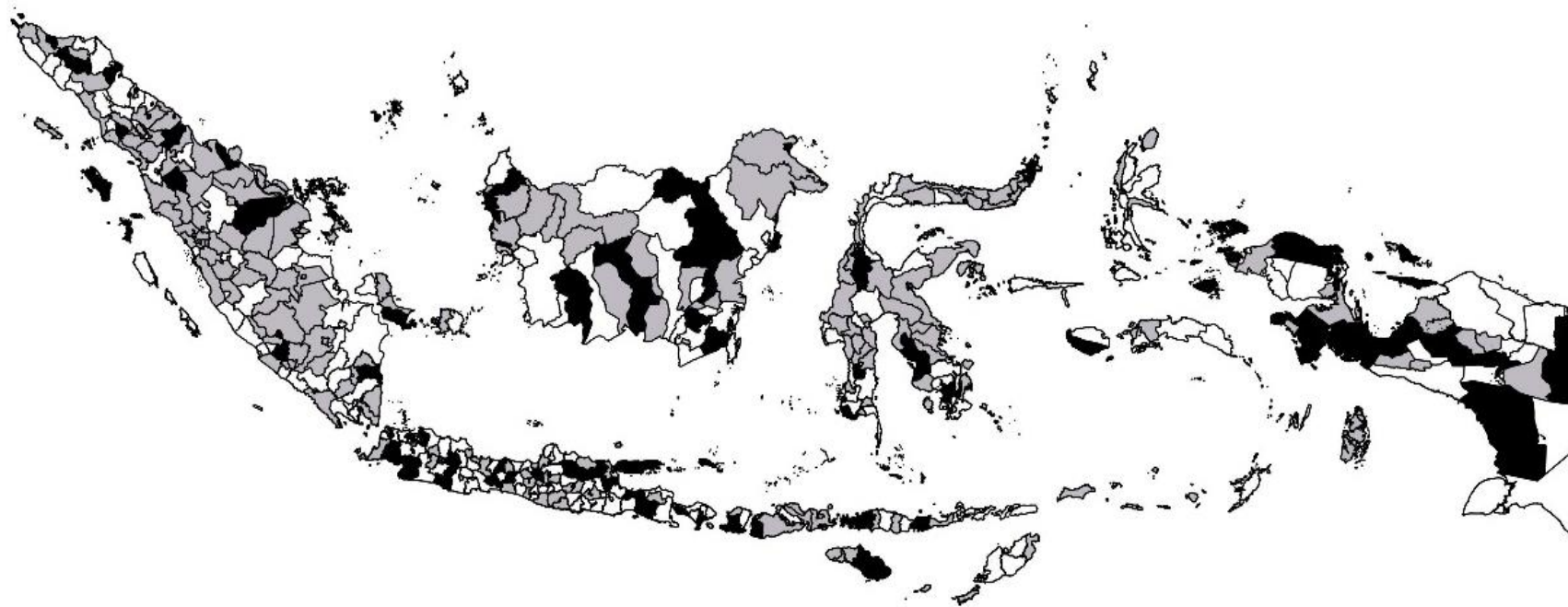
Disparity if the gap more than 5%
■ Disparity_Higher male enrolment
▨ Disparity_Higher female enrolment
□ No gender disparity

Source: Author's calculation from *Susenas* 2014

However, this study finds that regions with a patrilineal system do not necessarily manifest similar results in the opposite direction. This study finds that districts with higher concentrations of Bataknese in North Sumatera do not show a gender disparity that favors boys over girls. This finding differs from Rammohan and Robertson (2012), which show the presence of gender disparity with favor boys than girls in North Sumatera.

This study suggests that the difference may come from the definition of gender disparity itself. While Rammohan and Robertson describe gender disparity as any difference in educational attainment, this study suggests the issue of gender disparity only arises when the gap exceeds more than five percent in any direction. This study finds that districts with strong patrilineal kinship which expose a substantial gender disparity favored boys over girls are found only in Bali and only prevalent at the upper-secondary level. In addition, this study suggests that the low enrolment rate for girls in Bali should be associated with the availability of the unskilled-labor market. Therefore, discussing the gender disparity of Balinese should cover both factors and cannot be inferred separately.

Although Madurese apply a bilateral kinship system, this study finds that neither lower- nor upper-secondary enrolment rates in Madurese areas demonstrate parity level between boys and girls. While the previous discussion already cited Madura's case as one of the regions which suffer from low educational attainment, analysis on a gender basis reveals a staggering fact. In 2002, the girls' enrolment rate in Madura was less than half of boys'. This large gap has provoked this study to do further investigation on the cause of gender disparity.

Finally, to support the argument on the existence of gender disparity in Indonesia, this study does further analysis using a T-test. For such purpose, this study classifies the

enrolment data of Indonesian districts according to the gender and years, 2002 and 2014.

Table 3. 7: T-test for gender disparity at the district level years 2002 and 2014

| Year/ | Mean | | T-test |
Level of Education	Male	Female	
2002			
Lower-secondary school	0.6017	0.6220	-1.7633
Upper-secondary school	0.3815	0.3890	-0.5520
2014			
Lower-secondary school	0.7326	0.7696	-5.1146***
Upper-secondary school	0.5907	0.6160	-3.1057***

*** significant at level 1%

Source: Author's calculation from *Susenas* 2002 and 2014

As can be seen in Table 3. 7, this study finds that there is no significant difference between the mean of boys' enrolment rate and girls' enrolment rate in 2002. The results are consistent in both lower- and upper-secondary schools. It indicates that the issue of gender disparity in secondary education is not emerging yet in the early stages of decentralization. However, this study finds different results in 2014. Table 3. 7 demonstrates that, even with the coefficient confidence of 1 percent, there is a significant difference between the mean of boys and girls in both lower- and upper-secondary schools. These results suggest the rise of the gender disparity issue in the past decade, with the girls strongly perform higher enrolment rates than its counterpart.

3.6.3. 2 Lower educational attainments for girls in Madura's district

Although Madura's districts administered under East Java province, this study finds that, in general, Madura's districts have shown a consistently lower educational attainment vis-a-vis national average level during the past decades. Not surprising that Madura's educational attainment in both secondary levels is only slightly higher than the Papua islands and East Nusa Tenggara. This result supports the concern of Oey-Gardiner

(1991) that children living in Java are not necessarily better off than those elsewhere in Indonesia's regions. It also corresponds to Nooteboom (2015) that suggests the lower educational attainment in Madura's districts.

Further analysis in Madura's educational attainment reveals that, in fact, the primary enrolment rates already reached 92 percent in 2002 at a slightly level below the national level. Yet, the enrolment rate at the secondary level fell drastically and stand for less than half of the national average level, showing a severe problem of between-cycle dropouts in Madura.

Table 3. 8 presents the data of the enrolment rate in Madura's district during the past decade. It confirms the severe problem of educational attainment in Madura. Among districts in Madura, Sampang shows the lowest performance with level less than one-third and one-sixth of the national level for lower- and upper-secondary schools, respectively. The low enrolment rate in Sampang is coincidence with the fact that this region has the highest poverty rate and display the longest distance to the nearest school.

Table 3. 8: School enrolment, school institution, average distance of the school, and poverty rate in Madura islands 2002 -2014

Regions	Lower-secondary					Upper-secondary					Poverty rate
	Enrolment rate			# of school	average distance (km)	Enrolment rate			# of school	average distance (km)	
	Total	Male	Female			Total	Male	Female			
2002											
Bangkalan	37.54	35.02	40.05	81	4.04	14.27	12.74	16.07	25	9.14	34.69
Sampang	19.21	24.65	13.53	52	4.95	6.58	6.57	6.60	15	13.41	41.78
Pamekasan	40.69	51.70	29.28	134	2.65	28.18	36.85	19.99	61	6.44	34.87
Sumenep	47.39	46.38	48.45	182	3.42	19.54	25.71	13.63	63	12.31	31.08
Indonesia	**61.68**	**60.91**	**62.49**			**38.21**	**38.76**	**37.63**			**18.20**
2014											
Bangkalan	61.48	59.89	63.35	209	3.96	45.51	50.03	41.70	97	5.92	22.38
Sampang	67.71	74.12	62.32	309	2.41	38.99	51.14	24.17	139	5.12	25.80
Pamekasan	76.98	83.30	69.56	340	2.02	51.04	60.56	39.01	205	4.21	17.74
Sumenep	87.33	89.29	85.17	417	5.21	55.32	66.71	45.66	244	7.58	20.49
Indonesia	**77.45**	**75.75**	**79.24**			**59.18**	**58.69**	**59.71**			**11.30**

Source: Author's calculation based on Susenas (2002, 2014) and Podes (2003, 2014)

This study also finds that districts with low educational attainment are not limited

to Madura's districts. Other districts in the northern part of East Java province with a higher proportion of Madurese, such as Bondowoso, Probolinggo, Pasuruan, Jember, and Tuban, also show similar outcomes at both the lower- and upper-secondary levels. Although districts in Madura already increased its enrolment rates by more than double and more than six times in lower- and upper-secondary, respectively, they are continuing to have enrolment rate below the national level, with an exception for Sumenep's lower-secondary schools in 2014. There are several reasons for this phenomenon. First, Madura districts exhibit lower educational attainment in the early 2000s. Second, they also show a high poverty rate over the past decades. Third, the poor school accessibility affected by the few numbers of schools and a lengthy distance. Fourth, the presence of wide gender disparity with lower educational attainment for girls.

While the general educational attainments are already low in both levels of school, indeed, this study discovers big shortfalls in educational attainment for girls when discussing sex-based enrolment rates. According to Table 3. 8, Madurese girls are hindered from having equal education opportunities. In 2002, the gap between girls and boys stood between 11 and 22 percent at the lower-secondary level and more than 15 percent at the upper-secondary level. The difference remains considerable even after the introduction of the nine-year free tuition program in 2011. This study finds that in 2014 the enrolment rate for girls is still left behind. The difference holds 11 and 20 percent at the lower- and upper-secondary levels, respectively.

Although the number of schools has increased dramatically and the average distance to the nearest school has reduced around one third during the last decade (see Table 3. 8), this study finds that the gap between boys and girls remain considerable. Intuitively, the improvement of school accessibility should simultaneously increase the

enrolment rate but it is not applied in Madura's. Concerning these facts, this study

suggests the presence of other factors that affect the low enrolment rate, especially for

girls in Madura.

Table 3. 9 Reasons for not continuing school in Madura's districts, 2014

| Regions | Three main reasons for not continuing the school in 2014 | | | | | |
| | Lower-secondary | | | Upper-secondary | | |
	Both sexes	Male	Female	Both sexes	Male	Female
Bangkalan	Cannot afford the cost (39%), education sufficiency (10%),	Cannot afford the cost (49%) and distance (7%)	Cannot afford the cost (28%), education sufficiency (21%),	Cannot afford the cost (45%), married (14%), and working (10%).	Cannot afford the cost (45%), married (7%), and working (16%).	Cannot afford the cost (45%), married (18%), and education
Sampang	Cannot afford the cost (20%), education sufficiency (6%), working (5%) and	Cannot afford the cost (20%)	Cannot afford the cost (20%), education sufficiency (9%), working (8%) and	Married (27%), Cannot afford the cost (19%), and working (9%).	Working (16%), Cannot afford the cost (14%), and education sufficiency (6%).	Married (44%), Cannot afford the cost (22%), and working (5%).
Pamekasan	Cannot afford the cost (100%)	Cannot afford the cost (100%)	Cannot afford the cost (100%)	Cannot afford the cost (40%), education sufficiency (22%), and married (21%).	Cannot afford the cost (40%), education sufficiency (31%), Working (6%) and	Cannot afford the cost (40%), education sufficiency (14%), and married (36%).
Sumenep	-	-	-	Married (40%), Cannot afford the cost (29%), and Education	Cannot afford the cost (49%), Education sufficiency (13%),	Married (53%), Cannot afford the cost (22%), and Education

Source: Author's calculation from Susenas 2014

Among many socio-culture factors, this study highlights the issue of child

marriage and educational perception in Madura's educational attainment. As

demonstrated in Table 3. 9, this study finds a large share of between-cycle dropout caused

by married, especially for girls. Although the finding corroborates to Jones (2001, 2003)

and Nooteboom (2015) that show the child-marriage phenomenon in Madura, this study

finds that the number of girls cites marriage as the reason for dropping outs of school in

Madura is quite astonishing. It covers for more than 40 percent of Madurese's between-

cycle dropout cases in the upper-secondary (see Table 3. 9).

This study finds that between-cycle dropout caused by married in Madurese are

the most significant percentage among Indonesian districts. Moreover, this study suggests that Madurese girls are expected to marry as soon as they finish primary school and leave them with no further education (Jones, 2001). A similar pattern is found in the Northern part of East Java provinces with a high concentration of Madurese, such as Jember, Banyuwangi, Bondowoso, and Situbondo.

Table 3. 9 also shows other factors caused by the large between-cycle dropout in Madura, such as working and educational sufficiency. Nooteboom (2015) suggests that low educational attainment in Madura's districts is also affected by their perception of spending in education. According to him, the Madurese tend to identify their expense with kind of short-term benefit, mostly in terms of earning. Hence they perceive the spending in education as a consumption expenditure rather than investment. With this perception, they may not consider the long-term benefit of educational spending.

Therefore, improving the educational attainment in Madurese may relate to what Jones (2001) cites as unsettled the problem of marriages below the legal minimum age and what Nooteboom (2015) mentions as the perception of education. Lastly, using similar intuitions, this study suggests that improving the educational attainment in Indonesia districts should consider regional socio-culture factors rather than focus only on economic factors.

3. 7 Conclusion

During decentralization, Indonesia shows remarkable performance by steadily improving its national education attainment at both lower- and upper-secondary levels. However, a different picture emerges when one looks at the regional level. This study finds regional disparities, gender disparities, and between-cycle dropout problem as unsettled issues in educational attainment.

This study finds that the enrolment rate in previous education level, household expenditure on education, numbers of schools, the average distance to the nearest school as well as the free-tuition policy are statistically significant in affecting school enrolment in Indonesia's regions. Among these variables, household expenditure on education shows the highest estimation followed by numbers of schools, free-tuition policy, and average distance to the nearest school.

This study also suggests the positive effect of decentralization in educational attainment. This study finds that the local government policies in educational service delivery, especially through the combination of school expansion and restructuring, are significant factors in improving regional educational attainment. However, this study suggests that the role of the free-tuition policy may be smaller than the expectation of Indonesian governments.

Moreover, this study emphasizes the role of households that not limited to their capability to bear educational costs. It also connected to socio-culture factors affecting their decision to allow their children to attend or quit schools, such as norms, kinship, and the perceptions of education.

Regarding the regional disparities, this study suggests that the Western regions continuously shows a higher enrolment rate compared to the Eastern regions at lower-secondary level, with the gap remain broad for the past decade. This study finds that the difference between those two regions becomes narrowed at the upper-secondary level, caused by the high between-cycle. However, different patterns are found in six-main islands. In general, this study finds that Sumatera's districts tend to demonstrate higher educational attainment in both lower- and upper-secondary level, Javas' do not necessarily better off than other regions, and Papua and East Nusa Tenggara districts still fall behind

the rest of the country. Aside from geographical distribution, further analysis reveals regional disparities also related to other factors such as the unskilled–labor demand, opportunity cost to attend the school, and child marriage phenomenon.

Moreover, this study highlights an emerging issue in gender disparity in Indonesia's districts. With scattered and random distribution of gender disparity level, this study finds that this issue is more affected by the socio-culture conditions such as kinship, fervent religious culture, early marriage tradition, and household's perspective in education as well as the economic factor such as the demand for unskilled-labor. This study suggests that the latest element may be utilized as the first signal of gender bias in the labor force, which indicate a higher demand for male over female labor and vice versa.

Given the findings of this study, supporting education by budget and other administrative policies per se may not be sufficient in improving educational attainment. This study suggests that the general procedure should be focused on improving school accessibility, which can be done through the school expansion and restructuring, reducing the average school distance as well as a free-tuition policy. In addition to that, both the central and local governments should consider the economy and socio-culture factors in designing education policies. Therefore, this study argues that further education policy should be regional-specific rather than a panacea for all regions.

All in all, this study only focuses on the financial aspect and educational infrastructure on examining the role of decentralization in educational attainment. Moreover, the econometric analysis only considered household expenditure as the indicator of demand-side. This approach left several factors unobserved, such as the institutional change taken by local government in education policy, factors that affect the household income or expenditure in education, and other socio-culture indicators.

Therefore, to design more appropriate regional strategies, further research may answer these concerns, as well as consider socio-culture factors such as kinship, norms, or gender into the empirical models. The use of more detailed district-level data and policies may enlighten us on the role of decentralization and other policies needed to improve educational attainment.

Chapter 4 **Sectoral labor productivity and poverty reduction in Indonesia**

regions: An assessment using district-level data 2002-2013

4. 1 Introduction

Studies on the relationship between economic growth and poverty reduction show different results, especially about the sector that contributes most to poverty reduction (such as Ivanic & Martin, 2018; Loayza & Raddatz, 2010; Ravallion & Datt, 1996; Suryahadi et al., 2009). Those studies mainly associate the effect of sectoral growth in poverty reduction through two channels, the direct and indirect impact of sectoral economic growth on the real income of the poor. Other studies suggest that the effect of a particular sector depends on the participation of the poor there (Christiaensen et al., 2011; Suryahadi et al., 2009).

Most of the studies in this topic suggest the positive effect of agricultural sector (see Anríquez & Stamoulis, 2007; Christiaensen et al., 2011; Datt & Ravallion, 1998; De Janvry & Sadoulet, 2009; Imai, Cheng, & Gaiha, 2015; Irz, et al., 2001; Ivanic & Martin, 2018; Ravallion & Datt, 1996; Schneider & Gugerty, 2011; Valdes & Foster, 2010). This effect comes with the fact that most of the poor participate in the agricultural sector (Christiaensen & Demery, 2007). The growth in the agricultural sector is also associated with several effects such as the change of real income, the creation of employment, the rural non-farm multiplier effects, and the food prices effects (see De Janvry & Sadoulet, 2009; Irz et al., 2001; Schneider & Gugerty, 2011). Those effects later are expected to reduce poverty incidence.

With similar mechanisms, Ghani and Kharas (2010) suggest a prominent effect of the service sector in poverty alleviation. They argue that the service sector provides the largest source of new job growth. It also indirectly affect the income that, when spent,

will drive further demand for goods and services. In addition to that, Suryahadi et al. (2009) argue that the effect of the service sector in the urban area corroborates with the fact that most of the poor in urban areas have a livelihood in this sector (also see Suryahadi, Hadiwijaya, & Sumarto, 2012).

On the other hand, Hasan and Quibria (2004) argue that in the case of East Asia, the industrial sector is an essential factor in poverty reduction. The process was affected by a rapid increase in labor-intensive manufacturing industries. Lavopa and Adam (2012) argue that the positive effect of manufacturing in poverty reduction linked with employment creation. Moreover, they say that the role of this sector as the engine of economic growth will increase the overall employment and affect poverty reduction (also see Unido, 2017).

In the case of Indonesia, Ilmma and Wai-Poi (2014), Sumarto, et al. (2014), and Thorbecke and Jung (1996) highlight the critical role of agriculture in poverty reduction. Meanwhile Suryahadi et al. (2009, 2012) argue that service sector growth is significant in poverty reduction for both rural and urban areas. Suryahadi et al. (2009) also suggest that the impact of the industrial sector in poverty reduction is relatively small than the other two sectors, especially in rural areas.

Studies on the effect of decentralization in poverty reduction also show different results . Sumarto et al. (2014) argue that Indonesian poverty incidence had decreased during decentralization periods. Meanwhile, Ilmma and Wai-Poi (2014) argued that decentralization policy seems to have neither greatly accelerated poverty reduction nor led to a significant slowing. They highlight that the rate of poverty reduction in both provincial and district level had remained relatively unchanged.

However, previous studies on the effect of labor productivity in poverty reduction

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in Indonesia mainly focused either on the national level (such as Datt & Ravallion, 1998; Suryahadi et al., 2009) or household level (Thorbecke & Jung, 1996). Although Suryahadi et al. (2009) examine the premise using rural-urban level data, they aggregated the data at the provincial level. This study suggests that studies on the effect of sectoral productivity in regional poverty using district-level data are limited. Hence further research can be done at the district level.

Aside from that, this study also argues that previous studies mainly narrowed their conclusion to the particular sector and emphasize the need of development in a specific area, such as agricultural sector (see Suryahadi et al., 2009) or service sector (see Suryahadi et al., 2009 & 2012). While Indonesia districts show various initial poverty level, diverse economic endowments, as well as the different capacity to implement the decentralization policy, those existing studies may not seize regional poverty reduction problems and left a gap in designing suitable strategies in this issue.

Therefore, this study answers those concerns by presenting a comprehensive analysis in regional poverty reduction through several approaches. First, it uses of district-level data cover 492 regions from 2002-2013. Second, it estimates sectoral productivity. Lastly, it discusses the role of decentralization in poverty reduction. In doing so, this study utilizes econometric and statistical analysis to examine the effect of sectoral labor productivity in regional poverty reduction. This study also applies spatial analysis to draw the pattern of regional poverty in Indonesia, whether it concentrated in particular regions or randomly scattered in various areas. Lastly, this study investigates how local government policy through the local-government budget and direct election may affect regional poverty reduction.

The remainder of this study is organized as follows. This study starts with a

literature review on the effect of labor productivity and decentralization in poverty reduction. The third section shows data on regional poverty and sectoral productivity. The fourth section presents the methodology. The fifth section presents the empirical results and further discussion using statistical and spatial analysis. In the last part, it presents concluding remarks.

4. 2 Literature review

Studies on the effect of sectoral labor productivity in poverty reduction show different results and sizes of each sector. Many studies cite agriculture as the foremost sector in poverty reduction (see Anríquez & Stamoulis, 2007; Christiaensen et al., 2011; Datt & Ravallion, 1998; De Janvry & Sadoulet, 2009; Irz et al., 2001; Ivanic & Martin, 2018; Schneider & Gugerty, 2011; Valdes & Foster, 2010). Other studies also show the positive effect of the service sector (see Ghani & Kharas, 2010; Suryahadi et al., 2009 & 2012). Meanwhile, Hasan and Quibria (2004), Lavopa and Adam (2012), Unido (2017) present that the positive effect of manufacturing in poverty reduction.

In general, the direct impact of the agricultural sector in poverty reduction corresponds with two factors. First, the poor mainly participate in the agricultural sector (Christiaensen et al., 2011). Second, the indirect effect on the wage of the poor, especially in rural areas (Datt & Ravallion, 1998). Moreover, the role of the agriculture sector may come from its indirect effect on other sectors. Booth (2000) cites agricultural growth as the fuels of off-farm employment growth while De Janvry & Elisabeth (2002), Irz et al. (2001), and Schneider and Gugerty (2011) highlight the role of the agricultural sector in creating employment, establishing non-farm multiplier in rural area, and affecting food prices.

Empirical studies on sectoral productivity also show the positive effect of the

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agricultural sector in poverty reduction. Utilizing 315 households of the GTAP 9 database, Ivanic and Martin (2018) cite that an increase in agricultural productivity is generally, but not always, more effective in reducing poverty incidence than equivalent-sized productivity in industry or service. According to them, the effect of agricultural productivity is more significant in emerging countries. It's effect gradually decreases as the average incomes rise. Similar to that, a study by Imai et al. (2015) on cross-country panel data that covered 46 countries for the period 1970-2008 shows that agricultural growth is the most prominent factor in reducing inequality and poverty. They highlight the need to revive the agriculture sector as the main economic growth driver to eliminate extreme poverty rather than relies on rural-urban migration and urbanization.

Christiaensen et al. (2011), using cross-country analysis data, show that the contribution of a sector to poverty reduction depends on its growth performance and its indirect impact on other sectors' growth. Moreover, they emphasize the poor participation in the particular sector and the sectoral size in the total economy.

Meanwhile, citing an example from India, Ghani and Kharas (2010) argue that service sector growth is more important in poverty reduction than the agricultural sector. Similar to agricultural sector in other countries, they suggest two channels of the service sector effect on poverty reduction in India. First, it provides the largest source of new job growth. Second, it, indirectly, provides the income that, when spent, drives further demand for goods and services and even creates the jobs to produce them. Moreover, they show that for every job created in the information technology sector, the rise will create four other additional jobs in the rest of the economy. The result also suggests that the indirect effect of a growing service sector can be more significant than its direct impact.

