Regional Economic Growth and Inequality in Indonesia: Does Fiscal Decentralization Matter?

A Cross Province Analysis

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List of Acronym

BPS	: Badan Pusat Statistik (Indonesia Central Statistic Bureau)
DKI	: Daerah Khusus Ibukota
FD	: Fiscal Decentralization
GDP	: Gross Domestic Product
GFS	: Government Financial Statistic
GNP	: Gross National Product
IMF	: International Monetary Fund
INE	: Inequality level
SUR	: Seemingly Unrelated Regression

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Abstract

The purpose of this study is to analyze the effect of fiscal decentralization policy on regional economic indicators such as economic growth and inequality in Indonesia. Theoretically, fiscal decentralization can lead to economic growth because it creates efficiency by bringing government closer to the public (Musgrave, 1959). This study argues that besides directly affect economic growth, fiscal decentralization also indirectly affects economic growth through other economic indicators such economic inequality. There are several indicators can be used to measure fiscal decentralization as explained by IMF Government Financial Statistics (2001), this study uses one of them, which is fiscal decentralization as a total provincial revenue as a share of GDP as fiscal decentralization measurement, and for robustness test, this study uses the other indicator measurement from the IMF which is fiscal decentralization as a total provincial expenditure as a share of GDP. Furthermore, this study analyzes the effect of fiscal decentralization across 33 provinces in Indonesia from 2004 to 2013.

This study uses panel data and seemingly unrelated regression method in the analysis to accommodate the indirect effect of fiscal decentralization on economic growth through inequality. The result shows that fiscal decentralization does have a significant relationship with economic growth directly and indirectly through inequality level. The direct effect of fiscal decentralization on economic growth is negative, but the positive effect of fiscal decentralization in reducing inequality levels indirectly improves economic growth, which makes the actual total effect of fiscal decentralization on economic growth is positive.

Relevance to Development Studies

Fiscal decentralization was first implemented in Indonesia in 2001, and after more than a decade, this policy should have given positive impact to Indonesian economy. If it does not have positive impact on the economy then Government of Indonesia should discover what went wrong with this policy. Because of that reason, this study try to analyze do the fiscal decentralization policy in Indonesia can improve their economic growth and reduce inequality level across provinces after more than years of implementation. Improving economic growth means creating more wealth for people and by reducing inequality all people can experience the effect equally. One of the purposes of Development Studies is to improve and create equal welfare for the people especially in the poor and developing countries. Because of that reason, this study is very relevance to development studies because it analyzes the impact of fiscal decentralization policy in Indonesia in improving economic growth and creating economic equality across provinces to improve their people wealth.

Keyword

Fiscal Decentralization, Economic Growth, Inequality

Chapter 1
Introduction

1.1 Background

As a developing country with many regions, many problems faced by the government of Indonesia in developing their economy. Because of the widest area and low transportation infrastructure, the development process was sometimes only concentrated in big provinces like Jakarta, East Java, South Sulawesi and others, while small provinces especially in the east side of Indonesia seem to be untouched by development. This problem then creates another problem such as economic inequality between regions in Indonesia. Inequality is one of the major problems for the development process in Indonesia, like Kuznets (1955) said that in countries experiencing a transition to modernization, inequality was most likely to rise in the initial stages of the transition. Then Kuncoro (2003) said that the benchmark for successful development process can be seen from economic growth, economic structure, and smaller disparity among people between region and sectors. To solve the issue, Government introduced Fiscal decentralization system in 2001 based on rule of Act no. 25 year 1999. Based on this regulation, central government gave regional governments "more freedom" on financial issues, regional government can determine their own revenue and spending policy. This policy made based on consideration that by decentralizing Government can become closer to public because government in each region knows better what is best for their society based on their own characteristics (Ezcurra and Pascual, 2008). Furthermore, Davoodi and Zou (1998) stated that when a local government holds a major role than the central government in a decentralized fiscal system and public-service provision, it can create a positive effect that can boost economic growth in their region. Furthermore, Davoodi and Zou (1998) suggest that because of its sensitivity to local regional characteristics, it is more effective if central government gives more authority to local government in terms of public finance, public services, infrastructure spending and education and usually decentralized policies can encourage better economic growth than centrally determined policies.

Before we analyze the effect of fiscal decentralization on inequality and economic growth, let see the overall general condition of Indonesian province. As an archipelago country with 34 provinces which consist of 505 districts and municipalities, equal development process across regions almost become impossible to reach by the Government of Indonesia. The economic gap between the east and west side of Indonesia was in relatively high level. Before the decentralization policy implemented in Indonesia in 2001, majority of the development process and economic activity was centered on west side of Indonesia, especially in Java Island where the State capital province DKI Jakarta exists. But when autonomous eras started in 1999 and fiscal decentralization implemented in 2001, slowly the economic activity in eastern region of Indonesia began to improve significantly. Based on the data from Indonesia Central Statistics Agency (BPS), in national level, during the 2004 to 2013 Indonesia economic growths were steady at 6% a year on average. On the other hand, the national inequality level according to Williamson index shows an improvement, if in 2004 the inequality level was at 0.63, in 2013 the inequality level decreased to 0.53.

Meanwhile, in provincial level, the ten years average economic growth rate was varied across provinces. Eleven highest provincial economic growth shows average economic growth relatively above national economic growth, where West Papua province (the far east province in Indonesia) experienced the highest ten years average economic growth by 12% (see table A.3). Top seven highest provincial economic growths were positioned by province in the eastern region of Indonesia, and from top eleven only one province represented Java islands (east java province). This condition, of course shows that central government effort to stimulate economy in the eastern region of Indonesia (because majority of poor and low growth province before the decentralization era were in the eastern region of Indonesia) is starting to give them a good result. Even though the size of the economy was not as big as the economy in the west region (especially java islands), but it is a good sign that shows the policy is on the right track. On the other hand, the provincial inequality level also shows various results across provinces (see table A.3). Four out of six provinces in Java islands are in the top ten provinces with high inequality level. The interesting part is, provinces outside Java islands such as Gorontalo, Jambi, Central Borneo, and west Sulawesi provinces who are among the top ten provinces with high economic growth was categorized as low economic inequality provinces. This condition is parallel with the theory pointed out by Birdsall, Ross and Sabot (1995) that says low inequality condition is good for economic growth. Furthermore, if we categorized the provinces in Indonesia based on the fiscal decentralization measurement level (see table A.2), Gorontalo, Jambi, Central Borneo and West Sulawesi provinces are among the top eleven provinces with higher fiscal decentralization level. This description is a good start to prove this study hypothesis which believes fiscal decentralization can reduce inequality level and improve economic growth.

1.2 Research Objective

One implication of act no. 25 year 1999 about fiscal decentralization policy in Indonesia is revenue decentralization where the local government received more (but still limited) taxing authority to increase their real income and higher revenue sharing of natural resources. Besides decentralization on the revenue side, fiscal decentralization policy in Indonesia also emphasized on expenditure side where local government also given "relative" freedom to create policy in public spending, but because not all province had abundant natural resources and good infrastructure, therefore central government must have an important role on determine the revenue sharing policy so poor province can get more funding to run their economy.

After more than a decade of implementation, Indonesia should already experience the positive effect of fiscal decentralization policy. But some of the province still experienced low economic growth and high inequality level. Based on that, this study objective is to analyze and measure how significant is the effect of fiscal decentralization on regional economic development indicators such as the level of economic growth and inequality.

1.3 Research question

Based on the objective of the study discussed above, the questions developed for this study are:

1. What is the effect of fiscal decentralization to economic inequality across province in Indonesia?
2. What is the total effect (directly and indirectly through inequality) of fiscal decentralization to regional economic growth in Indonesia?

1.4 Structure

To answer the question above, this study will start chapter 2 by explaining the theory about fiscal decentralization, what it meant by economic indicators such as growth and economic inequality, what is the relationship between fiscal decentralization and those economic indicators, and gives an example of earlier research that has been done in analyzing the relationship between fiscal decentralization and economic growth and economic inequality. Then in chapter 3 will be describing the possible channel used to linked fiscal decentralization and economic growth, inflation and economic inequality. Then the explanation about the data and variable used in this study, also the model and hypothesis build on this study. Then chapter 4 will describe the result of the analysis that has been done in this study, then, conclusion will be made to sum up the analysis that has been done, and hopefully can answer the question of this study. The study will do analysis in 33 provinces (excluded Kalimantan Utara province, which was recently formed in 2012) in Indonesia for a period from year 2004 to 2013. From several economic indicators, this study will emphasize the analysis of provincial economic growth and inequality level as a main indicator that affected by fiscal decentralization policy. The use of other variables in this study is to support the main analysis on economic growth and Inequality level.

1.5 Contribution to development studies literature

Many researches had been done before on the relationship between fiscal decentralization and economic growth. But many of the research analyze the direct effect of fiscal decentralization on economic growth. Meanwhile this study argued that besides the direct effect, fiscal decentralization also can influence economic growth indirectly through its effect on inequality level, so this study not only analyze the direct effect but also the indirect effect of fiscal decentralization on economic growth through inequality level. Not many researches had been done before to analyze the indirect effect of fiscal decentralization on economic growth especially through inequality level. Furthermore, the methodology uses in this study to analyze the relationship between fiscal decentralization and economic growth is seemingly unrelated regression (SUR) which rarely used in the fiscal decentralization research before. Hopefully this research can enrich development study literature on the fiscal decentralization indirect effect on economic growth.