On the other hand, Hasan and Quibria (2004) suggest the vital role of the industrial

sector in poverty reduction in East Asia. They argue that the effect of the industrial sector was affected by the massive development of labor-intensive manufacturing industries in East Asian countries for the past decades. The argument is supported by Lavopa and Adam (2012), which show the positive effect of manufacturing in poverty reduction. According to them, the growth of manufacturing industries will create employment not only within the sector but also in the total sector (also see Unido, 2017).

In the case of Indonesia, Suryahadi et al. (2009) suggest that the effect of the service sector in poverty reduction is significant for both rural and urban areas while the role of the agricultural sector is prominent only for rural areas. They also argue that the development of the industrial sector may not be the key policy for reducing poverty in Indonesia since most of the poor are located either in the rural agriculture sector or urban services sector. The results corroborate to Suryahadi et al. (2012). They present several finding related to the poverty incidence in the period before and after the Asian financial crisis. First, service sector growth made the most significant contribution to poverty reduction in both rural and urban areas. Second, the industrial sector growth became irrelevant for poverty reduction in the post-crisis period. Lastly, the agricultural sector growth remained important in poverty alleviation but only for rural areas.

The study by Suryahadi et al. (2009, 2012) also suggests that location and sectoral components of growth do matter on poverty reduction. This argument confirms Cervantes-Godoy and Dewbre (2010), which highlight the role of the sector mix of growth in poverty alleviation. Thus, using cross-section data of developing countries and disaggregated them into three- and six-sector levels, Loayza and Raddatz (2010) suggest that both the size and composition of economic growth is prominent in poverty alleviation. Their study demonstrates the heterogeneity of the poverty response to the changes in

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economic growth, with the most considerable contributions come from unskilled labor-intensive sectors, namely agriculture, construction, and manufacturing.

Studies on the effect of decentralization in poverty reduction suggest that the role has corresponded to the role of local government in providing local public services and allocating budget provision that pro-poor (Khan, 2013). Thus, Khan argues that the effect may come from three dimensions. First, decentralization might lead to an improvement in economic growth, which may, in turn, reduce absolute poverty. Second, it also accrues in public services improvement then results in a decrease in the prevailing extent of relative deprivation. Lastly, through increased participation and representation, it might empower the impoverished and disadvantaged and give them a voice in the decision-making process, which may ultimately lead to a reduction in deprivation of particular capabilities.

Aside from that, Fossati (2016) argues that the decentralization, followed by the democratization, opens an opportunity for people to mobilize and gain political influence for their interest. Decentralization also reinforces the pressure on leaders to improve the economy and better popular welfare (Lewis, 2012). Moreover, the politicians will find incentives to furnish public goods, expand the economy, and enhance citizens' well-being and livelihoods to retain his/her chair (Besley & Kudamatsu, 2006; Lewis, 2012; Orenstein, 2012). Furthermore, direct election, as part of decentralization, will enhances political accountability since it gives voters including the poor a power to reward/discipline an incumbent and increases an incentive for incumbent to improve the quality of social welfare and governance (Besley, 2005; Besley & Smart, 2005; List & Strum, 2006).

However, Ilmma and Wai-Poi (2014) show the relatively unchanged rate of

poverty level during decentralization in Indonesia. Hence they suggest that decentralization policy seems to have neither greatly accelerated poverty reduction nor led to a significant slowing. Thus, Hill and Vidyattama (2014) cite that regional autonomy appears to have no discernible impact on local development because regional growth patterns and social outcomes remain the same as pre-decentralization for many Indonesia regions.

All in all, the previous studies suggest that the effect of sectoral productivity in poverty reduction is mainly related to the direct impact on increasing the wage of the poor and later improving the welfare of the poor. Besides, it is also associated with the indirect effect, such as creating employment and the multiplier effect on other sectors. It is also associated with the location and sectoral composition. With the different results on the impact of sectoral labor productivity and later decentralization in poverty reduction, further studies on this topic remain open. In the following section, this paper shows the regional poverty and sectoral labor productivity in Indonesia.

4. 3 Regional Poverty in Indonesia

For the last decades, Indonesia shows an astounding improvement in alleviating its poverty incidence. In 2013, the poverty rate decreased for more than half of its initial point in the early 2000s. This success is mainly affected by regional accomplishments in the Western part of Indonesia. As demonstrated in Figure 4. 1, the Western region consistently demonstrates a lower poverty rate compared to the average national level while the Eastern region shows the opposite direction. This study finds that, in general, districts in Kalimantan followed by Sumatera and Java-Bali consistently show low poverty levels. The results confirm studies by Hill and Vidyattama (2014) and Sumarto et al. (2014). The high poverty rate in the Eastern region is mainly affected by the high

poverty incidence in East Nusa Tenggara, Moluccas, and Papua islands.

Figure 4. 1: Regional poverty disparities of Indonesian district by main islands, 2002 - 2013
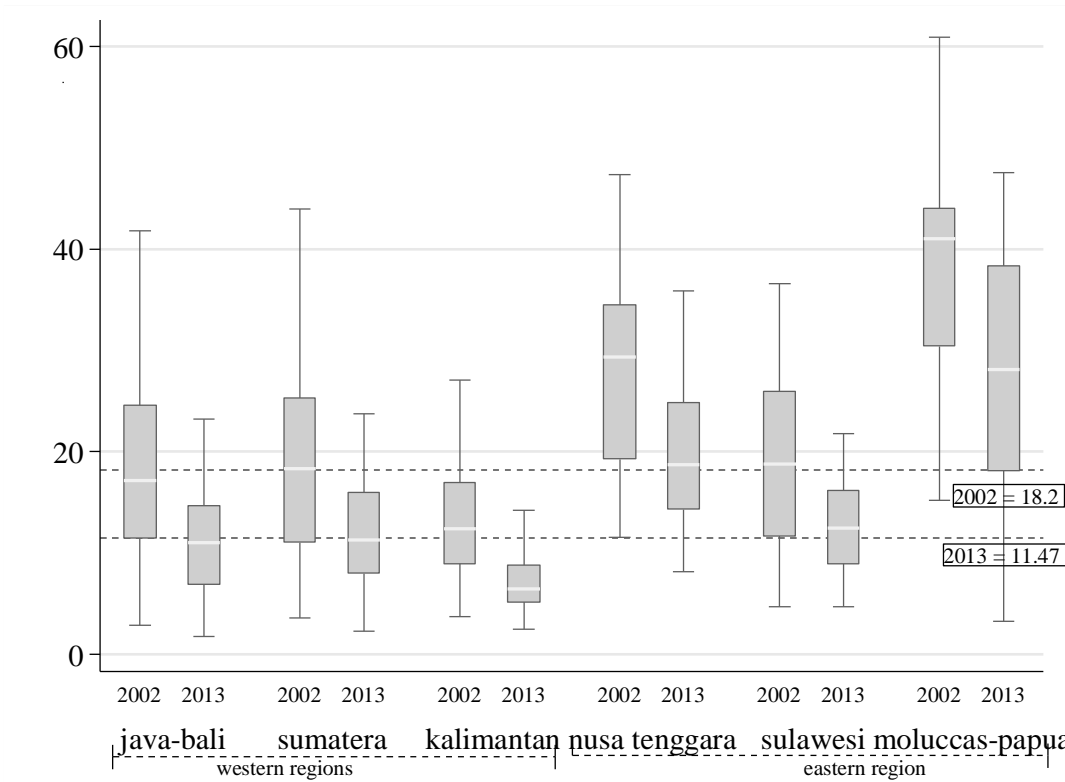
Source: Author calculation based on *Susenas* 2002-2013

This study also highlights a wide dispersion of regional poverty incidence. District with the highest poverty rate demonstrates for more than triple of national level. In 2002, the difference between the lowest and the highest varied from 1.33 percent in South Jakarta city of Jakarta province and 60.89 percent in Puncak Jaya district of Papua province. The gap remained wide in 2013. South Tangerang city of Banten province shows the lowest poverty incidence at 1.75 percent, while Deiyai of Papua province possesses the highest poverty at 47.52 percent. Furthermore, the disparity issue does not only arise between the Western and Eastern regions or among islands and provinces but also come up within areas such as Madurese districts and city administered districts in East Java province. These results confirm a considerable variation in regional poverty

incidence in Indonesia (see Hill & Vidyattama, 2014; Sumarto et al., 2014).

Moreover, clustering district-level data on poverty incidence into spatial and quintile groups, this study also confirms the large dispersion of regional poverty difference among Indonesia districts. Figure 4. 2 shows that most Eastern Indonesia districts, especially in East Nusa Tenggara and Papua, are mainly standing either in the first or second quintile. The results confirm that these regions are continuously experiencing high poverty incidence during the past decade. This study discovers that districts in the Eastern Indonesia with low poverty incidence are either the city-administered district or closed to the province capital city.

Figure 4. 2 shows that for the past decade, some of the Eastern districts, especially in Sulawesi, West Nusa Tenggara, and the Moluccas, are moving their group into the second or third quintile, showing their progress on alleviating poverty incidence. Yet, due to the higher initial poverty level, they are still demonstrating higher poverty incidence compared national level.

Figure 4. 2 also confirms the previous argument, that Western Indonesia consistently exhibits lower poverty incidence than its counterpart. The spatial data shows that many of the Western districts are found in the upper quintile. Moreover, among the Westerns, this study highlights the achievement of Jakarta's and Bali's districts, which successfully maintain its low poverty incidence compared to the national level.

However, this study finds that several districts in the Western area are located in the first and second quintiles, showing that some of them also suffer from high poverty incidence. These districts located in Northern and Southern parts of Sumatera, Central

Figure 4. 2: Regional poverty by district and quintile, 2002 – 2013

The year 2002

- 28.34 - 60.89
- 21.57 - 28.34
- 15.17 - 21.57
- 10.10 - 15.17
- 2.84 - 10.10

The year 2013

- 18.59 - 47.52
- 13.68 - 18.59
- 9.95 - 13.68
- 6.65 - 9.95
- 1.75 - 6.65
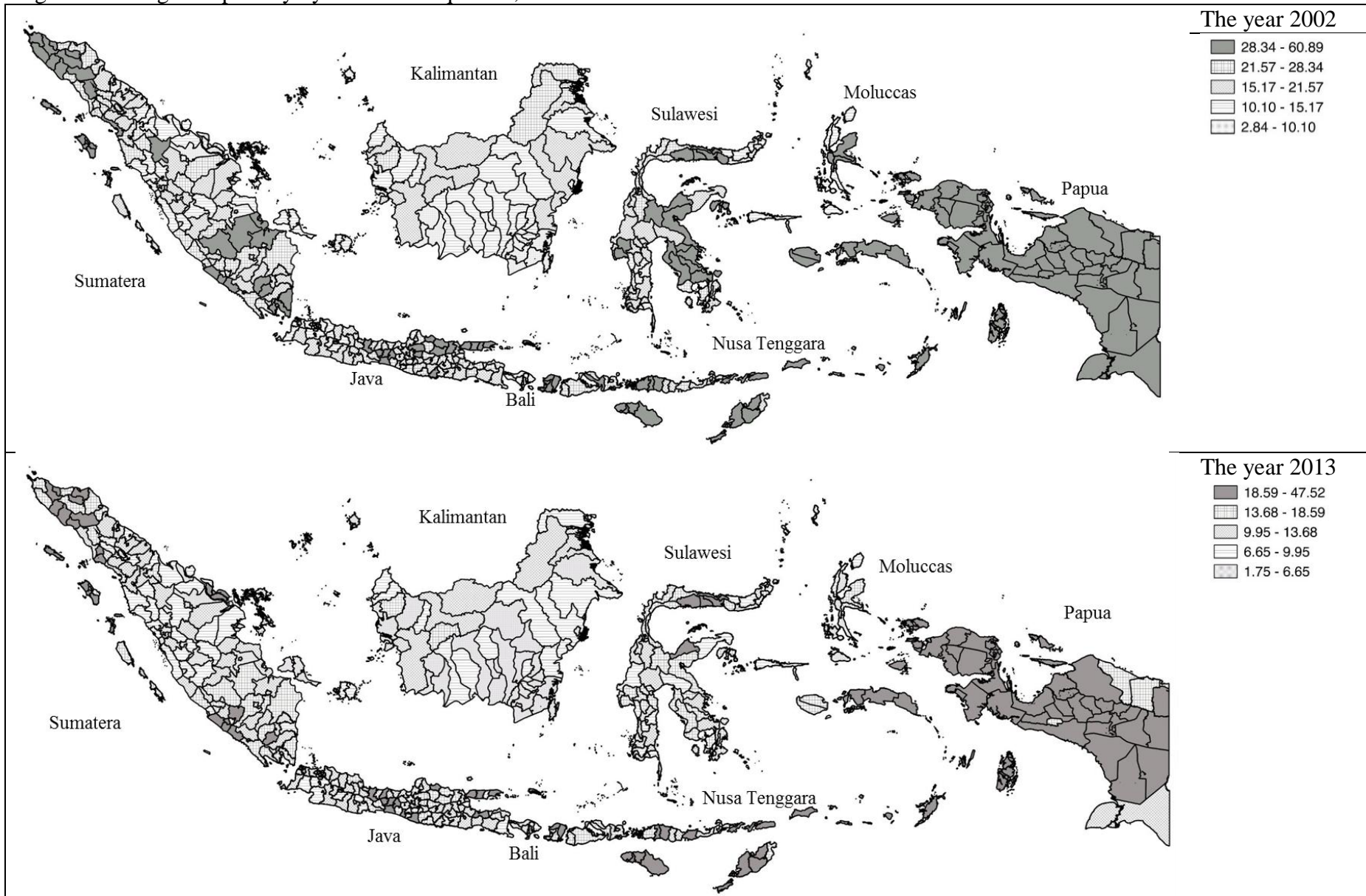
Source: Author calculation based on Susenas 2002 – 2013

and Southern parts of Java, Madura islands, and Western Kalimantan. The presence of high poverty incidence in Java also highlights the concern of previous studies on the Indonesian poverty issue. Booth (1998) argues that Indonesia's poverty as a primarily Javanese problem. Similar to that, Hill (2000) suggests the threat of poverty in Java's rural areas, especially with the fact that Java shows high density, which covers more than around 60 percent of the Indonesian population. Furthermore, Tadjoeddin (2014) shows that districts in Java are generally relatively poor to the Indonesian average level.

Table 4. 1: Regional poverty and economic development 2002 – 2013 by quintile

	Quantile	Range	Average poverty rate (%)	Number of Region		Number Java-Bali regions		Number Outside Java-Bali regions		Average Year of Schooling	Average Agricultural productivity (Rupiah)
2002	1	28.34 - 60.89	36.94	71	132*	16	16*	55	116*	6.36	4,849,801
	2	21.57 - 28.34	24.61	70	90*	27	27*	43	63*	6.69	6,739,997
	3	15.74 - 21.57	18.17	71	90*	32	33*	39	57*	6.65	6,877,943
	4	10.10 - 15.17	12.95	70	103*	19	20*	51	83*	7.70	8,864,537
	5	2.84 - 10.10	7.01	71	78*	29	31*	42	47*	8.89	13,743,744
	Total	2.84 - 60.89	19.55	353	493*	123	127*	230	366*	7.26	8,261,408
2013	1	18.59 - 47.52	27.12	98		13		85		6.98	8,224,483
	2	13.68 - 18.59	16.30	99		23		75		7.79	10,273,263
	3	9.95 - 13.68	11.70	98		34		65		8.05	12,148,303
	4	6.65 - 9.95	8.32	99		27		72		8.45	13,673,161
	5	1.75 - 6.65	4.98	99		30		69		9.14	17,879,886
	Total	1.75 - 47.52	13.69	493		127		366		8.09	12,431,802

Note: * show the number of the region as the effect of regional proliferation

Source: Author calculation from *Susenas* 2002-2013, *Podes* 2000-2014.

Following the spatial analysis, this study clusters the Indonesian districts into several groups. For such purpose, this study use several steps. First, this study classifies the data into quintile groups. Second, it groups the data into Java-Bali and outside Java-Bali regions. Lastly, it estimates the regional human capital level and regional productivity in agriculture for each cluster. Table 4. 1 shows that the composition of the Java-Bali region in each quintile is quite steady while outside the Java-Bali region shows

various numbers from 2002 to 2013. However, this study suggests that the increasing number of outside Java-Bali in each quintile is mainly affected by the regional proliferation process rather than the inter-quintile movement. Interestingly, Table 4. 1 also demonstrates a positive association between quintile group movement and the average year of schooling level and agricultural productivity. This study finds an increase of average years of schooling for each quintile movement, a similar outline also occur for agricultural productivity. These patterns hold in both year observation, 2002 and 2013.

4. 4 Sectoral Labor Productivity in Indonesia Regions

As part of estimating regional labor productivity, this study groups the regional output and employment into the traditional division of economy, namely agriculture, industry, and services. The sectoral labor productivity is calculated by dividing sectoral output with sectoral employment[26]. Figure 4. 3 demonstrates different outlines of sectoral labor productivity in Indonesia. In general, the industrial sector shows the highest labor productivity, yet also exhibits the most extensive dispersion, followed by service and agricultural sectors. Furthermore, this study finds various patterns of sectoral labor productivity when one looks at six-main islands.

However, this study suggests not solely associated with the high productivity level of the industrial sector with the high value-added per labor from manufacturing industries. This study argues that the value of industrial productivity is also affected by the mining sector as this sector contributes to at least 7 and 26 percent of total output and industrial output in Indonesia. The share is more significant for several districts.

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[26] This study presents the detail calculation of labor productivity in the methodology section

Figure 4. 3: Sectoral productivity 2002 – 2013 by main islands
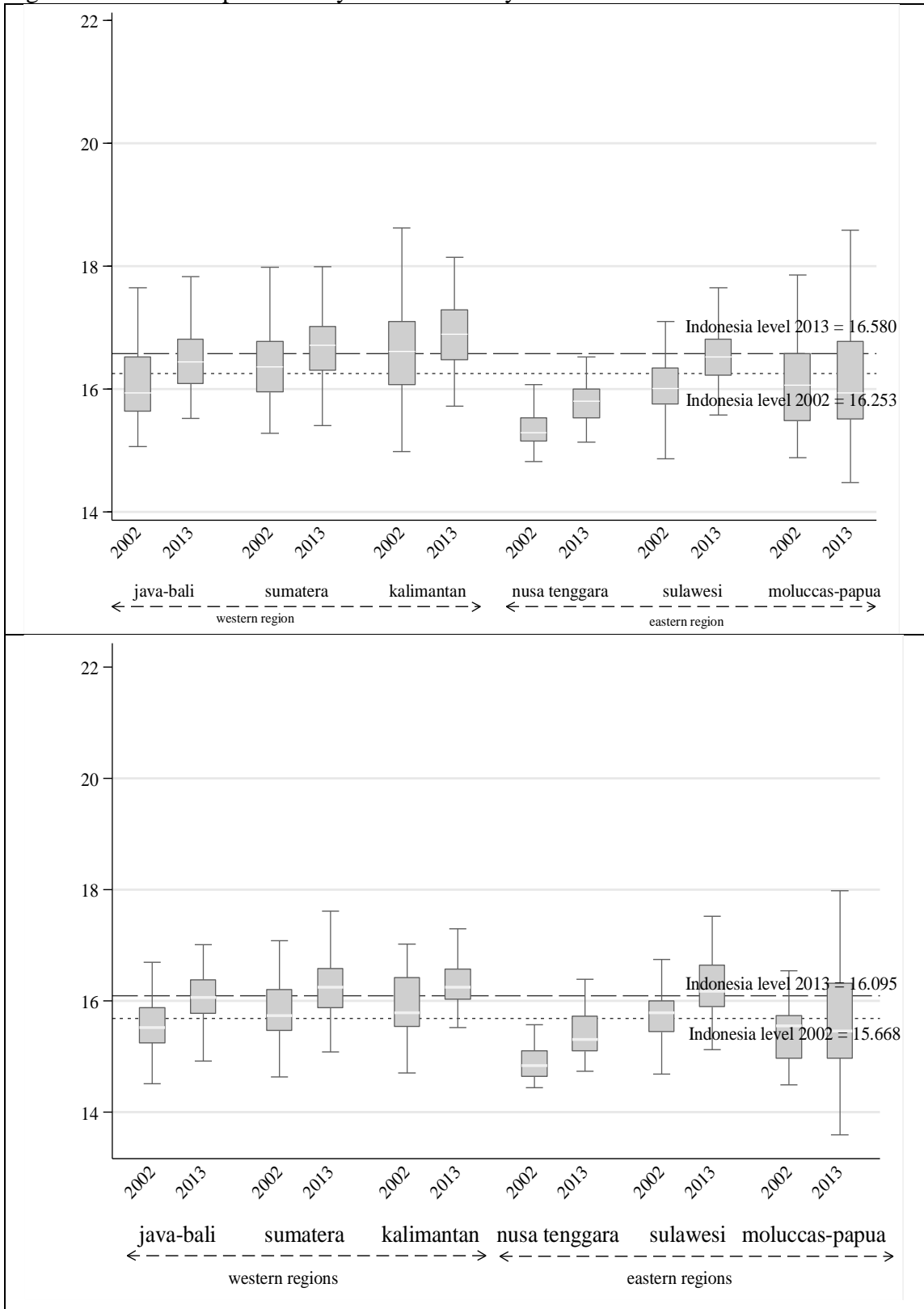
Figure 4. 3: Sectoral productivity 2002 – 2013 by main islands (continued)
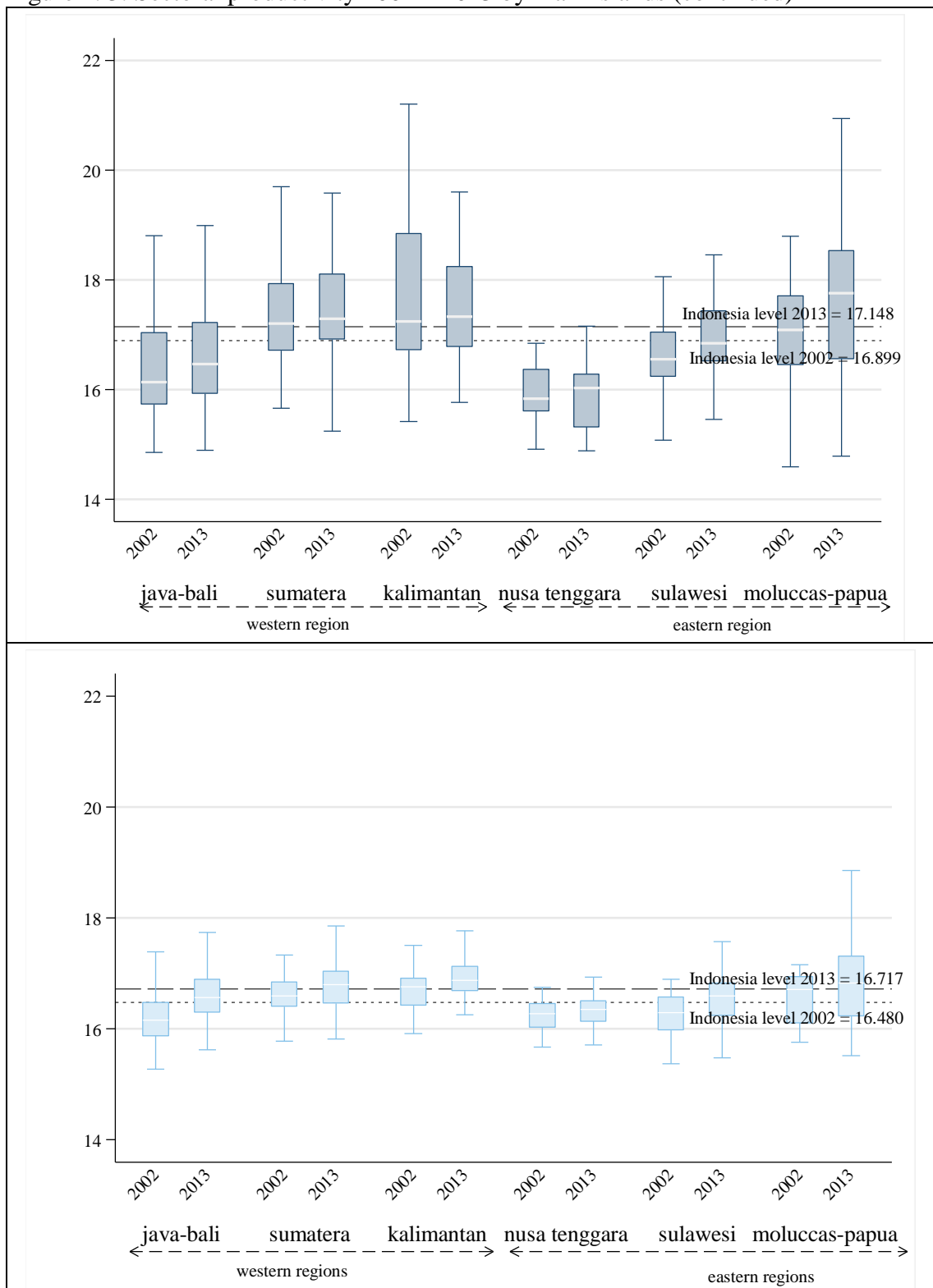
Source: Author calculation from BPS publications and Susenas 2002 - 2013

This study finds that the mining sector had escalated industrial productivity for many mining-regions. It raises industrial productivity for at least one and half compared to the non-mining industrial productivity in South Sumatera, Jakarta, and South Kalimantan provinces and more than double in Riau, Riau islands, East, and North Kalimantan provinces. This argument had been confirmed by Figure 4. 3 and Figure A4.1, which shows the gap between mining and non-mining productivity in the six-main islands.

Further analysis in six-main islands shows that Java-Bali's industrial productivity is mainly affected by the rapid development of the manufacturing industries, mostly through an industrial area or industrial agglomeration. This study finds that, on average, the share of the manufacturing sector covers more than two-thirds of industrial output in West, Central, and East Java provinces. The stock became larger in Banten province, which cover for more than 82 percent of its industrial output. Moreover, this study argues that the role of the mining sector in Java-Bali industrial productivity is insignificant as the presence of mining–district[27] is limited to 5 out of 127 districts.

Although the outside Java-Bali regions show different outlines of their industrial productivity, in general, this study argues the critical role of the mining sector in increasing industrial productivity. According to the regional GDP composition, the mining sector contributes for at least 34 percent of industrial output in outside Java-Bali and being cited by one-sixth of outside Java-Bali districts as an essential factor in their industrial productivity. The share of manufacturing industry in outside Java-Bali is not considerable as Java-Bali's. The development of large industrial areas is still limited in

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[27] This study defines the mining-based region for a region with more than 10 percent of mining contribution to total regional output.

the middle and coastal part of North Sumatera province and the coastal territory of East Kalimantan province.

Moreover, outside Java-Bali's industrial productivity level also can be traced to several causes. This study finds that the role of mining sector in Papua islands is limited to five districts. Yet, the share of this sector covers the majority of economic output in West Papua and Papua provinces. Moreover, due to lack of infrastructure and supporting raw material, this study barely finds a massive development of industrial agglomeration in Papua[28]. In Sulawesi, the development of the manufacturing sector is mainly evolving in North and South Sulawesi. However, the distribution is dispersed and limited to several districts. It is important to note that this study does not cover data of manufacturing development in Southeast and Central Sulawesi province as it just evolves in the past five years. Lastly, Nusa Tenggara shows the lowest industrial productivity since it lacks both the mining and manufacturing industries.

This study confirms a diminishing pattern of the agricultural sector on national and regional output in the past decades. This study finds that the agricultural sector largely contributes to the regional labor market but it also shows the lowest productivity level compared to other sectors.

This study also finds a large dispersion of agricultural productivity caused by different cultivations. Java-Bali shows large food crop production while outside Java-Bali exhibits large estate crop production. The food crop production in Java-Bali is dominated by paddy, which, in general, shows less value-added compared to estate crops. Although

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[28] An exception for Teluk Bintuni district, one of the largest resource of natural gas, which shows a large development petrochemical industry.

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data on estate crop production in Table A2. 6 indicates that Java-Bali produces estate crops mainly in sugarcane, tea, tobacco, and coconut; the products are only found in particular districts. With these facts, it is not surprising that Java-Bali records the second-lowest agricultural productivity compared to other six-main islands.

Outside Java-Bali shows the opposite pattern of agricultural production. As mentioned in Chapter 2, outside Java-Bali contributes largely to Indonesia's estate crop production. In general, Table A2. 6 shows that in 2013 Sumatera had produced at least 63, 31, 71, 62, and 24 percent of national production in palm oil, coconut and sugarcane, rubber, coffee, and cocoa, respectively. Meanwhile, Kalimantan was recorded as the second-largest contributor for palm oil and rubber production with a share of around 32 and 25 percent total national, respectively. While Sulawesi islands demonstrate a high percentage of cocoa and coconut production, Moluccas and Papua are famous for its spice production.

Among those commodities, this study argues the enormous contribution of palm oil plantation in affecting the high level of agricultural productivity. The result corroborates the previous discussion in Chapter 2. Provinces with the massive expansion of palm oil plantation, namely West and Central Kalimantan, Riau, and South Sumatera, had escalated their total regional output and GDP per capita in the last two decades.

Regarding the service sector productivity, this study finds a moderate level with narrowed distribution. This study suggests that, on average, the main contributor to the service sector is coming from a trade and food service sub-sector, which covers more than 44 percent of total service output. Other components, namely public and other service sectors, transportation and telecommunication, and finance and business sector, represent for 31, 14, and 11 percent of the total service output, respectively.

Although the general pattern of service sector contribution in Java-Bali and outside Java-Bali grouping is quite similar, further analysis in outside Java-Bali presents different outlines, especially for Eastern Indonesia.

This study finds that the public and other services sector dominates the output of service sector in Moluccas and Papua, Sulawesi and Nusa Tenggara. In the latter island, the service sector covers more than 20 percent of total regional output, showing a high dependency on government spending to support its regional economic activities. Moreover, this study suggests that the high share of government spending in eastern districts is related to two factors. First, they lack a high value-added economic sector, such as mining and manufacturing industries. Second, many of them are new districts formed by the regional proliferation process. The higher share of public spending may be associated with government spending-driven economic activities.

This study finds that trade and food service sub-sector progress rapidly in Sumatera, Kalimantan, and Sulawesi, suggesting that the development of this sub-sector is in line with the presence of higher share of the agricultural and industrial sector. Lastly, the finance and business sector only bloom in an urban area, represents by either city-administered district or provincial capital city or district that close to both areas.

4. 5 Data and Methodology

4.5. 1 Data

The original dataset covers of 492 districts for 2002-2013. However, on examining the role of decentralization policy, it excludes regions in greater Jakarta and around 20 districts in Moluccas and Papua. Jakarta is not decentralized and managed by the provincial government, while some of Moluccas and Papua are excluded due to data unavailability. In general, this study combines data from Indonesia Statistic Bureau

publication (BPS), World Bank's Indonesia Database for Policy and Economic Research (INDODAPOER), and Ministry of Finance. The detail of the data used in this study will be presented in Table A4. 1.

As part of assessing the role of decentralization in poverty reduction, this paper also utilizes regional fiscal data published by the Directorate General of Fiscal Balance, Ministry of Finance of the Republic of Indonesia. The data includes local government expenditures, total revenue, and other fiscal indicators. Lastly, this study utilizes data from the general election commission (KPU) that consist of direct election and composition of the local parliament.

4.5. 2 Methodology

This study adopts a model developed by Suryahadi et al. (2009) and Loayza and Raddatz (2010) on examining the effect of sectoral growth/composition in poverty reduction. While those studies measured the role of economic growth and its structure in poverty reduction, this study modifies the model by applying sectoral labor productivity as the explanatory variable. This study argues that the links between sectoral productivity and labor wage that later affect poor welfare are more realistic than economic growth. Moreover, this study highlights two reasons for using sectoral labor productivity as the independent variable. First, it could be associated directly with the wage of labor. Second, it may consider technological differences across sectors of production.

For these reasons, the general model can be formulated as follows:

$$dP_{it} = \alpha + \beta_1 \, \hat{y}_{it} \, + \, \beta_x Control_{it} + \, \varepsilon_{it} \qquad\qquad (1)$$

where P shows the level of poverty and dP refers to the change in the poverty rate, $\hat{y}$ represents labor productivity, *Control* represents the control variables, ε is the error term, i and t represent district-i and time-t respectively. At the same time, α and β are the

parameters to be estimated. The parameter of interest in this study is β that captures the change in poverty rate due to a change in labor productivity.

Since this study is more interested in examining the relationship between poverty and sectoral productivity, then the model in equation (1) can be reformulated as follows:

$$lnP_{it} = \alpha + \beta_1 ln\hat{y}_{it}^A + \beta_1 ln\hat{y}_{it}^I + \beta_3 ln\hat{y}_{it}^S + \beta_x Control_{it} + \varepsilon_{it} \qquad (2)$$

where $\hat{y}_{it}^A$, $\hat{y}_{it}^I$, and $\hat{y}_{it}^S$ represent the sectoral productivity in the agricultural, industrial, and service sectors. The sectoral productivity is measured using a constant price of 2000. This study estimates the equation using the district fixed effect.

The use of district-level data that covers 492 Indonesian districts from 2002-2013 answers the concern of Suryahadi et al. (2009) on estimating equation (1). They argue that the use of this equation requires a sufficiently long-spanning time-series data. In addition, the use of labor productivity as an explanatory variable also corresponds to the concern of Datt and Ravallion (1998), Loayza and Raddatz (2010), and Suryahadi et al. (2009) on the effect of migration across regions since it also takes into account the change of number of labor over time.

Regarding sectoral productivity, this study works estimates this variable by dividing regional sectoral output over sectoral labor[29]. In doing so, this study decomposes

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[29] $\hat{y}_{ijt} = \frac{y_{ijt}}{L_{ijt}}$, where

$\hat{y}_{ijt}$: Labor productivity of sector j in region i at year t

y_{ijt} : Output of sector j in region i at year t

L_{ijt} : Number of labor of sector j in region i at year t

i : region i

the total regional output and employment into the traditional division of economy, namely agriculture, industry, and services. The data of sectoral output is collected from the annual publication of Indonesia Statistic (BPS). Meanwhile, this study estimates sectoral labor from the national socio-economic survey (*Susenas*)[30]. This study works under the assumption that there is an indifferent worker hour spent by a worker in each economic sector.

Moreover, this study modifies the previous model by including the decentralization variables such as local expenditure in social function (health and education), total expenditures, and local owned revenue. These variables are selected since Indonesia's decentralization is more on expenditure-side, which gives huge authority to local governments on spending the money rather than collecting the revenue (Mahi, 2013). Thus, this study also includes variable direct election (see Fossati, 2016). Therefore, the model can be formulated as follows:

$$dP_{it} \quad = \quad + \beta_1 Social\ expenditure_{it} + \beta_2 Total\ expenditure_{it} +$$
$$\beta_3 Localownedrevenue_{it} + \beta_4 Directelection_{it} +$$
$$\beta_5 Unifiedlocalgovernment_{it} + \ + \beta_x Control_{it} + \varepsilon_{it} \qquad (3)$$

Where variable *social* and *total expenditures* represent the annual local expenditure in social function (health and education) and total local expenditure, respectively. Variable

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j : sector j

t : year t

[30] $L_{ijt} = \sum W_{ijt}$, where

L_{ijt} : Number of labor of sector j in region i at year t

W : Individual weight

local owned revenue represents the local taxes and revenue sharing from natural resources. All of these variables measured in constant price and divide by the regional population. Meanwhile, the dummy variable *direct election* represents the year after the implementation of direct election in Indonesia districts. Dummy variable *unified local government* shows the local council support to the local government.

Aside from the econometric model, this study utilizes statistical and spatial analysis to seizure the pattern of regional poverty incidence. This study then associates regional output and labor composition with poverty incidence. The use of spatial analysis also allows us to draw the pattern of regional poverty incidence, whether it is randomly scattered or concentrated to particular areas.

The distinctive of this paper, compared to previous studies, is that it emphasizes district-level data analysis. Therefore, first, aside from analyzing all Indonesia regions as one-pooled panel data, this study groups the data into Java-Bali regions and outside Java-Bali regions. The classification is mainly based on geographical characteristics and considered regional output and employment composition[31]. Second, this study applies the ternary diagram, which captures each district data as a single entity.

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[31] This study finds that, on average, Java-Bali contributes more than 55% and 45% of Indonesian labor and GDP respectively, while the rest come from outside Java-Bali. Moreover, this study finds that Java-Bali's show higher dependency on the service sector for both its regional economy and labor while outside Java-Bali relies on the industrial and agricultural sectors for its regional economy and labor, respectively.

4.5. 3 Descriptive Statistic

Table 4. 2 presents data of dependent and independent variables over observation periods. In general, this study finds a wide dispersion of regional poverty incidence. Districts with high poverty levels are not only found in outside Java-Bali but also in Java-Bali. Confirming our finding in Chapter 3, the data of the average year of schooling varies from 2 to 12 years with the Java-Bali region does not necessarily have the better condition than outside Java-Bali.

Moreover, data on regional productivity also confirms the previous discussion on the wide gap between the lowest and the highest productivity. Table 4. 2 shows that among the three sectors, the industrial sector shows the largest distribution, followed by the service and agricultural sector. The data also confirms that, on average, agricultural productivity in outside Java-Bali is higher than Java-Bali.

This study also highlights the differences of regional fiscal data such as local expenditures and local-owned source revenues. Moreover, direct election captures the implementation of direct local-election since 2005. Data from KPU shows that only 6.7 percent of districts have majority support in local parliament while the rest districts only have minority support in the local parliament.

Table 4. 2: Descriptive Statistic

Variable	Obs	Mean	Std. Dev.	Min	Max
All-Indonesian regions					
Poverty rate	5,343	16.83	10.001	1.33	60.89
Average years of schooling	5,420	7.65	1.580	1.81	12.27
Agricultural productivity	5,084	1.04E+07	9.47E+06	1.37E+05	2.38E+08
Industrial productivity	5,085	6.74E+07	2.20E+08	1.13E+06	5.67E+09
Service productivity	5,085	1.85E+07	1.77E+07	9.41E+05	3.96E+08
Mining productivity	4,813	3.57E+08	3.57E+09	7.14E+03	1.37E+11
Non-mining industrial productivity	5,080	4.26E+07	1.02E+08	1.07E+06	2.45E+09
Social expenditure per capita	4,620	7.46E+05	6.84E+05	9.59E+03	1.02E+07
Total local expenditure per capita	4,673	2.26E+06	3.10E+06	1.83E+04	5.08E+07
Local-owned source revenue per capita	5,164	1.31E+05	2.03E+05	3.30E+02	5.21E+06
Direct election (dummy)	5,844	1	0.493	0	1
Unified local government (dummy)	5,928	0	0.250	0	1
Java-Bali regions					
Poverty rate	1,502	14.70	7.588	1.33	41.78
Average years of schooling	1,497	7.63	1.627	2.90	11.56
Agricultural productivity	1,484	9.35E+06	8.33E+06	8.64E+05	9.72E+07
Industrial productivity	1,484	5.54E+07	3.09E+08	2.54E+06	5.67E+09
Service productivity	1,484	1.79E+07	2.36E+07	3.28E+06	2.88E+08
Mining productivity	1,303	4.93E+08	6.28E+09	2.54E+04	1.37E+11
Non-mining industrial productivity	1,484	2.98E+07	6.16E+07	2.25E+06	6.93E+08
Social expenditure per capita	1,305	4.50E+05	3.50E+05	9.59E+03	3.36E+06
Total local expenditure per capita	1,307	9.03E+05	6.47E+05	1.03E+05	4.49E+06
Local-owned source revenue per capita	1,429	1.26E+05	2.13E+05	2.82E+03	3.87E+06
Direct election (dummy)	1,524	1	0.495	0	1
Unified local government (dummy)	1,524	0	0.288	0	1
Outside Java-Bali regions					
Poverty rate	3,841	17.67	10.685	1.41	60.89
Average years of schooling	3,923	7.66	1.562	1.81	12.27
Agricultural productivity	3,600	1.08E+07	9.87E+06	1.37E+05	2.38E+08
Industrial productivity	3,601	7.24E+07	1.70E+08	1.13E+06	2.87E+09
Service productivity	3,601	1.87E+07	1.45E+07	9.41E+05	3.96E+08
Mining productivity	3,510	3.07E+08	1.69E+09	7.14E+03	4.53E+10
Non-mining industrial productivity	3,596	4.79E+07	1.14E+08	1.07E+06	2.45E+09
Social expenditure per capita	3,315	8.63E+05	7.45E+05	1.01E+04	1.02E+07
Total local expenditure per capita	3,366	2.79E+06	3.49E+06	1.83E+04	5.08E+07
Local-owned source revenue per capita	3,735	1.33E+05	1.99E+05	3.30E+02	5.21E+06
Direct election (dummy)	4,320	1	0.493	0	1
Unified local government (dummy)	4,404	0	0.234	0	1

Source: Stata output

4. 6 Discussion

4.6. 1 Empirical results

Table 4. 3: The role of sectoral labor productivity in the poverty rate

Variable	All regions	Java	Outside-Java
Year of schooling (Ln)	-2.0073541***	-1.4420261***	-2.0448159***
	0.2416126	0.1709837	0.3098144
Agricultural productivity (Ln)	-.08401127***	-.07390813**	-.08279334**
	0.0272843	0.0324165	0.034434
Industrial productivity (Ln)	.02417232*	-0.02434281	.02825913**
	0.0127779	0.0273191	0.0139646
Service productivity (Ln)	-.04654962**	-.28191058***	-0.01994604
	0.0232213	0.0511463	0.023047
Constanta	8.3753896***	11.690078***	7.9403335***
	0.4459957	0.8880558	0.5441063
District fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
Clustered standard error	Yes	Yes	Yes
Number of obs	5,020	1,358	3,662
Adj R-squared	0.9226	0.9432	0.9177
Group	492	118	374

Significant at *10%; ** 5%; *** 1%
Source: Stata output

In general, Table 4. 3 presents the positive effect of the agricultural and service sector in poverty reduction with both variables show negative and statistically significant estimation. This finding confirms studies by Ilmma and Wai-Poi (2014), Suryahadi, et al. (2009), Sumarto, et al. (2014), and Thorbecke and Jung (1996) on the role of agriculture and service sectors in poverty alleviation in Indonesia.

As demonstrated in column 1, agriculture shows the highest elasticity with the estimation almost double than the service sector. This finding corroborates to studies by Sumarto and Suryahadi (2007) and Imai et al. (2015), which highlight the immense role of the agricultural sector in poverty reduction in Indonesia.

This study suggests that the role of the agricultural sector in poverty reduction can

be explained into three channels. First, most of the poor live in rural areas and work in the agricultural sector. This argument support studies of Christiaensen et al. (2011) and Suryahadi et al. (2009), which suggest that the effect of sectoral growth in poverty reduction is related to how the poor participate in the sector. Second, on average, the agriculture sector is still counted as the highest contributor to regional employment. This study finds that this sector provides at least 47 percent of regional jobs (Susenas, 2002-2014). Lastly, similar to Datt and Ravallion (1998), De Janvry and Elisabeth (2002), Irz et al. (2001), and Schneider and Gugerty (2011), this study suggests that an increase in agricultural productivity may be associated to a rise in wages rural area and then improve a well-being of the poor.

Although the econometric result shows that the industrial sector has a positive and statistically significant estimation, this study suggests that this sector is less useful in affecting poverty reduction rather than indicating its negative association in poverty reduction. Since the role of sectoral productivity depends on how productivity rises the wage of the poor, then estimating industrial productivity that covers whole sub-sectors such as mining, manufacturing, utilities, and construction may present different results on poverty reduction.

According to regional output and employment data (BPS publication and *Susenas* 2002-2013), this study finds that the mining sector contributes more than 40 and 10 percent of the district's industrial and total output respectively, while it only provides 8 and 1 percent of industrial and total regional labor respectively. This study suggests that the poor are rarely working in mining sector since this sector is more capital-intensive and required skilled-labor (Hasan & Quibria, 2004; Loayza & Raddatz, 2010; Thorbecke & Jung, 1996). The finding also indicates that the increase in industrial productivity not

directly affect the wage of the poor and may not create an employment opportunity for them. The result corroborates to studies by Hasan and Quibria (2004), Loayza and Raddatz (2010), and Thorbecke and Jung (1996), which argues that the positive effect of the industrial sector in poverty reduction should be linked to the creation of employment from labor-intensive industries.

As part of supporting the argument, this study decomposes the industrial sector into two groups, mining and non-mining sector, then put them into the regression model. As demonstrated in Table A4. 2, this study presents two exciting findings. First, the mining sector indicates a negative association on poverty reduction by showing positive and statistically significant estimation. This finding confirms studies by Pegg (2003) and Loayza and Raddatz (2010) on the negative effect of the mining sector in poverty reduction. Second, non-mining industries present a negative sign in the regression result though it is statistically not significant. This result suggests that including the mining sector in industrial productivity calculation will reverse the outcome of non-mining industrial sector estimation.

As mentioned in the background of this study, aside from analyzing the role of sectoral productivity in poverty reduction for the whole nation, this study also does further analysis at the lower level by grouping the data into two clusters, Java-Bali and outside Java-Bali. The regression results of this clustering can be seen in Column 2 and 3 of Table 4. 3. According to the results, this study still highlights the role of the agricultural sector in poverty reduction. This sector consistently shows a positive association on poverty reduction. Agricultural sector also presents a similar elasticity in all observation groups, indicating that regardless of the level of analysis, this sector consistently shows a positive effect on poverty reduction.

Meanwhile, Column 2 and 3 of Table 4. 3 show that the role of the service sector in poverty reduction only prevails in Java-Bali. Outside Java-Bali shows negative estimation but it is statistically not significant. This study suggests that the positive effect of the service sector in Java-Bali may come from the fact that this sector dominates share of economic output and employment in Java-Bali.

Interestingly, this study finds that Java-Bali's (total) industrial sector exhibits different results than the whole dataset by showing a negative sign yet statistically not significant estimation. The result is robust after disaggregating the industrial sector into the mining and non-mining industrial sector (see Table A4. 2). This study suggests two possible explanations—first, a small share of mining-sector in Java-Bali's economy. In term of output and employment, this study finds that the mining sector only contributes to less than 1 percent. Hence, this sector cannot embezzle the role of the non-mining industries in Java-Bali. Second, this study finds a massive development of manufacturing industries in Java-Bali, which contributes at least one-third of total industrial output. This study also finds that many of the Java-Bali industries are more labor-intensive industries such as food processing, clothing and footwear, and tobacco industries. The finding corroborates studies by Hasan and Quibria (2004), Loayza and Raddatz (2010), and Thorbecke and Jung (1996) on the role of labor-intensive industries in poverty reduction.

As can be seen in Table 4. 3 and Table A4. 2, the estimation result of the industrial sector in outside Java-Bali, both the aggregate and decomposed, resembles the whole dataset. Therefore, this study suggests a similar argument on the role of the mining sector in industrial productivity. This argument also comes with the fact that the contribution of outside Java-Bali mining sector is higher than the national level, with more than 50 and 23 percent of industrial and total output, respectively. Yet, it only provides less than 5

percent in employment share.

Figure 4. 4: Elasticity of sectoral productivity in regional poverty reduction
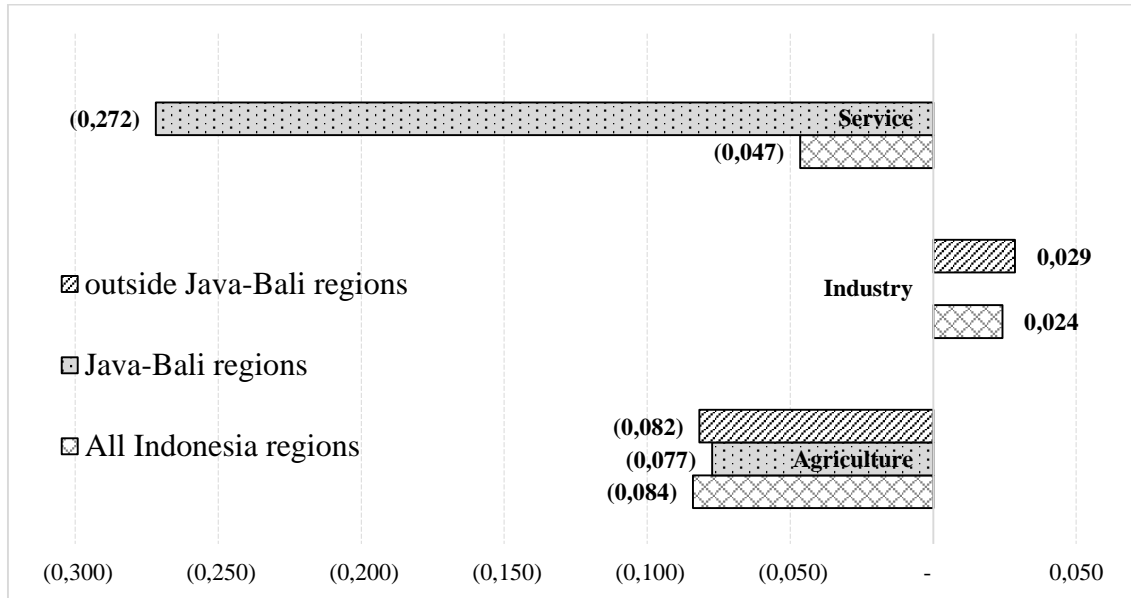
Source: deriving from Stata estimation

All in all, comparing the regression results estimation in Figure 4. 4, this study finds the different elasticity of sectoral productivity within and across observation groups. Therefore Indonesian government both the central and local should consider the results on designing proper and sustainable policies in poverty alleviation. Those findings imply that Java-Bali should focus its strategy on increasing service sector productivity since it shows the highest estimation. Meanwhile, outside Java-Bali should focus on the agricultural sector. Furthermore, the findings also suggest that regional policy in poverty reduction is not necessarily one fit for all. It depends on the characteristic of each region. This study will do further discussion in the next following sections.

4.6. 2 The role of labor intensity and labor share

While the econometric analysis shows different results in size and direction on the role of sectoral productivity in poverty reduction, the results do not clearly explain how a sector may perform more than others. As part of answering this question, this study

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adopts Loayza and Raddatz (2010) model, which analyzes the effect of sectoral growth in poverty reduction.

In general, Loayza and Raddatz argue that the effect of a sector in poverty reduction depends on its labor intensity[32]. Loayza and Raddatz (2010) suggest that, to some extent, sectoral labor intensity may differ among others; hence the sectoral effects in poverty reduction are not similar. According to them, a sector with higher labor intensity would show a higher impact on alleviating poverty incidence and vice versa. Furthermore, they describe that the sectoral elasticity of poverty reduction may be a country (regional) specific, meaning that, in principle, labor intensities can be various not only across sectors but also across countries (regions) in the same sector.

Figure 4. 5 presents box-plots for the cross-region distribution of labor intensity correspond to three sectors over observation periods. This study discerns that, first, in different degrees, these sectors exhibit a notable dispersion of labor intensity across sectors and groups, and second, despite these dispersions, it is possible to identify labor intensity ranking within and across groups.

Moreover, Figure 4. 5 also demonstrates that the agricultural sector seems to be the most labor-intensive sector, followed by the service and industrial sectors. This study

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[32] Loayza and Raddatz define labor intensity as the difference between sectoral labor share of total employment (l_j) and its sectoral share in total output (s_j). It is estimated by (i_j) = (l_j)/ (s_j).

The calculation indicates that sector with high labor intensity absorbs a large share of employment compared to a sector with low labor intensity.

finds that the agricultural sector is the only sector that shows a consistent median value of labor intensity larger than 1 in all observation groups and periods. This finding confirms Loayza and Raddatz (2010) on the positive effect of the agricultural sector in poverty reduction. However, this study also finds a large dispersion in agricultural labor intensity. This study suggests this dispersion is affected by two factors. First, there is different cultivation produced by Indonesia regions with Java-Bali shows a large share of food crops while outside Java-Bali shows a considerable size of estate crops. Second, there is a different share of the agricultural sector in regional output and employment between city- and municipality-administered districts. While most of the municipalities are heavily relying on their economic and labor market in the agricultural sector, cities are less dependent on this sector.

Figure 4. 5: Cross-region distribution of labor intensity per sector

Authors calculation based on Susenas and BPS Publication on Regional GDP 2002 - 2013
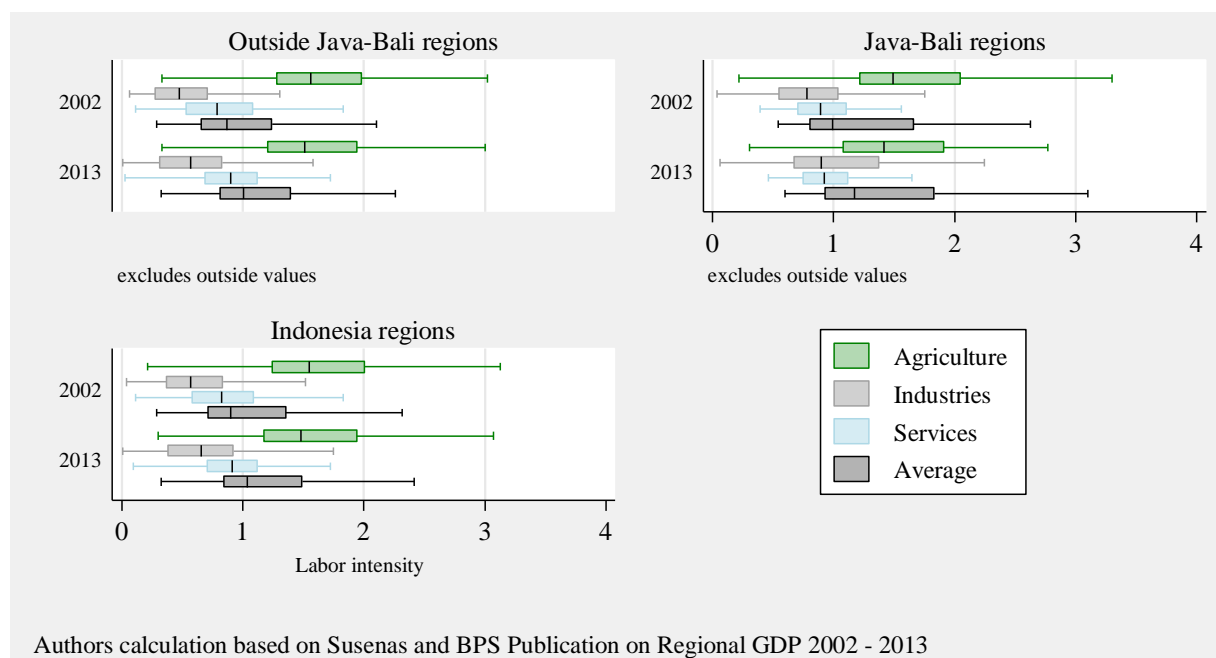
Although the service sector has a median labor intensity value less than one, its value also increases overtime. This sector also indicates a wide across-region dispersion

of labor intensity between city- and municipality-administered districts. This study finds that Indonesia cities show a higher estimation than municipalities. Moreover, this study finds that the value of Java-Bali's service intensity is closed to 1 and becoming narrowed. In contrast, the outside Java-Bali's are smaller and showing a slower pace during the observation periods.

Since the industrial sector includes the mining sector in its calculation, which shows a significant share in regional output yet only provides less employment share, this study finds that the industrial sector presents the lowest labor intensity in all observation groups. The result corroborates the positive estimation of the industrial sector in regression results. This finding also confirms studies by Loayza and Raddatz (2010), Suryahadi, et al. (2009), and Thorbecke and Jung (1996), which suggest the less powerful impact of the industrial sector in poverty reduction.

Comparing Table 4. 3 and Figure 4. 5, the labor intensity model seems plausible to explain the role of sectoral productivity in poverty alleviation. A sector with higher labor intensity may show a positive association on poverty reduction and vice versa. Thus, the ranking of labor intensity (in decreasing order) coincides with the classification of sectoral labor productivity estimation (from more to less negative). However, this study finds that the labor intensity model collapses on explaining the size of sectoral productivity in Java-Bali regions. Since Java-Bali's agricultural sector also shows the highest labor intensity, then according to Loayza and Raddatz (2010), it should present the highest elasticity compared to other sectors.

With the challenge met by the labor intensity model, this study suggests the need to modify Loayza and Raddatz model. This argument comes with the fact that Loayza and Raddatz develop their econometric model used cross-section data. In doing so, this

Figure 4. 6: Pattern of labor intensity by sector and region 2002 -2013
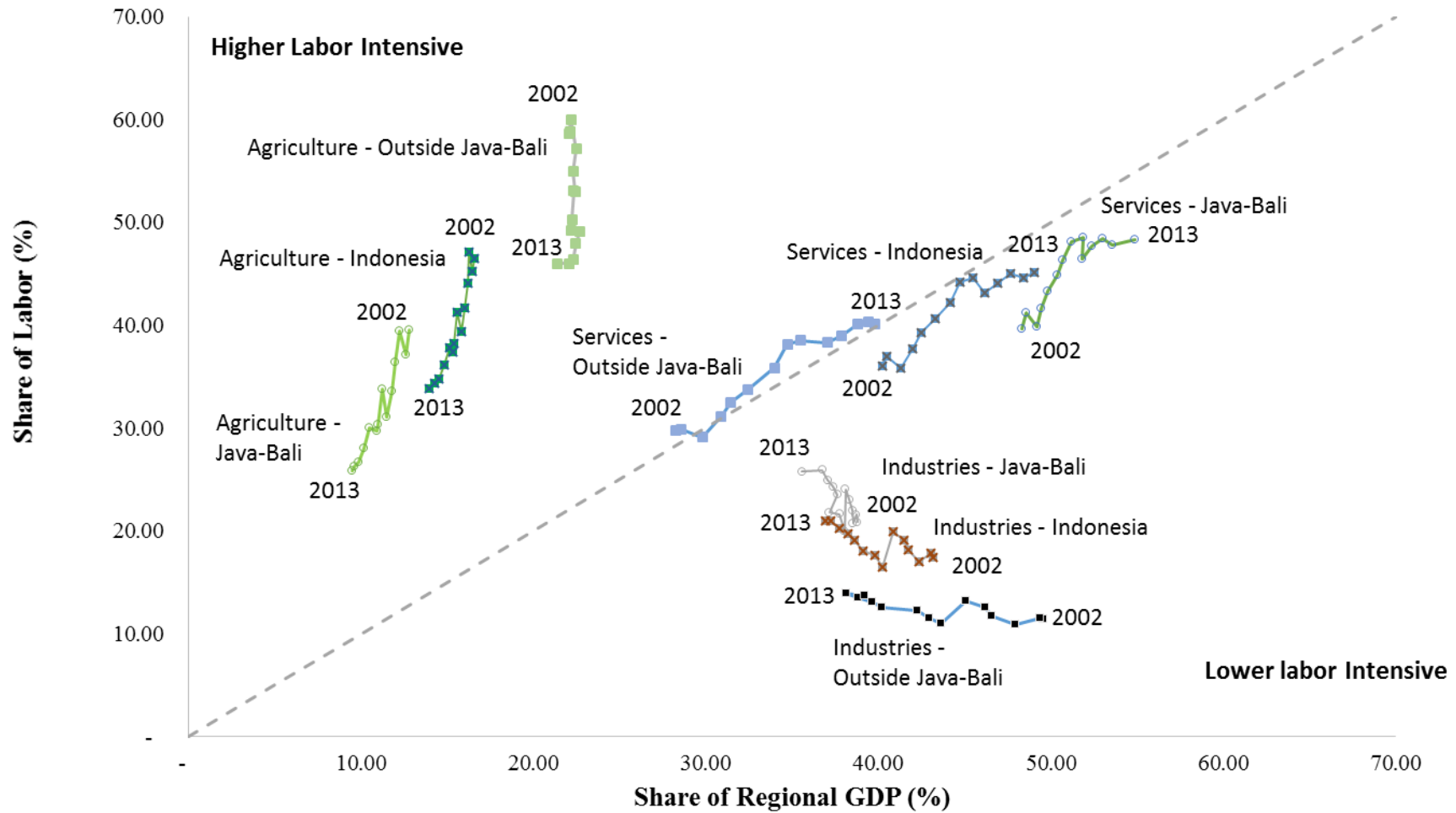
Source: Author calculation based on *Susenas* and BPS publication on Regional GDP 2002-2013

study applies several steps as follows. First, this study uses the movement of sectoral labor intensity during observation instead of its static degree. This approach is expected to seize the change of sectoral intensity, whether a sector become more or less labor intensive. Second, rather than displaying its value as a single estimation, this study decomposes the labor intensity into its component, the share of output, and share of employment. This approach will facilitate us to understand the role of labor intensity component in poverty alleviation since a sector (or region) with different compositions of sectoral output and employment share may present similar labor intensity.

Figure 4. 6 demonstrates various patterns of sectoral labor intensity movement over time. The figure confirms the high value of labor intensity in the agriculture sector, followed by the service and industrial sectors. However, the figure also indicates a diminishing value of labor intensity in the agricultural sector from 2002 to 2013, which affected by a decrease of labor share rather than an increase in output share. At the regional level, this study finds a sharp decline in agricultural labor share in Java-Bali. A different outline is found in the service sector. This study finds that in all observation groups, the service labor share of increase rapidly compared to its output share. Hence the service sector labor intensity is increasing over time. Industrial labor intensity gradually rises with some fluctuation over time. This study suggests that the increase of industrial labor intensity in full datasets and outside Java-Bali is mainly affected by a decreasing share of industrial output. In contrast, in the case of Java-Bali, it is affected by an increase in industrial labor share.

However, assessing the role of sectoral labor intensity in poverty reduction through its movement also meets challenge since sector which become more labor-intensive such as industrial sector does not necessarily show a positive association.

Figure 4. 7: Regional employment shares and poverty quintile by district level

Year	Java-Bali
2002	
2013	
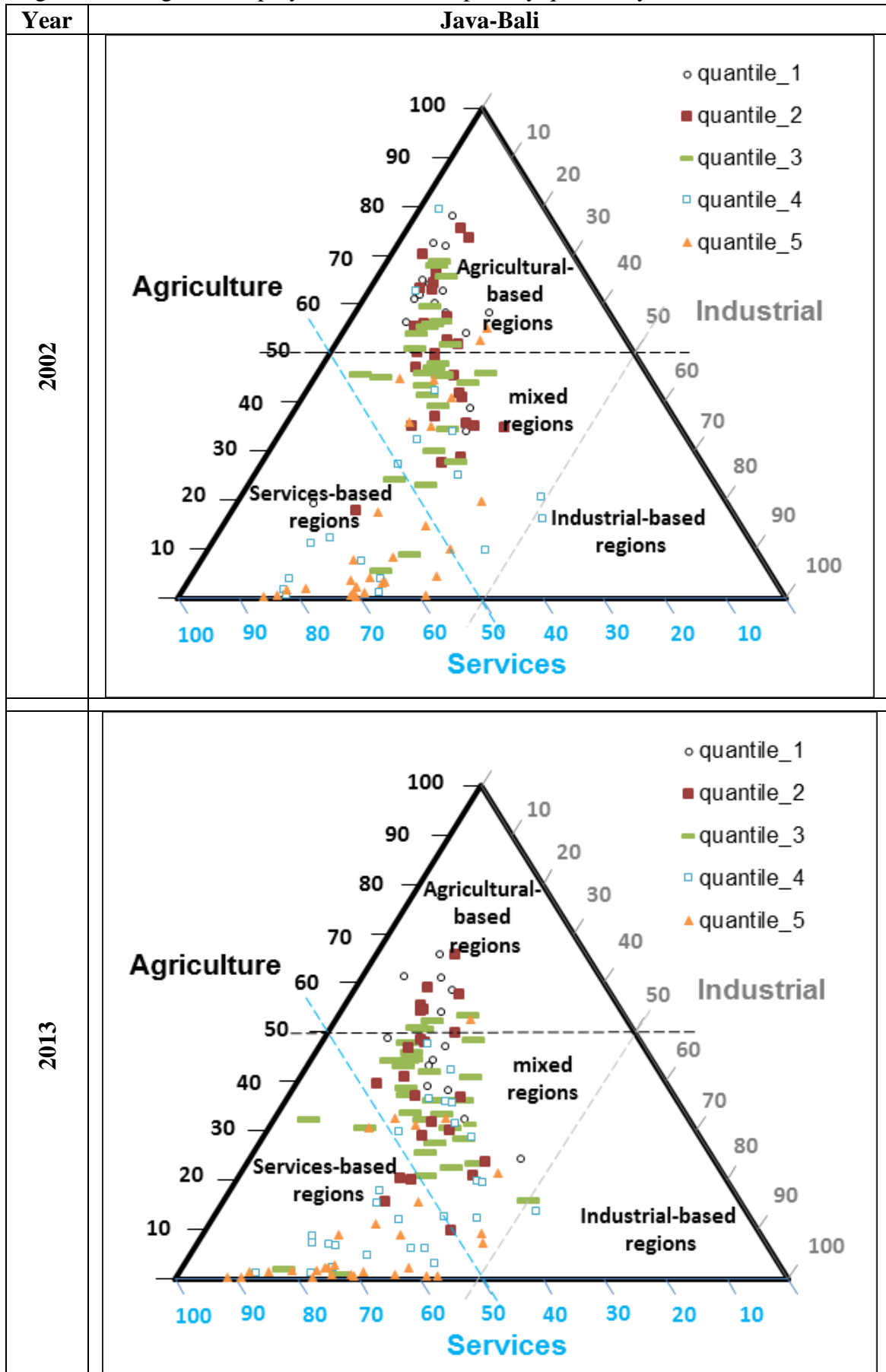
Figure 4. 7: Regional employment shares and poverty quintile by district level (continued)
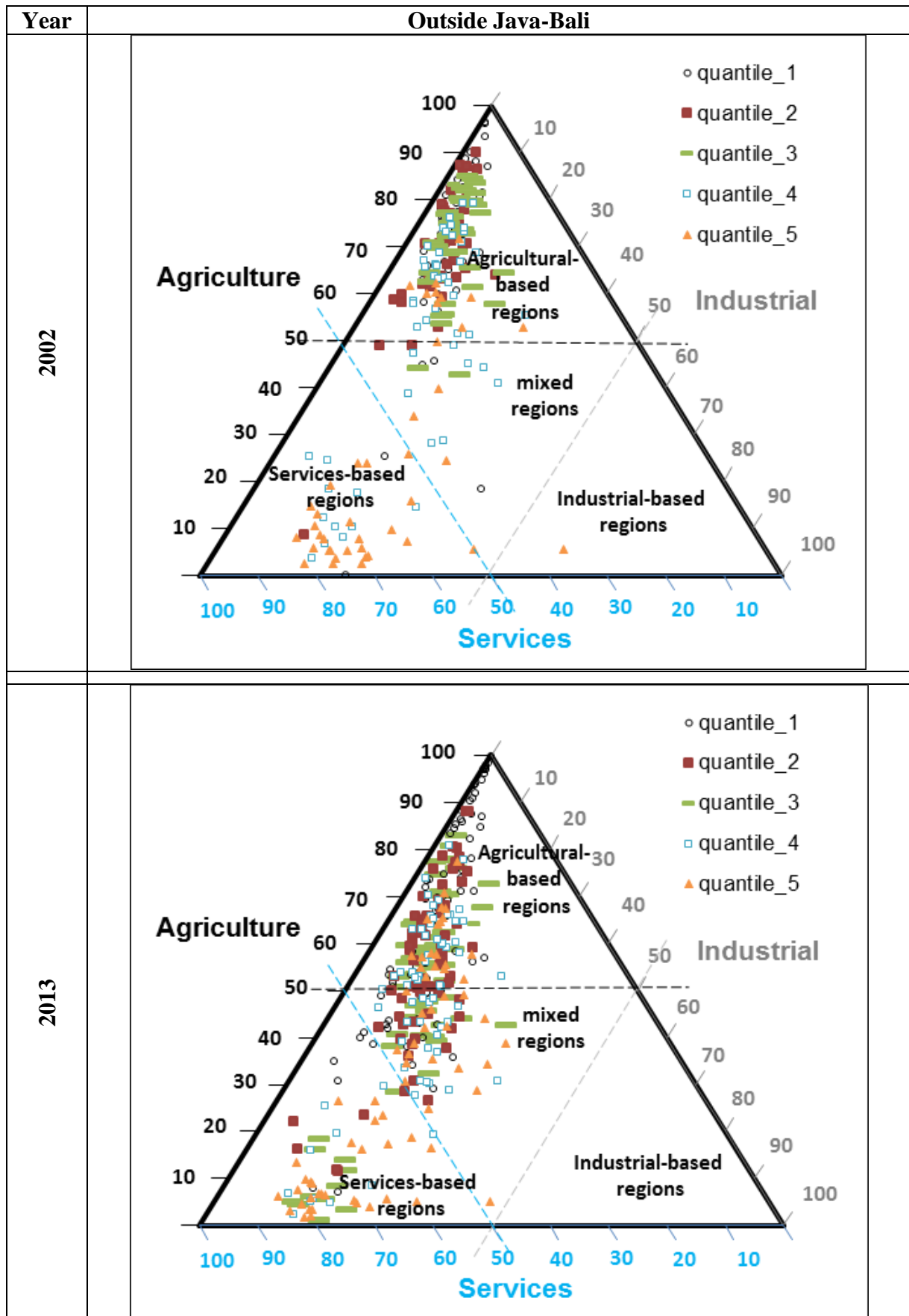
Source: Author calculation from *Susenas* and BPS publications, 2002 – 2013

However, Figure 4. 6 reveals other fact. It indicates that sector with a large share of labor will show a positive association on poverty reduction. Therefore, this study suggests that the role of sectoral productivity in poverty reduction is likely affected by sectoral labor rather than output share. As part of examining this presumption, this study combines the data of regional poverty quintile and the ternary diagram of regional output and labor composition for the years 2002 and 2013.

Figure 4. 7 shows that, in general, Java-Bali districts are concentrated in either the agricultural or service sector, while outside Java-Bali districts are largely clustered in the agricultural sector. Moreover, Figure 4. 7 also indicate that many districts in Java-Bali move their labor to the service sector for the past decades. Hence this study suggests that in 2013 Java-Bali districts are more concentrated on the lower left side on the ternary diagram.

Meanwhile, despite showing a similar movement to the service sector, outside Java-Bali districts are consistently showing a large share of the agricultural sector. These facts are corresponding with the econometric results in the previous section. Java-Bali shows the positive association of the agricultural and service sector, while outside Java-Bali only shows the positive association of agriculture. The results suggest the relationship between poverty incidence and employment share.

Since the results seem to be suggestive, this study applies an empirical examination by classifying the data into different groups based on regional employment share. Thus, this study uses a similar model for each group and compares the results with Table 4. 3. This study classifies a region as an agricultural-based region if the share of agricultural labor take the majority share, and so on. If the assumption is valid, then the

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Table 4. 4: The role of sectoral labor productivities in the poverty rate by sectoral-based region.

Variable	Agricultural-based regions			Services-based regions		
	All	Java-Bali	Outside Java-Bali	All	Java-Bali	Outside Java-Bali
Year of schooling (Ln)	-1.9039707***	-.98407447***	-1.9751714***	-1.974402***	-1.7195214***	-2.1645988***
	0.3132486	0.2933943	0.3716096	0.2700774	0.3502523	0.4392291
Agricultural productivity (Ln)	-.13115296**	-.25853502***	-.11851236**	-0.0205143	-0.0346849	-0.00120481
	0.0533224	0.0714233	0.0543805	0.0271939	0.036107	0.0394482
Industrial productivity (Ln)	0.01661645	-0.05270287	0.02311997	0.0680283	0.03050858	0.07139191
	0.0144401	0.0317641	0.0154487	0.0413824	0.0455586	0.0566302
Service productivity (Ln)	-0.02824216	-.18185737**	-0.02168893	-.14639406**	-.30749238***	0.02111738
	0.027297	0.0789305	0.0266665	0.0587913	0.079601	0.0736226
Constanta	8.765888***	12.530299***	8.5136488***	8.142812***	11.052016***	5.4639562***
	0.5797866	1.963662	0.6552722	1.143804	1.190887	1.727883
Number of obs	3,311	652	2,659	1,627	759	868
Adj R-squared	0.9018	0.9248	0.8999	0.9075	0.9272	0.8934
Group	378	73	305	217	92	125

Notes: *** = significant at 1%; ** = significant at 5; * = significant at 10%.

estimation of sectoral productivity in sectoral-based should be larger than the results in Table 4. 3.

In general, the results confirm the hypothesis that the share of sectoral labor determines the size of sectoral productivity in poverty reduction. As can be seen in Table 4. 3 and Table 4. 4, the estimation results of a sector in sectoral-based dataset exhibits higher estimation compared to the full dataset. This study finds that in sectoral-based regression, outside Java-Bali's agricultural sector shows an elasticity 1.5 times higher. At the same time, Java-Bali even exhibits a higher estimation three times than the estimation results in the full dataset. Similar results are also found in service-based regression. Java-Bali's shows higher estimation than the whole dataset though outside Java-Bali region still shows statistically not significant estimation.

All in all, the discussion clarifies why agriculture show a positive association in all observation groups, while the service sector only shows its widespread role in Java-Bali. It also explains why the industrial sector is less effective in reducing regional poverty incidence. This study suggests that the role and size of sectoral productivity in poverty reduction depend on the share of sectoral labor in regional labor. These results corroborate with studies by Christiaensen et al. (2011) and Suryahadi et al. (2009), which argue that the effect of sectoral growth (or productivity) in poverty reduction is depending on the participating of the poor in the particular sector.

4.6. 3 The role of decentralization on poverty reduction

Table 4. 5 shows that, in general, all independent variables show negative sign and statistically significant with an exception for dummy variable local parliament support (see Column 1). These results implies the positive effect of decentralization in regional poverty reduction. Among those variables, social expenditure demonstrates the

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largest elasticity. The results confirm the study by Gundlach, Pablo, and Weisert (2004), which show the important role of social expenditure in education to alleviate poverty incidence. They argue that improving access to education is one of the best poverty reduction strategies.

Table 4. 5: The role of local expenditure and direct election in poverty reduction

Dependent: Poverty rate (Ln)	Indonesia	Java-Bali	Outside Java-Bali
	(1)	(2)	(3)
Year of schooling (Ln)	-1.0218508***	-.78445646**	-1.0662079***
	0.2481307	0.2781684	0.3117852
Social expenditure per capita (Ln)	-.05064355***	-0.04558715	-.05613666***
	0.0136964	0.0278793	0.0151507
Total expenditure per capita (Ln)	-.04767577**	-0.00095871	-.05290881**
	0.020497	0.0351618	0.0230676
Local-owned source revenue per capita	-.03327295**	-.09575865***	-.02199267*
	0.0109749	0.0209796	0.0121786
Direct election (*dummy*)	-.03765529**	-0.02388099	-.04523029**
	0.0156128	0.0195066	0.0195066
Unified local government (*dummy*)	-0.0060456	0.02136278	-.05884814*
	0.042732	0.0271166	0.0271166
Constanta	7.0559541***	5.8470499***	7.2772192***
	0.3962775	0.6268548	0.4918041
Number of obs	4,456	1,300	3,157
Adjusted R-squared	0.9253	0.9378	0.9215
Number of regions	474	121	353

Notes: *** = significant at 1%, ** = significant at 5%, * = significant at 10%

Source: stata output

In addition, this study also reveals the positive effect of local government fiscal capacity, represented by local-owned revenue sources, in poverty reduction. The result corroborates to Manor (1997), which cited the critical role of sufficient financial resources as one of the requirements to implement a decentralization policy successfully. He argues that regions with higher income may have a broadened chance to finance their programs and vice versa. In other words, a district with an abundant financial resource may show a

better performance since it is less dependent on the central government transfer and having flexibility and broader choice on designing a program in public services and poverty reduction.

Moreover, this study also provides an empirical result on the positive effect of direct election in poverty reduction. This finding confirms studies by Besley (2005), Besley and Smart (2005), Fossati (2016), and List and Strum (2006). According to them, a direct local election will enhance political accountability then improve public service delivery. This political accountability process can be explained through two channels. First, it gives voters the power to reward/discipline local incumbents to be reelected/replaced by another challenger. Moreover, it provides incumbent an incentive to improve the quality of social welfare and governance since (s)he may have a higher probability of being re-elected to office.

At the regional level, this study finds that outside Java-Bali mimics the full dataset by showing the positive effect of social and total expenditures, local-owned source revenue, and direct election in poverty reduction. Outside Java-Bali even shows a positive effect of the support of local parliament to local government on reducing poverty incidence. Meanwhile, Java-Bali only shows a positive effect of local fiscal capacity on regional poverty alleviation while other variables show statistically not significant results.

In summary, this study argues that the implementation of decentralization could promote regional poverty alleviation through the local budget provision and accountability process. Government spending on social expenditure, especially education and health sectors, may improve the human capital of the poor and later, are expected to increase their productivity. In addition, local budget allocation in social expenditure also reduces a burden for the poor on financing his/her needs. Finally, as stated by Fossati

(2016), the introduction of the direct election also shape the responsiveness of local government to the policy preference of the poor since they have a chance to mobilize their voice and gain political influence from the government.

4. 7 Conclusion

During decentralization, Indonesia shows significant achievement in poverty alleviation by reducing its level of more than half of its initial condition in 2000. However, regional level data does not necessarily resemble the national level achievement. This study finds that some regions successfully manage their regional poverty at a low level, while others still meet challenges. Concerning different endowment and regional characteristics, this study examines the role of sectoral labor productivity in poverty alleviation in Indonesia region and whether different outlines are found among Indonesian districts in the past decade.

In general, this study confirms the prominent role of agricultural and service sectors in poverty reduction. The results are robust at the regional level. This study finds that the agricultural sector consistently shows a positive association in Java-Bali and outside Java-Bali. In contrast, the service sector only shows its positive association in the Java-Bali region. Moreover, this study suggests that the role of sectoral productivity in poverty reduction is mainly associated with sectoral labor share, implying that a sector with larger labor share in a particular region will demonstrate higher elasticity and vice versa.

This study also suggests the positive association of decentralization on poverty reduction. The argument works through two channels. First, decentralization increases the effectiveness of local government spending. Second, decentralization through direct election increases political accountability that induces poverty reduction through reward

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and punishes mechanism.

However, this study also suggests that Indonesia still encounters a similar pattern in regional poverty. Poverty incidence emerges in many Indonesia regions. It arises in both Western and Eastern areas, Java-Bali and outside Java-Bali, and other group classifications. At the regional level, poverty reduction is led by the achievement of Kalimantan, Java-Bali, Sumatera, and Sulawesi. Meanwhile, Nusa Tenggara and Moluccas-Papua islands are struggling to alleviate its regional poverty level.

All in all, this study classifies the regional economy into three main sectors of the economy. Further research on peculiar sectors such as six-sectors or even nine-sectors of economies may show a different path and give a broader perspective on how sectoral economy may affect poverty reduction. Moreover, this study does not discuss yet how sectoral labor productivity increases and how the productivity of one sector may be related to others. Lastly, in examining the decentralization policy, this study only considers local budget allocation policy and direct election. Therefore, future research should broaden the investigation in those issues as part of promoting regional poverty reduction in Indonesia.

Chapter 5   Concluding Remarks: Policy Implication and Further Research

5. 1   Pattern of Regional Economies in Indonesia

This chapter shows the pattern of regional disparities in Indonesia for the past decades. In general, regional disparities raise gradually with some fluctuation in the 1990s. After reaching its peak in 2001, it is steadily decreasing during the decentralization. This chapter shows that regional disparities are largely affected by within-region rather than between-region inequality. Among the six main islands, this study finds that the Moluccas and Papua show the highest disparities, followed by Java-Bali, Kalimantan, and Sumatera islands. In contrast, Nusa Tenggara and Sulawesi consistently show the lowest disparity level.

Moreover, this study finds that districts with either a large share of mining resources or the development of manufacturing industries, transportation and telecommunication, and financial and business sectors tend to show higher regional GDP per capita level which induce higher regional disparities. This argument is supported by a positive association between regional GDP per capita level and the share of either the industrial sector or the transportation and telecommunication sector. Meanwhile, the agricultural and the public and other service sectors show the opposite association.

Since the different sectoral composition of the district economy leads to different regional GDP levels thus regional disparity level, this study suggests that Indonesia's disparities are more affected by the sectoral composition rather than clustered geographically.

According to the findings in this chapter, this study argues that the regional economic development should cover both regional GDP per capita improvement and equality issues, meaning that the program should accelerate the spread of regional

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development across Indonesia districts. For such purposes, this study suggests several policies to solve this issue. First, as the transportation and communication sector show a positive link to regional GDP per capita, both the central and local governments should prioritize the development of this sector through infrastructure development such as road, port, airport, and other supporting facilities. The expansion of this sector will connect the Indonesia regions and thus support the development of other sectors of economies.

Second, the central government should consistently adopt the concept of MP3EI or its successor, which clusters Indonesia regions into several corridors according to its economic characteristics. This approach helps the government to focus its program in particular sector, which sector should be developed and expanded in each region. Third, the central government should initiate the development of manufacturing industries in outside Java-Bali regions. To do so, the government may attract and facilitate investment, including the FDI, in those areas. Moreover, the industrial development should be linked with the availability of mining resources there. This approach will maximize regional sector advantages and may spread the benefit of mining resources to its contiguous regions.

Fourth, local governments should classify their regional economic characteristic. Considering their sectoral composition, local governments may develop a specific policy to boost their regional economies. Further, the provincial government may use the data to harmonize economic strategies among districts under their administration how one district economic development program should be linked with its contiguous regions. Lastly, with the fact that many outside Java-Bali agricultural-based districts exhibit high regional GDP per capita, local governments may ease and support the shift of local agriculture production into high-value crops such as palm oil and other estate crops

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production.

Lastly, since our arguments are mainly based on statistical analysis and other associations, further research may consider using an econometric model to examine the role of sectoral composition in regional economies and disparities. This approach may support and confirm our arguments in the previous section. It may clarify the size of sectoral composition in regional economies and disparities.

5.2   Dynamics of Educational Attainment in Decentralized Indonesia, 2002-2014

Chapter 3 shows the positive effect of decentralization in educational attainment at the secondary level through accessibility improvement. The combination of the number of schools and the average distance to the nearest school show a significant role in increasing educational attainment. This Chapter also reveals the role of other factors, such as the educational attainment in the previous school level, household expenditure in education, free tuition policy, and geographical location.

Although the difference between Western and Eastern regions becomes narrowed at the upper-secondary level, this section argues the persistence of regional disparities in the lower-secondary level. The problem of low educational attainment does not only arise in Eastern regions such as East Nusa Tenggara, Moluccas, and Papua but also emerge in Java. Moreover, the findings suggest that regional disparities remain unsolved for the past decades. Furthermore, this study also suggests the rise of gender disparity issue. This study finds that only 13 percent of Indonesian districts present a gender parity in education in lower-secondary schools, and the gap becomes wider at the upper level.

This study suggests that, in general, the problem of low educational attainment is related mainly to the low regional GDP, high poverty incidence, poor (educational) infrastructure, and the availability of unskilled labor demand. Meanwhile, gender

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disparities also related to socio-culture factors such as kinship, religious culture, marriage tradition, and perception in education.

Following the findings in Chapter 3, this study implies several policies: First, the local government should prioritize the improvement of school accessibility through school development, expansion, and restructuring. Second, along with this approach, local governments should support teacher and education-staff provision in rural areas. Third, in order to address the problem of regional and gender disparity, local government policy in education should be combined with other strategies. For example, the local government may reinforce the child-labor restriction in industrial areas as well as forbid the practice of child marriage in a particular region.

Fourth, the central government should review the allocation of educational grants to support the nine-year free-tuition policy. Rather than an equal lump-sum for the whole nation, the central government should distribute a regional-based grant. This approach implies that some rural areas and the Eastern Indonesia regions may receive higher grants than its counterpart in Western regions since they show pricy operational costs. Fifth, the central government should accelerate the education attainment across Indonesian regions. The central government may prioritize the allocation of special-grant on education to low education attainment regions. The budget should be assigned to develop a school building and other educational facilities in rural or remote areas.

Lastly, as part of improving educational attainment that gives boys and girls equal opportunities to attend school, both central and local governments should harmonize their education policies. The design of central government policy should accommodate regional-characteristic and consider local government inquiries. By implementing those approaches, we expect that education policy could be implemented with ease and answer

regional problems.

As this study argues the important role of socio-culture factors on educational attainment, further research may include these variables in the econometric model. Moreover, future research on the relationship between educational attainment and the demand for unskilled labor is also worth studying.

5.3 Sectoral Labor Productivity and Poverty Reduction in Indonesia Regions: An assessment using district-level data 2002-2013

This chapter highlights the role of agricultural and service sectors in poverty reduction. At the regional level, the role of the service sector is significant in Java-Bali regions, while the agricultural sector shows a positive impact in both Java-Bali and outside Java-Bali regions. Moreover, this study argues that the elasticity size of sectoral productivity in poverty reduction is linked to its labor share, meaning that a sector with higher labor-share will demonstrate higher elasticity in poverty reduction and vice versa. Thus, this chapter also finds the positive impact of decentralization on poverty reduction, primarily through the local budget provision and direct election.

However, the diminishing of regional poverty incidence during the past decade left regional disparities unsettled. Regional differences in poverty incidence occur in many regional groups such as Western and Eastern regions, Java-Bali and outside Java-Bali, and even within-group observation.

According to the analysis in the previous chapter, this study argues several policies implication as follows. First, as the effect of sectoral productivity linked to labor share, local government should classify their region according to sectoral labor share. Local governments may utilize the result to design policies and strategies on improving productivity in those sectors and thus reducing poverty incidence. This approach works

in either two assumptions. Most of the poor are located in this sector, and an increase in labor productivity may indirectly affect other sectors where the poor are located.

Second, local governments may expand the policies to raise non-sectoral-based sector's productivities, yet it should be accompanied by job creation in those areas. This suggestion is related to the major role of the labor-intensive sector in poverty reduction. Third, local governments should allocate a pro-poor program in their budget provisions such as education and health expenditures. This spending will improve the quality of life of the poor and later is expected to increase their productivity.

Fourth, similar to Chapter 2, this study also suggests the need for central government support on improving regional productivity, mainly through policy in investment and infrastructure development. Fifth, considering the positive effect of social expenditure, the central government, along with local government, may continuously allocate social assistance to the poor. The allocation may be determined to a region with high poverty levels such as Eastern regions and the southern part of Java.

Future research may include the role of institutional change during the decentralization periods. Moreover, considering the critical role of sectoral productivity, further research may cover factors that affect regional and sectoral productivity differences. Lastly, the analysis might be expanded into detail, such as 6-sectors or even 9-sectors of economies.

5.4 Regional economies, education attainment, and poverty reduction, which policy should come first?

Although each chapter shows different results on the achievement of regional development and factors affecting the results, there is a unity of finding throughout the chapters' discussions. First, regional disparities remain wide in general, with many

regions still struggling to catch-up on the achievement of their counterparts. Second, there is a cyclical pattern of the three indicators. For example, a region with a low regional GDP level tends to show low educational attainment and a high poverty rate, and so on.

Given these findings, which policy should be prioritized?

Similar to the chicken and egg problem, there is no easy answer to this question. One argument may stimulate another argument. Hence, the author suggests there is no panacea nor a one-size-fits-all approach to address the development gap properly. In fact, a sequence of policies needs to be taken to address the gap in regional development. The steps are as follows:

1. The first policy should be focused on increasing human capital through the improvement of educational attainment. The discussion in Chapter 4 presents the relation between years of schooling and poverty reduction, while Chapter 2 implies the need for human capital primarily related to the development of several sectors such as industrial and financial and business sectors. Moreover, this approach also refers to the finding in Chapter 3 that demonstrates the important role of government, whether national or local, in improving educational attainment. Therefore, the Indonesia governments may lead and have immense control over policy implementation. In addition to that, the government may reallocate its educational expenditure to cover not just basic school operational costs but also essential expenditures, such as providing incentives for teachers in the remote or rural area.

2. This study also suggests an improvement in the regional infrastructure. This policy refers to several findings such as challenge met by pupils in Southern part of Java and Eastern Indonesia to access the school which caused by lack of transportation facilities (Chapter 3). It also related to the positive relation between regional GDP per

capita level and transportation and telecommunication sector (Chapter 2). This study argues that this policy will ease access to education and enhance regional connectivity - a necessity for regional development and poverty reduction.

3. Lastly, the local government should consider a sectoral approach when creating its regional development plan. While the discussion in Chapter 2 shows that regional GDP per capita level is mainly affected by the composition of the sectoral economy, Chapter 4 shows that the size of sectoral productivity in poverty reduction is linked to the share of sectoral labor. Therefore, the sectoral-based development not only increases the regional GDP per capita level, but it may lead to poverty reduction acceleration as well.

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Appendix

Figure A1. 1 Indonesia province in pre-decentralization periods

Figure A1. 2 Indonesia province in decentralization periods
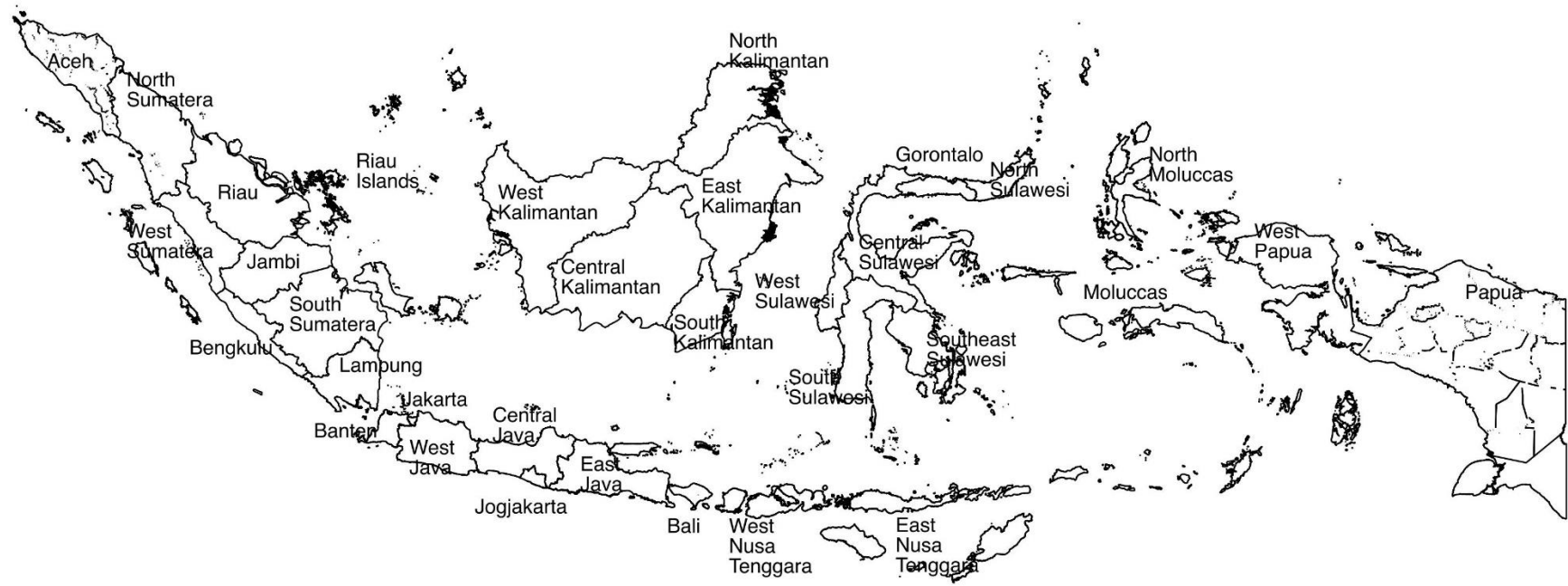
Figure A2. 1: Regional agriculture output by composition – year 2013
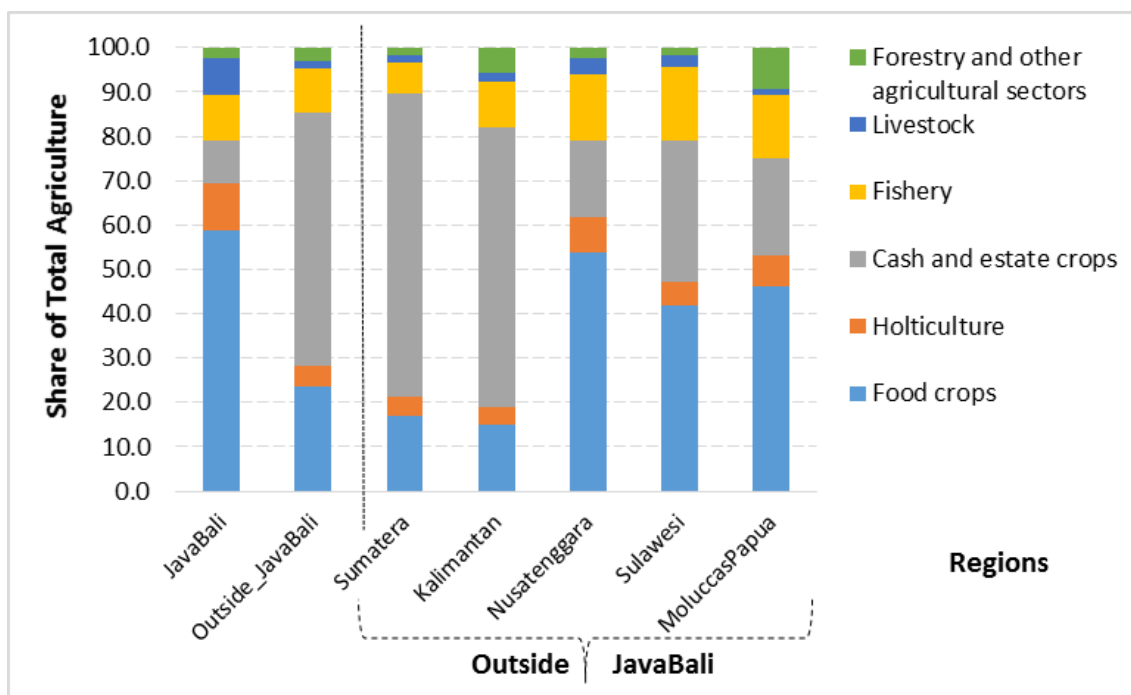
Source: Author's calculation from Indonesia Statistic.

Figure A2. 2: Regional Theil indices, clustering by Java-Bali and outside Java-Bali
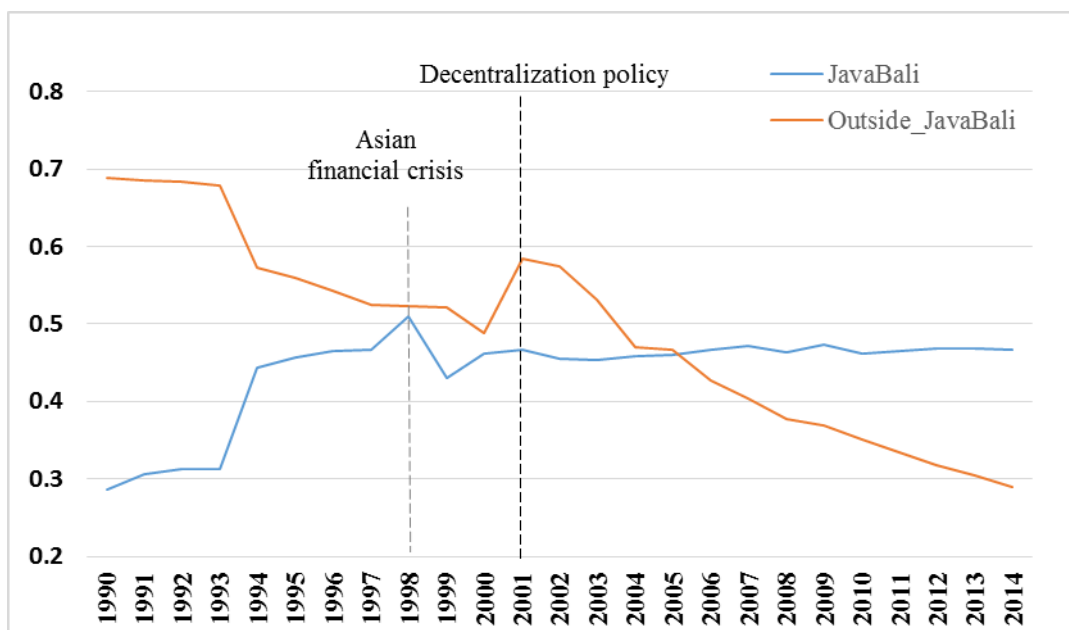
Source: Author's calculation.

Table A2. 1: The number of sectoral-based district by quintile and islands year 2002

Islands	Sectors	Quintile 1 Agri	Indust	Serv	Quintile 2 Agri	Indust	Serv	Quintile 3 Agri	Indust	Serv	Quintile 4 Agri	Indust	Serv	Quintile 5 Agri	Indust	Serv	Total Agri	Indust	Serv
Java-Bali	Agri	12			7			5			-			-			24		
	Indust		-			2			6			9			12			29	
	Serv			9			24			19			10			12			74
Outside Java-Bali																			
Sumatera	Agri	22			24			14			9			4			73		
	Indust		1			2			-			15			22			40	
	Serv			8			4			5			17			3			37
Kalimantan	Agri	2			4			6			6			6			24		
	Indust		2			-			-			4			13			19	
	Serv			-			1			4			4			3			12
Nusa Tenggara	Agri	19			-			1			-			-			20		
	Indust		-			2			-			-			-			2	
	Serv			6			1			-			1			-			8
Sulawesi	Agri	10			14			13			4			-			41		
	Indust		-			-			2			6			-			8	
	Serv			8			5			7			1			3			24
Moluccas-Papua	Agri	22			3			10			3			2			40		
	Indust		-			-			-			-			6			6	
	Serv			7			-			4			3			-			14
All regions	Agri	87			52			49			22			12			222		
	Indust		3			6			8			34			53			104	
	Serv			38			35			39			36			21			169

Source: Author's calculation from Indonesia statistic 2002

Table A2. 2: The number of sectoral-based district by quintile and islands year 2014

Islands	Sectors	Quintile 1 Regional sector-based			Quintile 2 Regional sector-based			Quintile 3 Regional sector-based			Quintile 4 Regional sector-based			Quintile 5 Regional sector-based			Total Regional sector-based		
		Agri	Indust	Serv	Agri	Indust	Serv	Agri	Indust	Serv	Agri	Indust	Serv	Agri	Indust	Serv	Agri	Indust	Serv
Java-Bali		12	-	9	7	2	24	5	6	19	-	9	10	-	12	12	24	29	74
Outside Java-Bali																			
Sumatera		22	1	8	24	2	4	14	-	5	9	15	17	4	22	3	73	40	37
Kalimantan		2	2	-	4	-	1	6	-	4	6	4	4	6	13	3	24	19	12
Nusa Tenggara		19	-	6	-	2	1	1	-	-	-	-	1	-	-	-	20	2	8
Sulawesi		10	-	8	14	-	5	13	2	7	4	6	1	-	-	3	41	8	24
Moluccas-Papua		22	-	7	3	-	-	10	-	4	3	-	3	2	6	-	40	6	14
All regions		87	3	38	52	6	35	49	8	39	22	34	36	12	53	21	222	104	169

Source: Author's calculation from Indonesia statistic

Table A2. 3: Sectoral share of regional economic by quintile and islands year 2002 and 2014

2002

Islands	Sectors	Quintile 1			Quintile 2			Quintile 3			Quintile 4			Quintile 5			Total		
		Agr	Ind	Ser	Agr	Ind	Ser	Agr	Ind	Ser	Agr	Ind	Ser	Agr	Ind	Ser	Agr	Ind	Ser
Java-Bali	Agr	41.69%			35.34%			26.39%			12.87%			3.82%			24.96%		
	Ind		18.30%			20.77%			28.01%			42.07%			49.79%			30.74%	
	Ser			40.01%			43.89%			45.60%			45.07%			46.39%			44.30%
Outside Java-Bali																			
Sumatera	Agr	45.81%			45.07%			43.97%			27.58%			18.67%			35.20%		
	Ind		17.38%			21.21%			18.56%			31.30%			58.51%			30.05%	
	Ser			36.80%			33.72%			37.48%			41.11%			22.81%			34.75%
Kalimantan	Agr	36.15%			52.58%			35.94%			33.74%			24.04%			32.15%		
	Ind		32.08%			16.39%			23.73%			27.77%			48.18%			34.5%	
	Ser			31.77%			31.04%			40.33%			38.49%			27.78%			33.4%
Nusa Tenggara	Agr	48.74%			10.66%			50.74%			5.37%			-			43.55%		
	Ind		11.23%			57.63%			11.76%			15.45%			-			16.03%	
	Ser			40.03%			31.71%			37.50%			79.18%			-			40.41%
Sulawesi	Agr	41.35%			51.64%			43.38%			34.47%			8.86%			42.27%		
	Ind		16.01%			12.14%			20.98%			32.85%			32.21%			19.70%	
	Ser			42.64%			36.22%			35.64%			32.68%			58.93%			38.03%
Moluccas-Papua	Agr	55.42%			43.31%			45.48%			34.77%			27.28%			46.68%		
	Ind		11.06%			27.06%			20.09%			19.16%			58.23%			21.07%	
	Ser			33.52%			29.62%			34.43%			46.08%			14.49%			32.26%
All regions	Agr	46.96%			42.20%			37.79%			26.53%			16.36%			35.17%		
	Ind		15.17%			20.31%			22.76%			32.21%			52.49%			27.26%	
	Ser			37.88%			37.50%			39.45%			41.26%			31.15%			37.57%

Source: Author's calculation from Indonesia statistic

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Table A2. 3: Sectoral share of regional economic by quintile and islands year 2002 and 2014 (continued)

2014

Islands	Sectors	Quintile 1			Quintile 2			Quintile 3			Quintile 4			Quintile 5			Total		
		Agr	Ind	Ser	Agr	Ind	Ser	Agr	Ind	Ser	Agr	Ind	Ser	Agr	Ind	Ser	Agr	Ind	Ser
Java-Bali		34.8%	22.7%	42.5%	27.4%	22.7%	49.9%	22.2%	27.1%	50.7%	18.1%	32.8%	49.1%	2.2%	41.6%	56.2%	20.4%	29.2%	50.4%
Outside Java-Bali																			
Sumatera		46.1%	14.8%	39.1%	41.1%	18.7%	40.1%	43.0%	20.1%	36.9%	23.5%	26.3%	50.2%	20.6%	44.6%	34.8%	32.3%	26.8%	40.9%
Kalimantan		37.7%	25.1%	37.2%	32.6%	21.7%	45.6%	37.9%	21.3%	40.9%	35.1%	19.5%	45.3%	18.5%	52.8%	28.7%	28.4%	34.9%	36.7%
Nusa Tenggara		41.3%	10.9%	47.7%	42.6%	15.0%	42.4%	3.5%	22.8%	73.6%	3.9%	14.9%	81.2%	5.0%	87.7%	7.3%	37.8%	14.4%	47.8%
Sulawesi		38.3%	16.4%	45.4%	38.8%	16.5%	44.7%	36.9%	20.1%	43.0%	35.4%	28.2%	36.5%	8.9%	41.7%	49.4%	35.7%	21.8%	42.5%
Moluccas-Papua		42.7%	15.0%	42.3%	32.1%	22.6%	45.4%	37.1%	17.2%	45.7%	28.4%	27.3%	44.3%	16.9%	52.9%	30.2%	36.0%	22.2%	41.7%
All regions		40.7%	15.7%	43.5%	35.5%	19.7%	44.8%	33.7%	22.4%	43.9%	26.5%	27.0%	46.5%	14.0%	46.7%	39.4%	30.1%	26.3%	43.6%

Source: Author's calculation from Indonesia statistic

Table A2. 4: Regional sectoral share by quintile and islands year 2002 (9 sectors- classification)

Islands / Sectors	Quintile 1 Agri 1	Ind 2	Ind 3	Ind 4	Ind 5	Serv 6	Serv 7	Serv 8	Serv 9	Quintile 2 Agri 1	Ind 2	Ind 3	Ind 4	Ind 5	Serv 6	Serv 7	Serv 8	Serv 9	Quintile 3 Agri 1	Ind 2	Ind 3	Ind 4	Ind 5	Serv 6	Serv 7	Serv 8	Serv 9
Java-Bali	41.69%	2.08%	10.55%	0.71%	4.97%	17.10%	4.66%	5.45%	12.79%	35.35%	1.54%	13.96%	0.87%	4.53%	21.67%	5.05%	4.51%	12.53%	26.95%	2.04%	18.73%	1.60%	4.37%	22.99%	6.29%	5.34%	11.67%
Outside Java-Bali																											
Sumatera	46.61%	5.02%	6.57%	0.26%	6.62%	17.07%	4.63%	2.86%	10.35%	46.98%	2.76%	9.66%	0.42%	5.48%	15.21%	4.59%	3.34%	11.56%	40.06%	7.84%	9.85%	0.44%	4.89%	16.47%	5.25%	3.84%	11.36%
Kalimantan	36.15%	23.01%	5.40%	0.28%	3.39%	17.45%	3.08%	3.02%	8.21%	52.52%	1.62%	9.76%	0.25%	4.78%	10.00%	4.38%	4.23%	12.46%	36.13%	3.23%	13.00%	0.66%	5.94%	21.70%	4.16%	4.07%	11.09%
Nusa Tenggara	47.11%	1.72%	2.28%	0.33%	7.06%	13.28%	5.71%	3.20%	19.31%	9.57%	35.89%	6.46%	0.50%	5.53%	11.96%	15.66%	5.43%	9.00%	50.74%	1.98%	3.83%	0.32%	5.62%	15.45%	5.28%	3.80%	12.97%
Sulawesi	42.41%	1.23%	5.76%	0.85%	7.29%	12.94%	6.03%	6.16%	17.33%	53.26%	0.83%	6.55%	0.46%	3.94%	12.31%	4.41%	3.97%	14.26%	42.58%	6.08%	6.48%	0.68%	5.98%	13.09%	7.54%	4.14%	13.44%
Moluccas-Papua	51.34%	0.81%	5.54%	0.42%	3.82%	18.80%	4.16%	2.87%	12.24%	43.31%	19.85%	4.61%	0.10%	2.50%	16.72%	3.25%	1.26%	8.40%	42.74%	4.37%	7.60%	0.48%	8.77%	9.52%	7.20%	2.48%	16.84%
All regions	45.05%	2.85%	6.45%	0.50%	5.88%	15.88%	4.97%	4.13%	14.28%	42.04%	2.96%	10.84%	0.63%	4.67%	17.29%	5.05%	4.07%	12.46%	35.08%	4.30%	12.92%	0.99%	5.29%	18.51%	6.17%	4.45%	12.29%

Islands	Sectors	Quintile 4									Quintile 5									Total								
		Agri	Ind				Serv				Agri	Ind				Serv				Agri	Ind				Serv			
		1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
Java-Bali		13.42%	0.98%	29.34%	1.98%	5.64%	22.82%	7.83%	6.06%	11.93%	5.90%	7.20%	33.34%	1.84%	4.75%	23.15%	7.46%	9.05%	7.31%	25.32%	3.40%	20.90%	1.41%	4.73%	21.31%	6.05%	5.84%	11.04%
Outside Java-Bali																												
Sumatera		26.57%	6.73%	14.58%	0.80%	6.41%	18.45%	8.68%	4.64%	13.12%	19.06%	38.69%	14.61%	0.37%	3.62%	10.23%	4.99%	2.55%	5.87%	35.20%	11.90%	12.25%	0.46%	5.45%	15.68%	5.51%	3.32%	10.23%
Kalimantan		29.48%	6.33%	14.45%	0.71%	5.29%	19.68%	8.95%	3.52%	11.61%	20.78%	36.44%	10.63%	0.40%	4.40%	13.82%	5.19%	2.97%	5.37%	32.15%	17.19%	12.31%	0.45%	4.53%	16.38%	5.63%	3.15%	8.21%
Nusa Tenggara		5.37%	2.13%	3.71%	1.18%	8.43%	29.15%	14.24%	5.14%	30.66%																		
Sulawesi		36.96%	5.21%	16.75%	0.78%	6.90%	11.12%	4.86%	4.65%	12.77%	11.85%	2.32%	19.35%	2.14%	8.38%	25.83%	15.12%	7.31%	7.70%	42.39%	4.38%	7.63%	0.66%	7.03%	12.86%	6.05%	4.51%	14.49%
Moluccas-Papua		25.14%	1.19%	8.05%	0.78%	9.11%	18.64%	12.05%	5.11%	19.92%	24.00%	51.87%	5.33%	0.21%	4.34%	4.55%	2.55%	0.67%	6.48%	46.68%	8.81%	6.65%	0.34%	5.27%	12.96%	4.81%	2.16%	12.33%
All regions		24.49%	4.85%	17.59%	1.06%	6.30%	19.16%	8.47%	4.84%	13.24%	14.87%	26.35%	19.87%	0.95%	4.43%	15.96%	6.21%	5.01%	6.35%	14.87%	26.35%	19.87%	0.95%	4.43%	15.96%	6.21%	5.01%	6.35%

Source: Author calculation based on Indonesia Statistic publication 2002

Table A2. 5: Regional sectoral share by quintile and islands year 2014 (9 sectors- classification)

		Quintile 1									Quintile 2									Quintile 3								
		Agri	Ind				Serv				Agri	Ind				Serv				Agri	Ind				Serv			
Islands	Sectors	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
Java-Bali		34.80%	2.14%	14.52%	1.07%	4.95%	18.56%	5.07%	5.75%	13.13%	27.36%	1.41%	14.54%	1.26%	5.50%	24.63%	5.72%	5.63%	13.95%	22.21%	1.13%	19.26%	1.77%	4.91%	26.98%	6.12%	5.37%	12.25%
Outside Java-Bali																												
Sumatera		46.12%	4.31%	4.12%	0.25%	6.12%	16.46%	6.04%	2.71%	13.87%	41.13%	3.67%	6.53%	0.36%	8.18%	16.76%	4.26%	4.57%	14.54%	43.04%	5.36%	7.81%	0.42%	6.52%	15.71%	5.52%	2.98%	12.64%
Kalimantan		37.70%	3.04%	11.03%	0.32%	10.75%	24.32%	1.96%	4.48%	6.40%	32.64%	2.39%	11.83%	0.71%	6.80%	18.73%	5.50%	4.89%	16.51%	37.85%	5.09%	9.05%	0.48%	6.64%	20.43%	4.31%	4.18%	11.97%
Nusa Tenggara		41.35%	1.74%	1.95%	0.35%	6.88%	15.73%	6.25%	3.68%	22.06%	42.61%	2.54%	3.44%	0.40%	8.62%	19.09%	6.64%	4.83%	11.83%	3.54%	0.01%	11.73%	0.89%	10.21%	22.21%	18.97%	20.63%	11.82%
Sulawesi		38.27%	3.30%	5.69%	0.56%	6.83%	15.65%	5.58%	8.64%	15.47%	38.82%	1.53%	6.00%	0.81%	8.13%	14.53%	6.06%	7.65%	16.48%	36.87%	5.02%	5.82%	0.65%	8.64%	13.78%	6.95%	6.29%	15.98%
Moluccas-Papua		42.68%	1.83%	4.60%	0.24%	8.34%	17.90%	4.25%	2.25%	17.92%	32.05%	0.82%	0.63%	0.23%	20.88%	9.97%	5.83%	4.26%	25.34%	37.11%	3.11%	1.85%	0.37%	11.85%	15.34%	6.99%	3.11%	20.28%
All regions		40.74%	2.32%	5.95%	0.45%	7.02%	17.22%	5.18%	4.02%	17.10%	35.47%	2.31%	9.06%	0.76%	7.61%	18.88%	5.28%	5.55%	15.08%	33.69%	3.72%	11.04%	0.91%	6.73%	19.70%	6.03%	4.74%	13.44%

Quintile		Quintile 4									Quintile 5									All								
Islands	Sectors	Agri	Ind				Serv				Agri	Ind				Serv				Agri	Ind				Serv			
		1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
Java-Bali		18.06%	5.78%	21.81%	1.49%	3.73%	26.67%	6.08%	5.61%	10.77%	2.19%	3.33%	30.82%	1.66%	5.81%	27.48%	10.32%	8.79%	9.60%	20.40%	2.42%	20.23%	1.48%	5.12%	25.25%	6.79%	6.28%	12.05%
Outside Java-Bali																												
Sumatera		23.76%	3.86%	14.43%	0.87%	6.62%	20.19%	9.88%	6.34%	14.06%	20.60%	18.39%	20.31%	0.42%	5.53%	16.26%	6.19%	3.22%	9.08%	32.43%	7.52%	11.92%	0.51%	6.68%	17.34%	6.58%	4.29%	12.73%
Kalimantan		35.14%	2.70%	9.81%	0.47%	6.57%	18.47%	8.80%	5.43%	12.60%	18.48%	34.75%	11.23%	0.51%	6.29%	13.95%	6.06%	2.93%	5.80%	28.43%	17.28%	10.46%	0.51%	6.64%	17.23%	5.91%	3.94%	9.60%
Nusa Tenggara		3.85%	1.38%	2.44%	0.95%	10.13%	29.01%	15.50%	5.72%	31.02%	5.03%	84.19%	0.47%	0.06%	2.98%	3.74%	1.81%	0.50%	1.23%	37.75%	4.50%	2.39%	0.39%	7.14%	16.33%	6.88%	4.32%	20.30%
Sulawesi		35.52%	5.45%	9.79%	0.71%	11.56%	13.54%	6.85%	4.65%	11.93%	8.94%	19.20%	11.87%	1.16%	9.47%	17.44%	15.53%	7.92%	8.47%	35.74%	4.68%	7.18%	0.73%	9.00%	14.42%	6.95%	6.71%	14.61%
Moluccas-Papua		28.37%	2.52%	8.72%	0.43%	15.65%	13.92%	9.99%	4.04%	16.36%	16.87%	24.11%	18.89%	0.20%	9.70%	8.39%	7.84%	3.14%	10.85%	36.05%	4.61%	6.60%	0.28%	10.76%	15.45%	6.03%	2.85%	17.37%
All regions		26.52%	4.17%	13.53%	0.85%	8.13%	19.22%	8.64%	5.54%	13.40%	13.99%	19.20%	20.44%	0.80%	6.22%	18.24%	7.78%	4.88%	8.45%	13.99%	19.20%	20.44%	0.80%	6.22%	18.24%	7.78%	4.88%	8.45%

Source: Author calculation based on Indonesia Statistic publication 2014

Table A2. 6: Estate crops plantations 2012-2014

Provinsi	Plantation areas											
	Palm oil			Copra			Rubber			Coffee		
	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014
in hectare (thousands)												
Java-Bali	31	34	33	931	913	896	136	136	141	215	220	220
Outside Java-Bali	10,103	10,431	10,722	2,850	2,742	2,715	3,370	3,420	3,466	1,020	1,022	1,011
Sumatera	6,355	6,682	6,804	1,203	1,166	1,152	2,482	2,532	2,544	778	781	771
Kalimantan	3,312	3,307	3,452	256	208	206	859	870	904	31	26	25
Sulawesi	331	319	355	787	782	780	24	13	13	114	118	116
Nusa Tenggara	-	-	-	227	217	205	-	-	-	85	85	85
Moluccas-Papua	105	124	111	378	369	373	5	6	5	12	12	14
Total	**10,133**	**10,465**	**10,755**	**3,782**	**3,655**	**3,611**	**3,506**	**3,556**	**3,606**	**1,235**	**1,242**	**1,231**
in percentage												
Java-Bali	0.30%	0.32%	0.31%	24.62%	24.97%	24.81%	3.87%	3.82%	3.90%	17.39%	17.70%	17.86%
Outside Java-Bali	99.70%	99.68%	99.69%	75.38%	75.03%	75.19%	96.13%	96.18%	96.12%	82.61%	82.30%	82.14%
Sumatera	62.72%	63.85%	63.26%	31.81%	31.90%	31.92%	70.80%	71.19%	70.55%	62.99%	62.87%	62.68%
Kalimantan	32.68%	31.60%	32.10%	6.77%	5.70%	5.69%	24.50%	24.45%	25.06%	2.49%	2.12%	2.00%
Sulawesi	3.26%	3.05%	3.30%	20.81%	21.41%	21.59%	0.68%	0.37%	0.37%	9.23%	9.51%	9.41%
Nusa Tenggara	0.00%	0.00%	0.00%	5.99%	5.93%	5.67%	0.00%	0.00%	0.00%	6.88%	6.83%	6.88%
Moluccas-Papua	1.04%	1.18%	1.03%	9.99%	10.09%	10.32%	0.14%	0.16%	0.13%	1.01%	0.97%	1.17%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Provinsi	Plantation areas											
	Cacao			Sugarcane			Tea			Clove		
	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014
in hectare (thousands)												
Java-Bali	112	106	95	281	305	313	107	108	103	220	151	173
Outside Java-Bali	1,663	1,635	1,635	162	166	164	14	14	16	50	42	37
Sumatera	423	431	430	143	147	147	14	14	16	7	8	8
Kalimantan	38	36	36	-	-	-	0	0	0	-	-	-
Sulawesi	1,016	998	996	19	19	18	-	-	0	3	3	2
Nusa Tenggara	65	62	61	-	-	-	-	-	-	40	31	27
Moluccas-Papua	122	108	112	-	-	-	-	-	-	-	-	-
Total	**1,774**	**1,741**	**1,727**	**443**	**471**	**477**	**122**	**122**	**119**	**270**	**193**	**209**
in percentage												
Java-Bali	6.28%	6.10%	5.52%	63.46%	64.78%	65.58%	88.22%	88.28%	86.63%	81.42%	78.33%	82.57%
Outside Java-Bali	93.72%	93.91%	94.66%	36.55%	35.22%	34.42%	11.79%	11.72%	13.23%	18.59%	21.67%	17.48%
Sumatera	23.83%	24.74%	24.91%	32.29%	31.28%	30.75%	11.76%	11.70%	13.12%	2.74%	4.08%	3.72%
Kalimantan	2.12%	2.06%	2.07%	0.00%	0.00%	0.00%	0.02%	0.02%	0.03%	0.00%	0.00%	0.00%
Sulawesi	57.24%	57.34%	57.67%	4.26%	3.94%	3.67%	0.00%	0.00%	0.08%	1.10%	1.34%	1.05%
Nusa Tenggara	3.68%	3.55%	3.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	14.75%	16.26%	12.70%
Moluccas-Papua	6.85%	6.21%	6.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Author's calculation based on BPS publication

Table A3. 1: Reasons for not continuing study

Reasons	2009						2014					
	lower			Upper			lower			Upper		
	all	male	female	all	male	female	all	male	female	all	male	female
Cannot afford the cost	58.75	56.09	62.14	58.83	58.67	41.34	41.34	36.62	48.41	43.54	42.53	44.63
Working	6.36	7.10	5.43	11.88	13.36	7.17	7.17	8.39	5.34	14.97	17.52	12.22
Married	0.58	0.08	1.21	4.09	0.19	1.37	1.37	0.04	3.35	7.93	0.43	16.04
Education sufficiency	3.12	2.16	4.36	6.59	6.58	4.16	4.16	3.58	5.04	8.03	8.07	7.98
Ashamed (economic factor)	2.06	2.21	1.87	1.08	1.08	1.55	1.55	1.84	1.11	0.81	1.03	0.58
Too far (distance)	3.20	2.71	3.82	1.95	1.98	3.83	3.83	2.67	5.56	1.58	1.36	1.81
Difable	1.46	1.60	1.28	0.63	0.65	2.08	2.08	2.06	2.11	0.65	0.64	0.65
Waiting for enrolment	0.68	0.79	0.54	1.61	1.44					2.27	2.13	2.43
Not accepted	0.52	0.46	0.61	0.62	0.64	0.13	0.13	0.15	0.10	0.28	0.26	0.31
Others	23.25	26.81	18.74	12.72	15.41	38.37	38.37	44.65	28.98	19.94	26.02	13.37
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Author's calculation from *Susenas* 2009 & 2014.

Table A3. 2: Data estimation process

Variable	Source	Comments
Enrolment rate (gender basis)	Author calculation from *Susenas*	$$ER_{jlgt} = \frac{\sum W(pupil)_{jlgt}}{\sum W(child)_{jlgt}}$$ Whereas: $\quad ER_{jlgt}$ Enrolment rate of boy/girl in district j in secondary school l in year t $\quad W(pupil)$ Individual weight of child $\quad j$ District $\quad l$ Level of secondary school $\quad g$ Gender $\quad t$ Years
Reason for not continuing the school	Author calculation from *Susenas*	$$Reason_{jlt} = \frac{\sum W(Dropout)_{jlrt}}{\sum W(Dropout)_{jlt}}$$ Whereas: $\quad W(dropout)$ Individual weight of pupil who dropout from school $\quad j$ District $\quad l$ Level of secondary school $\quad r$ Reason $\quad t$ Years
Number of school	Author calculation from *Podes*	$$School_{jlt} = \sum School_{jlvt}$$ Whereas: $\quad j$ District $\quad l$ Level of secondary school $\quad v$ Village $\quad t$ Years
Average distance to the nearest school	Author calculation from *Podes*	$$Average\ distance_{jlt} = \frac{1}{v}\sum Distance_{jlvt}$$ Whereas: $\quad j$ District $\quad l$ Level of secondary school $\quad v$ Village $\quad t$ Years

Table A3. 3: Number of schools and average distance to the nearest school, by province

(2003 – 2014)

No	Province	2003				2014			
		Lower-second		Upper-second		Lower-second		Upper-second	
		# of school	dist (km)	# of school	dist (km)	# of school	dist (km)	# of school	dist (km)
Western Indonesia									
1	Aceh	1,056	4.23	405	7.68	1,233	2.74	806	4.64
2	North Sumatera	1,560	5.61	1,487	10.73	2,987	4.82	2,114	8.08
3	West Sumatera	932	3.66	433	7.05	1,004	4.02	603	7.19
4	Riau	970	7.51	533	16.35	1,470	5.55	840	10.52
5	Riau Island*					325	6.27	210	11.43
6	Jambi	596	5.29	270	14.75	881	3.68	495	8.85
7	South Sumatera	934	7.66	537	19.07	1,497	4.66	883	8.42
8	Bengkulu	394	4.77	148	10.97	452	2.87	241	7.04
9	Lampung	808	3.68	700	9.02	1,783	3.45	1,044	6.30
10	Bangka Belitung Island	934	7.66	537	19.07	217	5.30	123	10.82
11	Jakarta **	640	0.07	951	0.72	1,163	8.72	1,080	4.94
12	West Java	2,934	2.21	2,141	5.98	6,657	2.65	4,477	5.17
13	Banten*					2,010	2.90	1,340	5.09
14	Central Java	3,186	2.14	1,997	5.53	4,569	2.67	2,755	5.21
15	DI Yogyakarta	478	0.86	356	3.39	491	2.24	378	4.76
16	East Java	3,080	2.20	2,530	5.65	6,894	2.85	4,174	5.01
17	Bali	390	2.43	245	5.64	384	3.21	314	5.96
18	West Kalimantan	656	11.89	363	23.84	1,349	13.04	650	21.32
19	Central Kalimantan	528	21.02	200	37.08	837	11.62	377	22.11
20	South Kalimantan	694	5.27	285	13.07	877	4.15	419	8.02
21	East Kalimantan	582	18.04	316	32.37	676	13.21	463	20.92
22	North Kalimantan*					155	16.19	88	28.11
Eastern Indonesia									
23	West Nusa Tenggara	566	2.51	378	7.88	1,473	2.13	951	6.07
24	East Nusa Tenggara	604	7.58	259	21.99	1,514	4.73	691	12.76
25	North Sulawesi	536	3.19	251	9.36	706	2.86	387	8.60
26	Gorontalo*	536	3.19	251	9.36	372	2.08	137	6.31
27	Central Sulawesi	584	7.25	229	21.77	983	5.05	463	11.85
28	South Sulawesi	1,500	4.76	725	12.28	2,033	3.32	1,145	7.75
29	West Sulawesi*	1,500	4.76	725	12.28	419	4.39	231	12.27
30	Southeast Sulawesi	580	4.70	210	16.71	849	3.12	449	6.86
31	Moluccas	344	13.11	170	35.06	642	13.88	369	20.66
32	North Moluccas*	344	13.11	170	35.06	534	5.40	332	10.73
33	West Papua*	524	31.84	193	57.16	264	17.45	159	37.02
34	Papua	524	31.84	193	57.16	586	34.08	310	49.71

* proliferated region (we assume that the data for 2003 is similar to its parent data)

** an increase in the average distance is related with the new establishment of Seribu island district from North Jakarta City.

Source: Author's calculation from *Podes* 2003 & 2014.

Table A3. 4: The Educational Attainment Gap between the Western and Eastern Regions
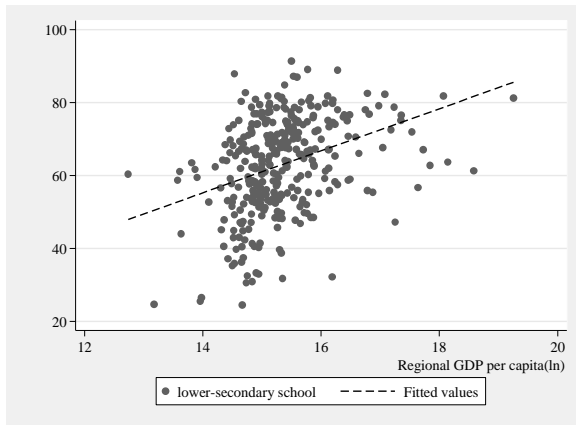
(2002 – 2014)

No	School level Years	Western regions	Eastern regions	The difference
1.	**Lower-secondary level**			
	2002	62.48	51.92	10.55
	2014	77.75	70.37	7.39
2.	**Upper-secondary level**			
	2002	40.77	34.62	6.16
	2014	61.12	58.81	2.32

Source: Author's calculation from *Susenas* 2002 & 2014.

Figure A3. 1: Scatter plot on lower-secondary enrolment by district
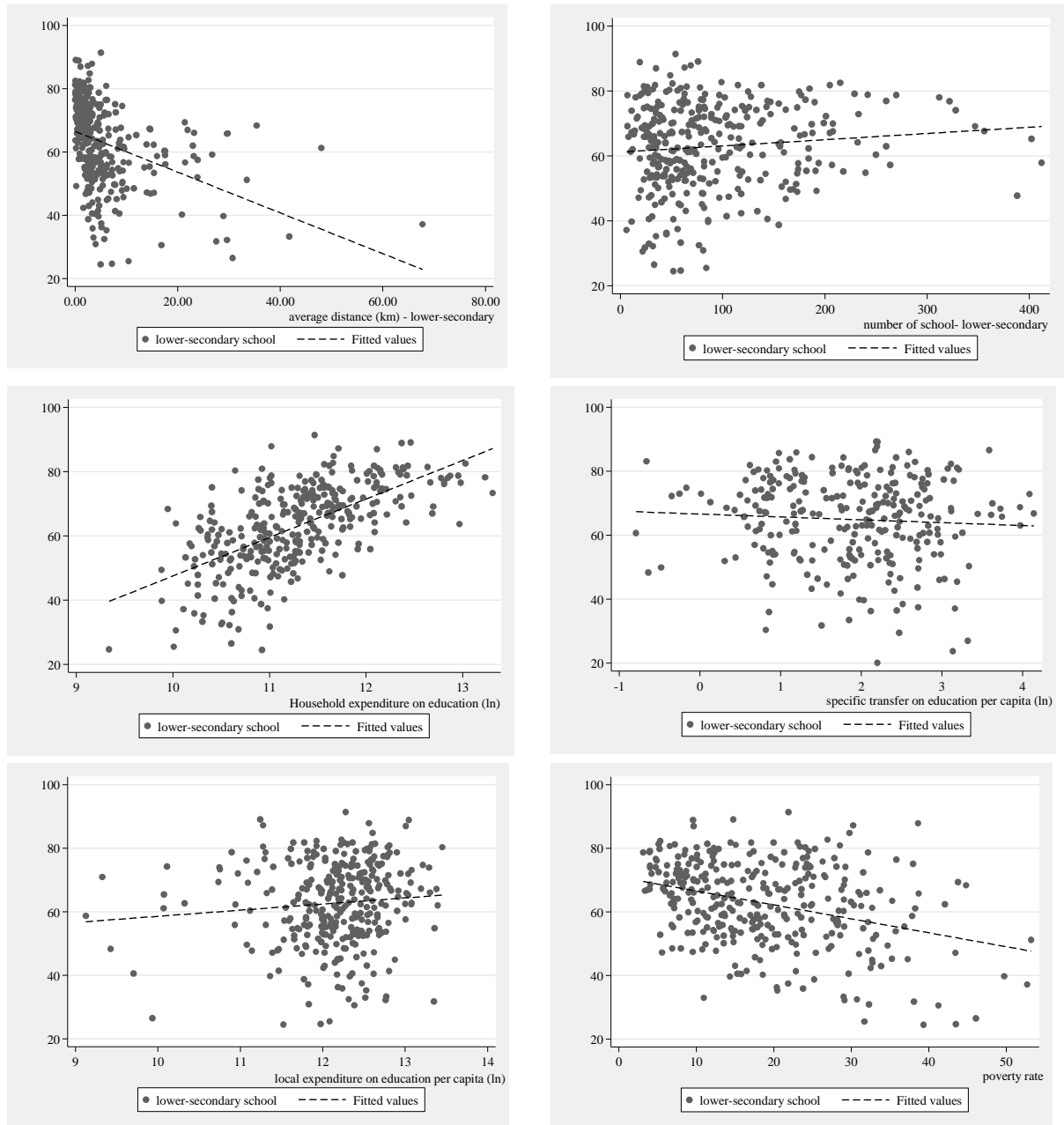
Source: Stata output

Figure A3. 2: Scatter plot on upper-secondary enrolment by district
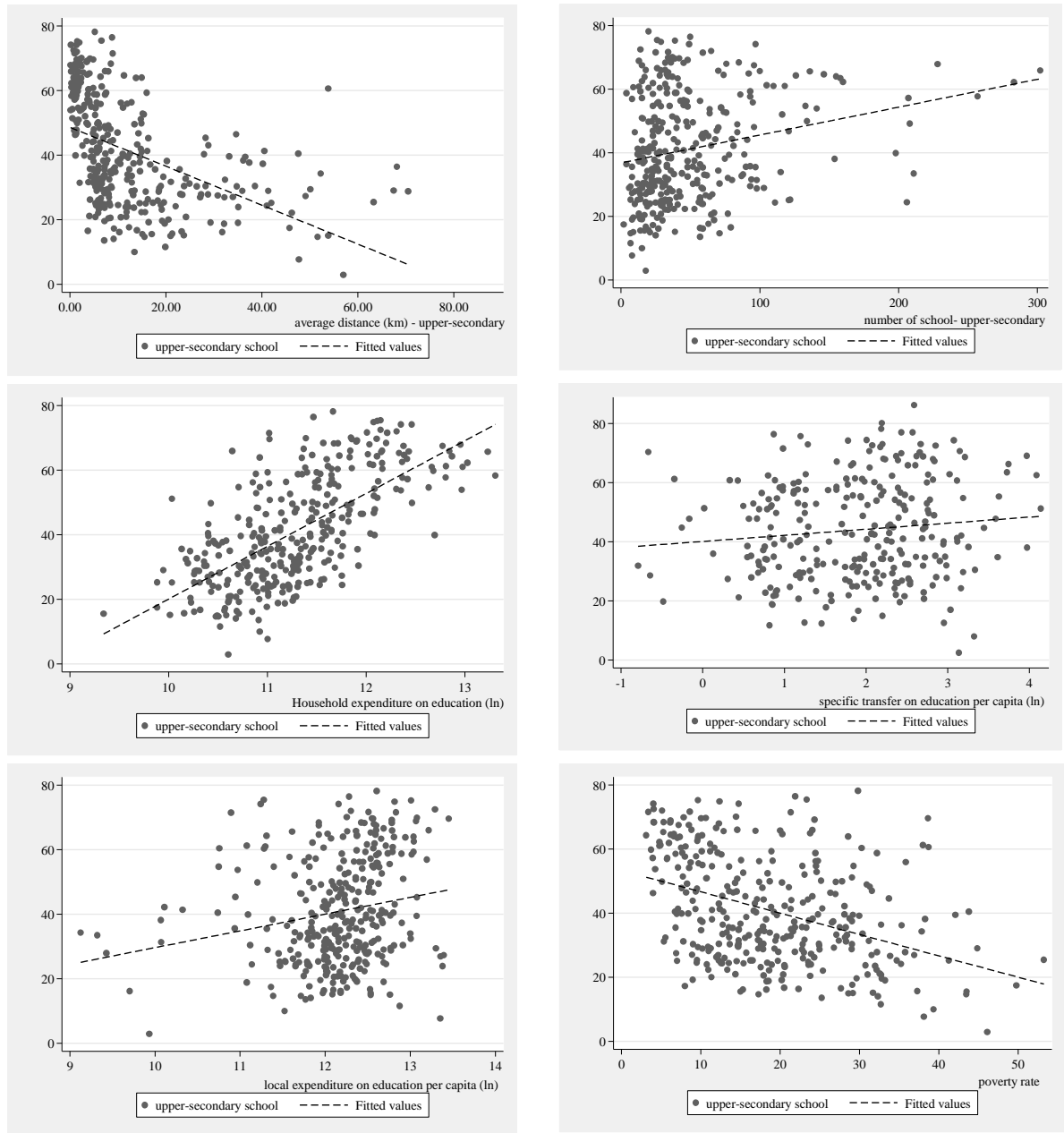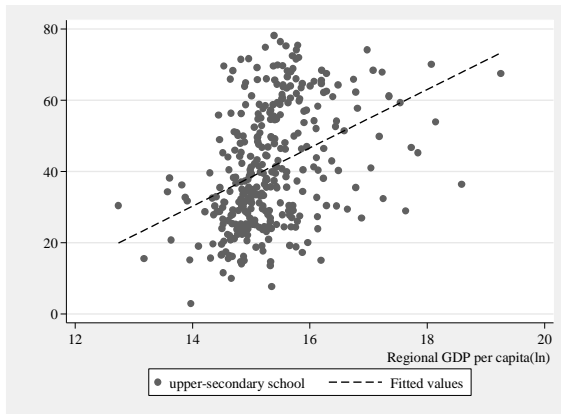
Source: Stata output

Figure A3. 3: Net enrolment rate based on gender, province, and level of education (2002 – 2014)
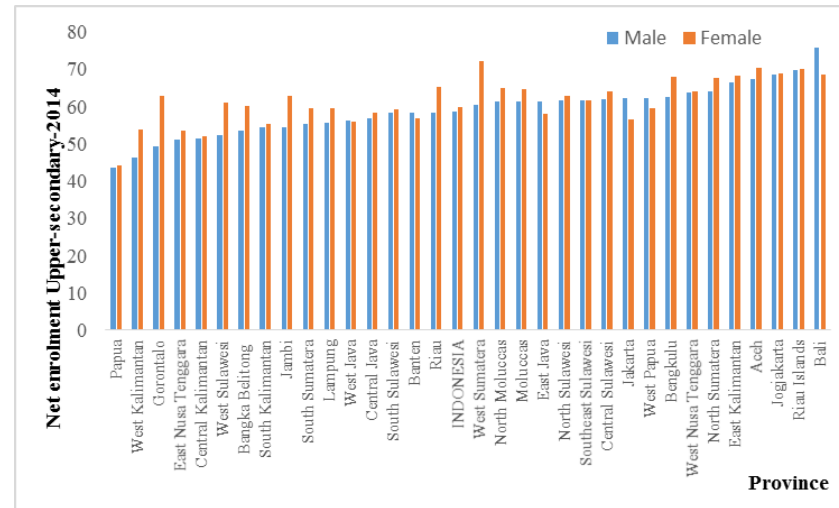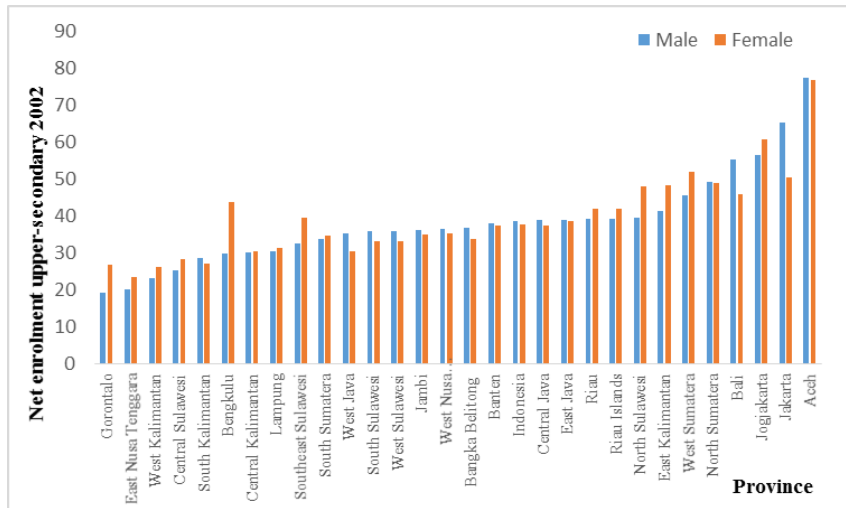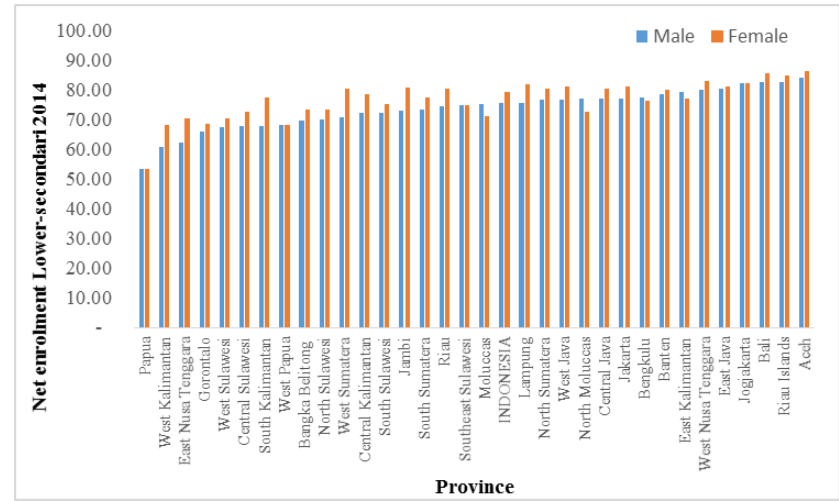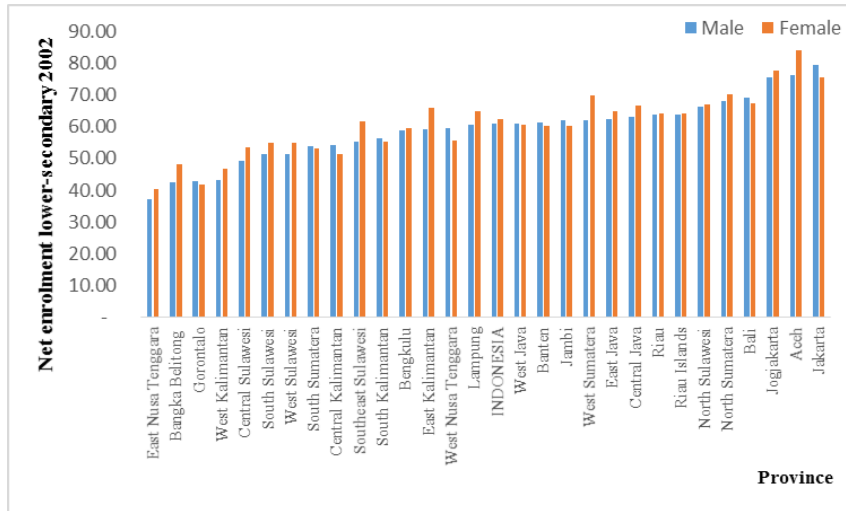
Source: Author's calculation based on *Susenas* 2002 and 2014

Figure A3. 4: Hausman Test

```
.
                   ── Coefficients ──
                 (b)          (B)          (b-B)       sqrt(diag(V_b-V_B))
                 fe           re          Difference         S.E.

     Primary   .2206509     .5932763     -.3726254          .023939
Special_fund   .0005949     -.002808      .0034029          .0015344
Household_~e   .0506794     .0686867     -.0180073          .0032605
School_num~r   .0565154     .0583494      -.001834          .0086687
School_dis~e  -.0248038    -.0506169      .0258131          .0042162
        Free   .0293075     .0081257      .0211818          .0012062

                     b = consistent under Ho and Ha; obtained from xtreg
          B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

           chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                   =       302.13
         Prob>chi2 =      0.0000
         (V_b-V_B is not positive definite)
```

Source: Stata output

Figure A3. 5: The role of supply and demand-side on enrolment rate
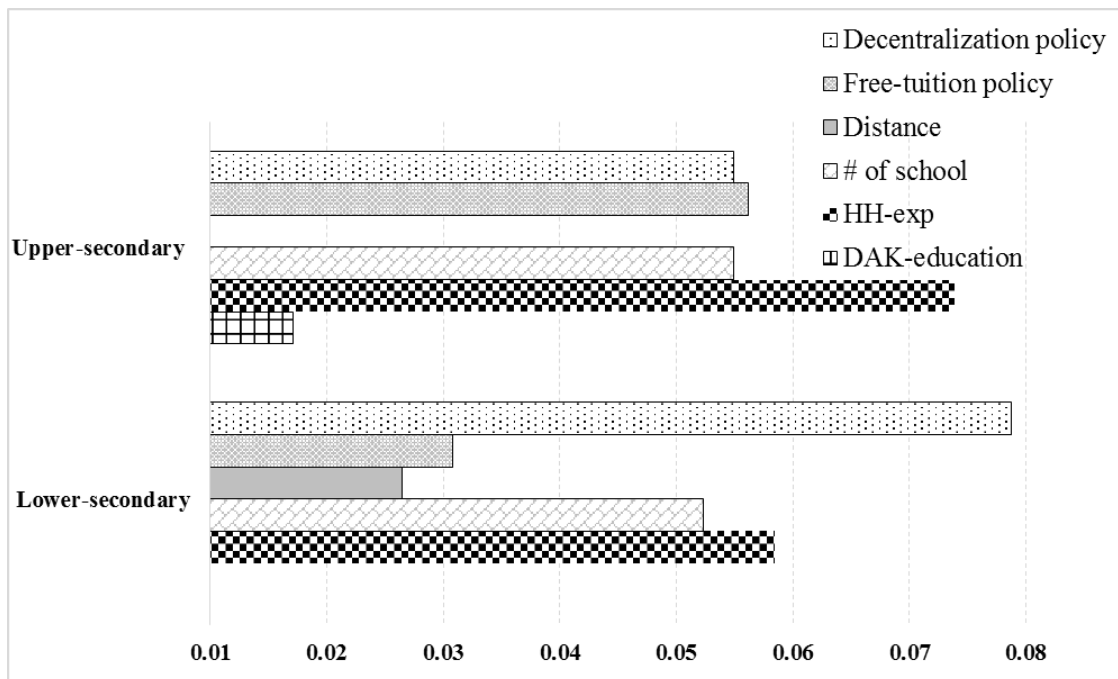
Source: Stata output

Table A4. 1:   Variable definition and data sources

| Variable	Source	Comments
Poverty rate	Indonesia Statistic Bureau, World Bank Indonesia Database for Policy and Economic Research (INDO-DAPOER).	Poverty headcount. Measured by the headcount poverty index, a fraction of regional population with income below a given regional poverty line
Regional GDP per sector	Indonesia Statistic Bureau	1. Use constant 2000. 2. Industrial sector consists of Mining, Manufacturing, Utilities and Construction. 3. Service consists of Trade and food service, Transportation and Telecommunication, Finance and Business, and Government and other service sectors.
Regional labor per sector	Indonesia Socio Economic Monitoring Survey (Susenas), World Bank Indonesia Database for Policy and Economic Research (INDO-DAPOER)	Combination of data from different sources described in the text. INDO-DAPOER cover 2002-2007 data, while data 2008-2013 has been estimated from SUSENAS Whereas: $$L_{ijt} = \sum W_{ijt}$$ W Individual weight i Sector j District k Individu t Years
Year of schooling	Indonesia Statistic Bureau	Stock of years of education (in years)
Sectoral labor intensity	Author calculation	$$\text{Labor intensity}_{ijt} = \frac{Share\ of\ labor_{ijt}}{Share\ of\ GDP_{ijt}}$$ Whereas: i Sector j District t Years
Social-expenditure	Local government financial report. Directorate General of Fiscal Balance, Ministry of Finance	The sump of annual local government expenditure on education and health.
Local owned-resource revenue	Local government financial report. Directorate General of Fiscal Balance, Ministry of Finance	
Total expenditure	Local government financial report. Directorate General of Fiscal Balance, Ministry of Finance	
Local direct election	General Election commission	Dummy variable. 1 : for the years after the implementation of direct election 0: otherwise
Unified local government	General Election commission	Dummy variable 1 : for the district government that supported by the majority of local council 0: otherwise

Table A4. 2 The role of sectoral labor productivity in poverty rate (4 sectors)

| Variable	Full dataset	Java-Bali	Outside Java-Bali
Year of schooling (Ln)	-1.9868957***	-1.3750587***	-2.0309132***
	0.2523379	0.1793121	0.3240995
Agricultural productivity (Ln)	-.09725221***	-.10991951***	-.08971456**
	0.0318884	0.0318884	0.0365794
Mining productivity (Ln)	.00963794**	-0.00030664	.01215648**
	0.0044606	0.0044606	0.0055142
Non-mining productivity (Ln)	-0.00467715	-0.02278542	-0.00316456
	0.0127571	0.0127571	0.0138679
Service productivity (Ln)	-.0425644*	-.29245025***	-0.01331043
	0.0240766	0.0240766	0.0516695
Constanta	8.82124***	12.232595***	8.281447***
	0.4745346	0.4745346	0.5736744
Regions fixed effect	Yes	Yes	Yes
Years fixed effect	Yes	Yes	Yes
Clustered standard error	Yes	Yes	Yes
Number of obs	4,762	1,300	3,462
Adj R-squared	0.9177	0.9422	0.912
Group	469	112	357

 Significant at *10%; ** 5%; *** 1%

Source: Stata output

Figure A4. 1 : Sectoral productivity for mining and non-mining industry 2002 –
2013 by main islands
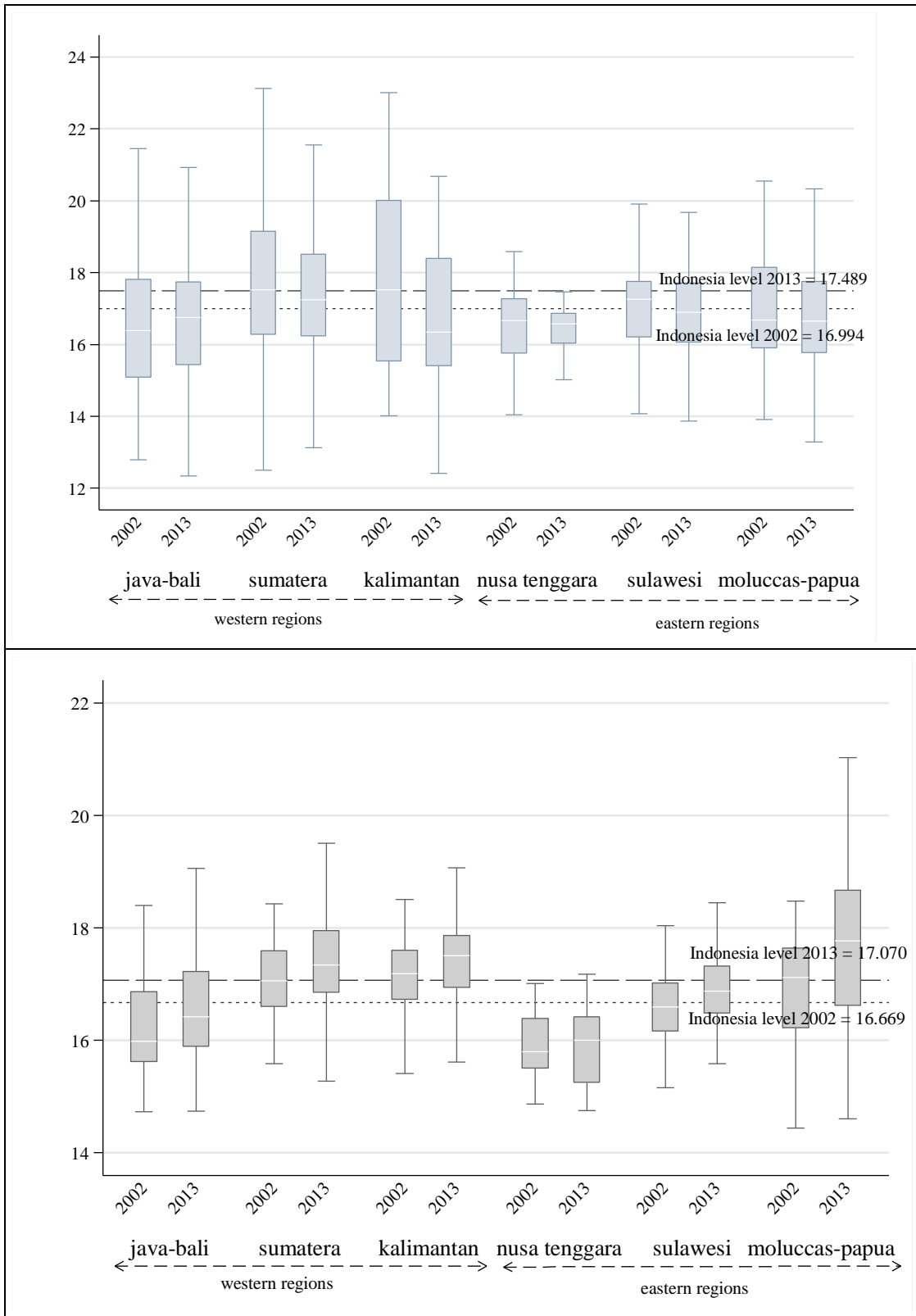
Source: Author calculation from BPS publications and Susenas 2002 - 2013

Figure A4. 2   :   The relationship between regional economy structure and regional poverty quintile by district and quintile
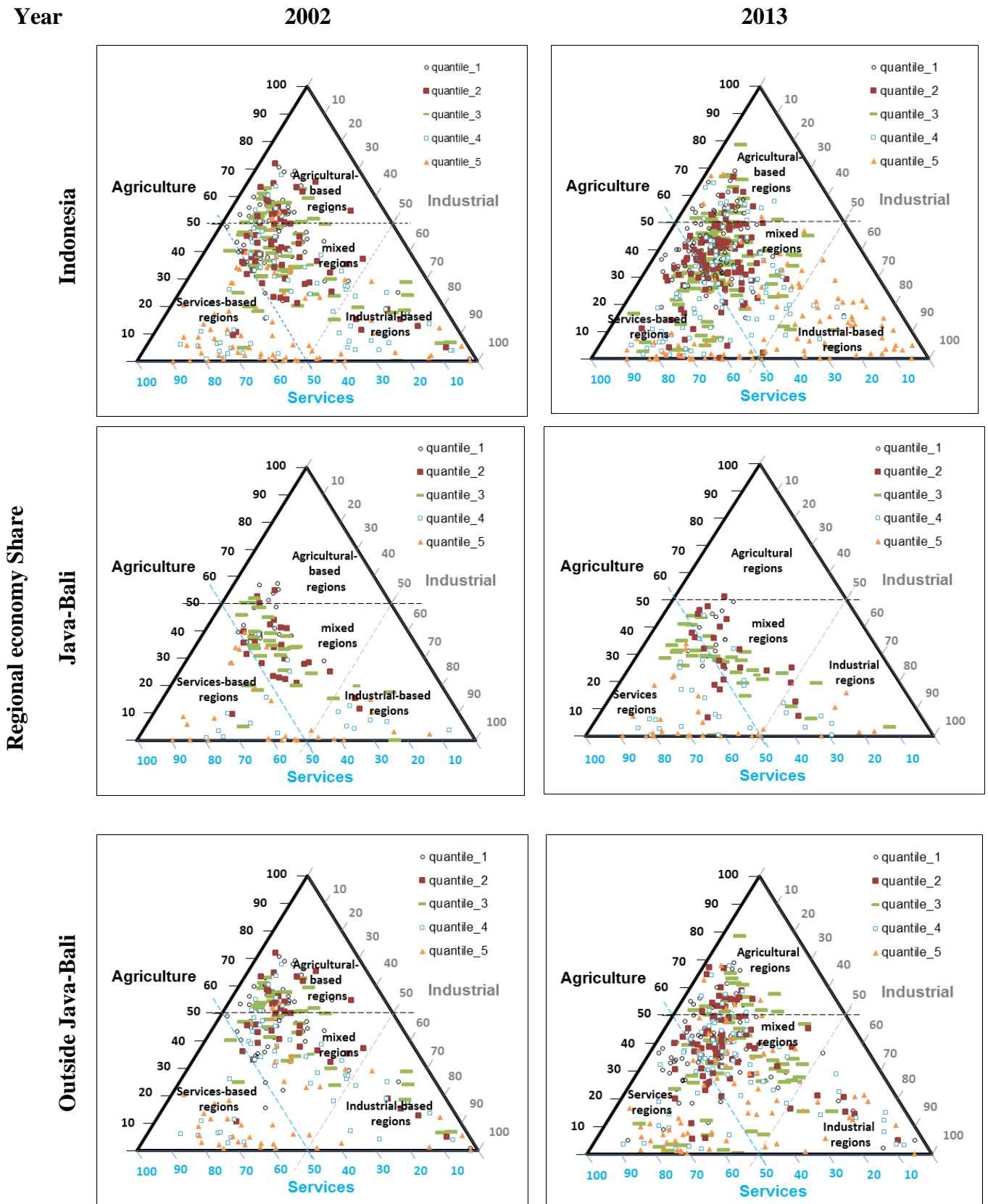
Source: Author calculation from Indonesia Statistic and *Susenas* data , 2002 – 2013

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Figure A4. 3   :   The relationship between regional employment shares on poverty quintile by district and quintile

Figure A4. 3   :   The relationship between regional employment shares on poverty quintile by district and quintile (continued)

Figure A4. 3 : The relationship between regional employment shares on poverty quintile by district and quintile (continued)
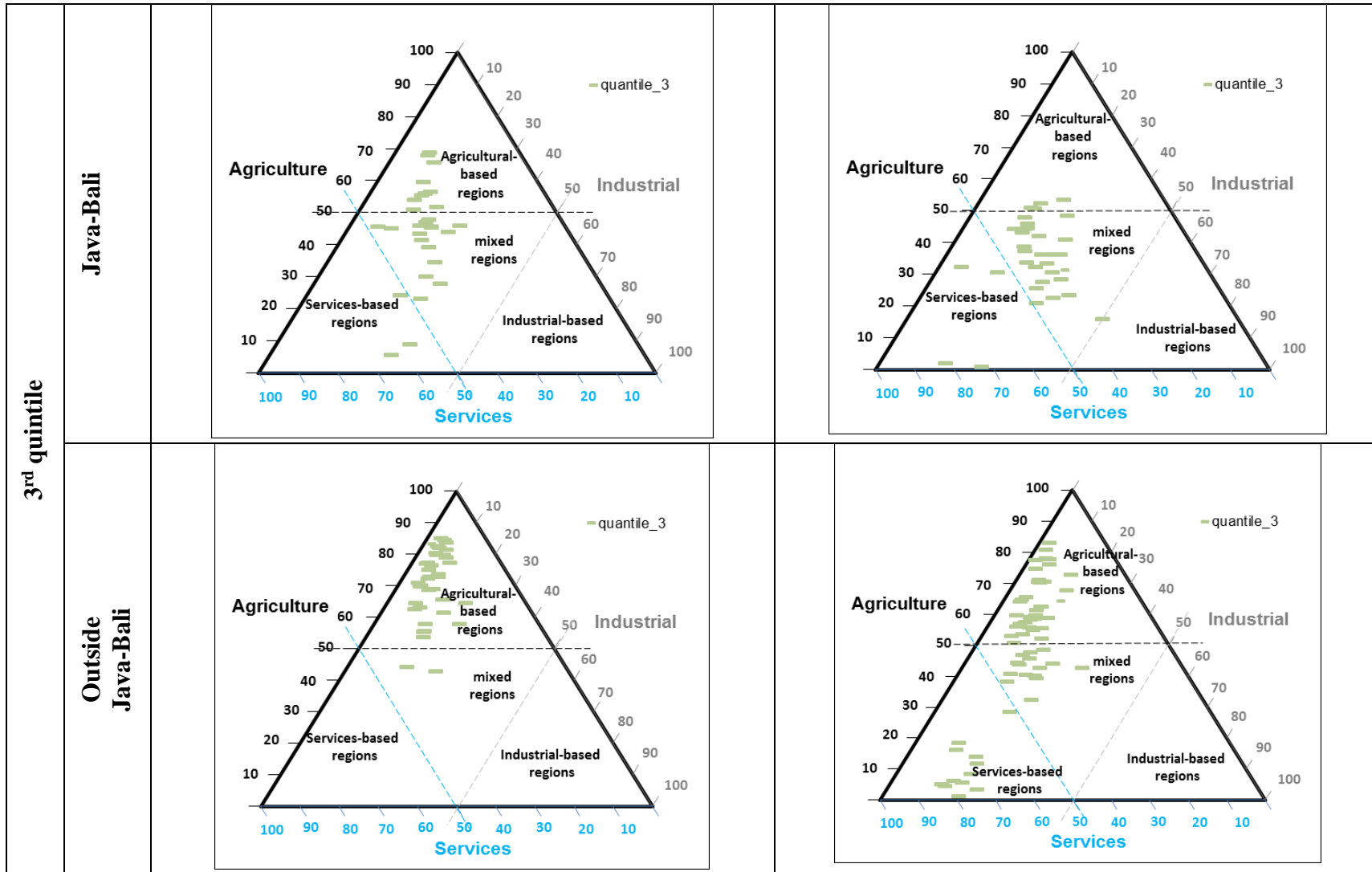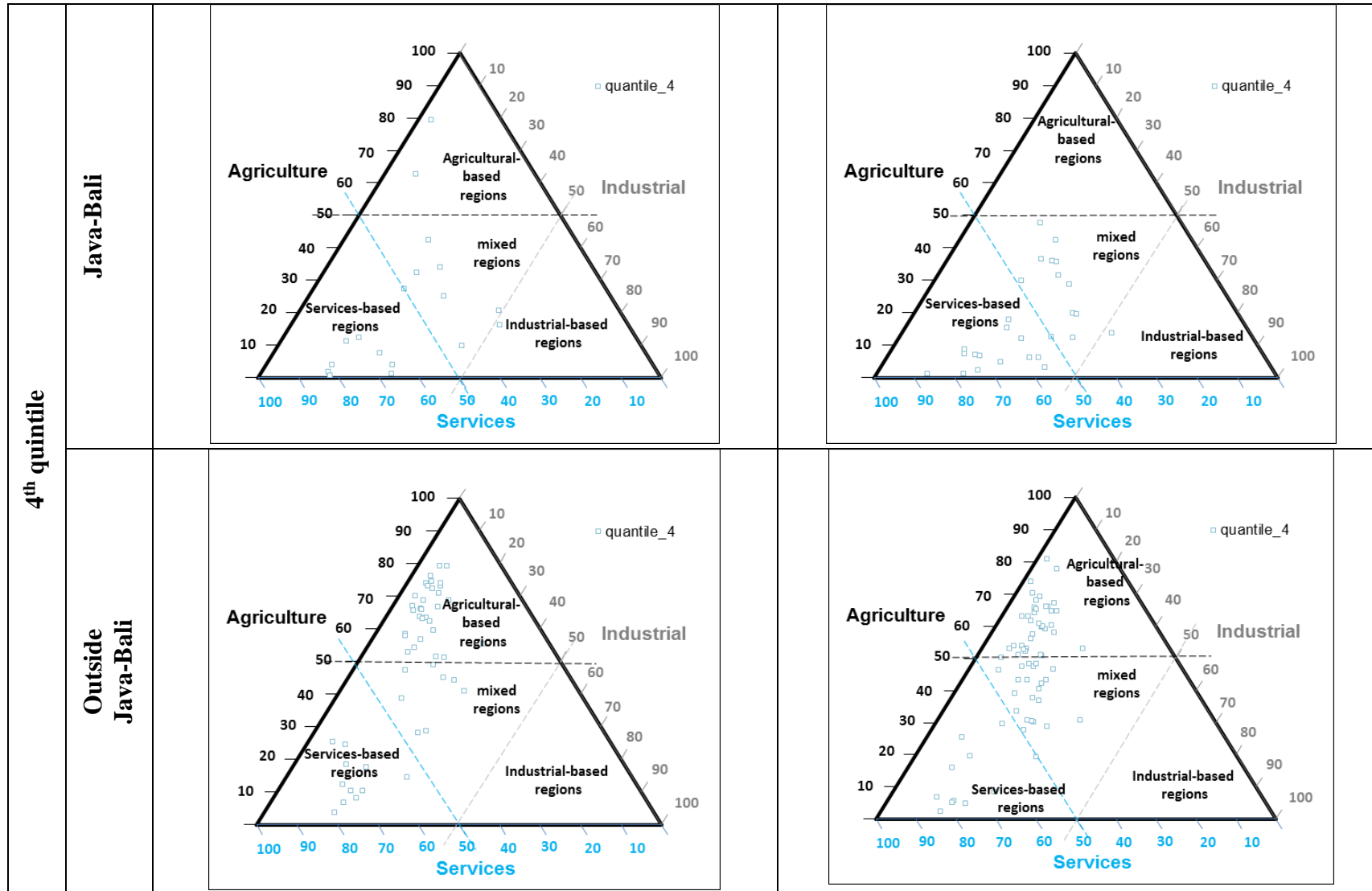

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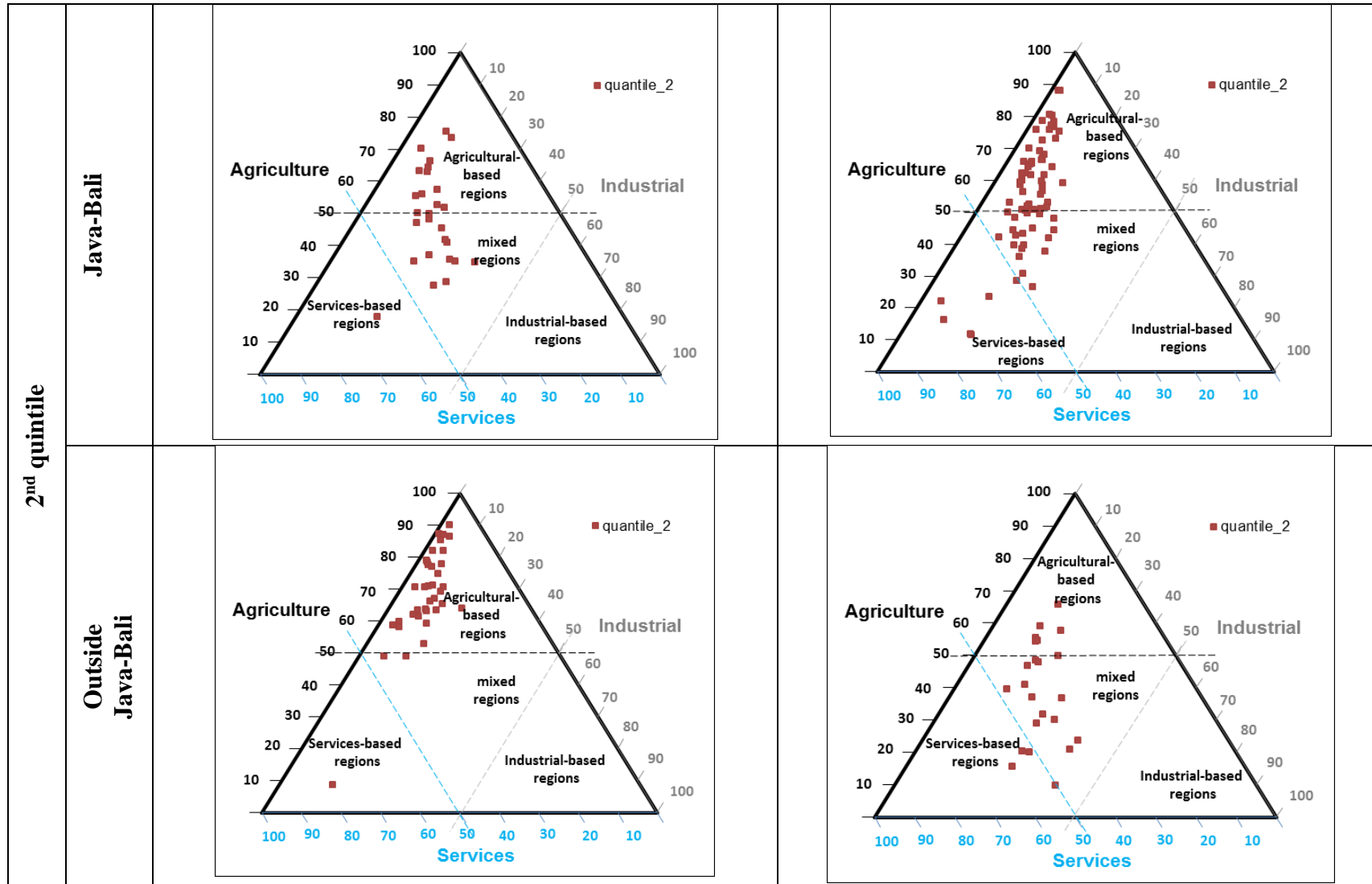
Figure A4. 3   :   The relationship between regional employment shares on poverty quintile by district and quintile (continued)

Figure A4. 3   :   The relationship between regional employment shares on poverty quintile by district and quintile (continued)
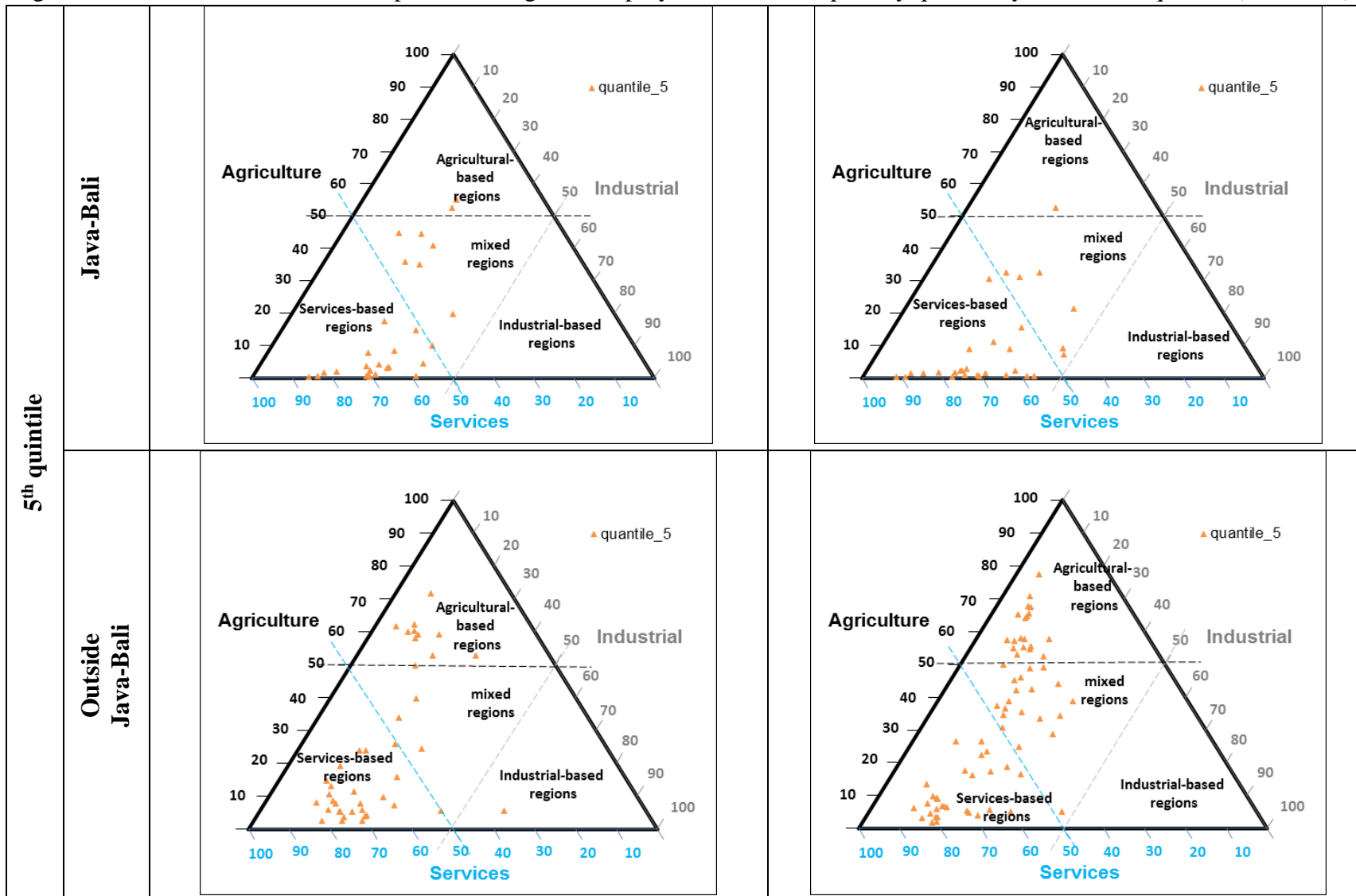

Source: Author calculation from Indonesia Statistic and *Susenas* data, 2002 – 2013

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