Chapter 2
Literature Review

This chapter discussed theories about fiscal decentralization, economic growth and inequality level. This chapter also describes how fiscal decentralization interacts with inequality and economic growth based on some theory and research done by several people before. The result of several earlier research on fiscal decentralization discussed here are also become basic argument for this study.

2.1 Theories about Economic Growth, Inequality and Fiscal Decentralization

Fiscal decentralization has become popular policy in the last few decades, some of the economist argued that the fiscal decentralization policy is one of the reasons behind the success of China become one of the most improving economic growth country several decades ago. The success of China has made many developing countries to implement fiscal decentralization policy in their economy. According to Akai and Sakata (2002), fiscal decentralization basically can be described as devolution of a power or authority in term of policy making from a higher level of government to its lower level government. Furthermore, they stated that the standard approach that is mainly used to measure the authority devolution or fiscal decentralization is using an accounting measure such as revenue decentralization and expenditure decentralization. Fiscal decentralization is strongly connected with public funds revenue and expenditure function relationship between central government and regional or local governments (Muluk, 2006 in Wardana et.al., 2010). Moreover, Wardana et.al. (2010) added that to create an effective local government, besides giving them more freedom to create spending policies in the public sector (expenditure decentralization), they also must have enough revenue resources that they can manage independently (Revenue Decentralization), but if they do not have enough revenue resources, then central government should help them by providing the resources they need. These fiscal decentralization policies can help improve country's efficiency and effectiveness, stabilizing and improving the economy. Stoker (1991) added that the fiscal decentralization policy can also help to improve the competitive advantage of a country or region compare to another country or region. This because through fiscal decentralization one local government has more freedom to create fiscal policy that offers better tax system and public services than other local government. Besides its promising benefit, fiscal decentralization system can also create failure if the government made the wrong design of the decentralization system (Prud'homme, 1995). This wrong designed system happens if the decentralized system creates a soft budget constraint (Kornai, 1979), the low transaction cost condition in local government cannot be fulfilled, and weakening the lower government accountability system. One thing that sometimes people do not understand is that fiscal decentralization is not the main purpose, but it is an instrument for helping a country to achieve their main goal which is public wealth (MOF, 2004). Since the autonomous era in Indonesia in 1999, many rich local government (district and province) demand fiscal independence from central government so they can manage their own spending and revenue from their abundant natural resources, while on the other hand, poorer region demand more transfer funds from central government. This condition has become a

challenge for Government of Indonesia in determining how far is the level of decentralization they have to make so they can create equal public wealth in all regions.

Basically, the purpose of fiscal decentralization policy in Indonesia is to improve local economic growth and reduced the inequality level across region in Indonesia. Government of Indonesia tries to improve local economic growth because it is maybe the most important and popular economic indicator to describe a country/region wealth and economic activity. Many countries, especially poor and developing countries believe that by achieving high economic growth they can solve all problems in their country such as poverty, and increase their public wealth. World Bank (2004) define economic growth as the increasing value of goods and services produced by a country for one year period, the goods and services produced by a country also known as country Gross Domestic Product (GDP) or country Gross National Product (GNP), so basically economic growth is the increasing value of GDP/GNP (usually in percentage) of a country in one year period. Furthermore, World Bank (2004) classified economic growth into two terms, first is extensive growth, this means the increasing value of goods and services produce than before is mainly because of the increasing number of resources used such as natural resources, labor resources, or capital resources or in other word, they use more input to produce more output. The second term is intensive growth, what makes it different from extensive growth is that intensive growth country uses the same amount of input than last year, but they can produce more goods and services because of increasing efficiency in production process.

Other goal that the government of Indonesia wanted to achieve from fiscal decentralization policy is to reduce inequality level across region. Inequality in term of economic is usually referring to the gap of wealth distribution between one region and another region. Many developing countries try to reduce their inequality level because they believe that low inequality condition is good for economic growth. This point of view similar to the argument pointed out by Birdsall, Ross and Sabot (1995), they argue that the rapid economic growth of East Asian countries has experienced is because of they have successfully reduced the wealth inequality in their country. Their study also found out that there are positive correlation between low inequality condition and improving economic growth. There are many ways can be done to reduce inequality level, one of them is by fiscal decentralization policy, Prud'Homme (1995), Shankar and Shah (2003) and Gil et.al. (2004) indicate that fiscal decentralization can reduce inequality by creating a local competitive advantage and reducing territorial imbalance. On the other hand, the inequality itself can be measured by several indicators such as Gini index, Theil index and Williamson index. Gini index also known as Gini ratio or Gini coefficient described the distribution of income received by groups of population based on the amount of income they received. Meanwhile, theil index is "the expected information content of the indirect message which transforms the population shares as a prior probability into the income shares as posterior probabilities" (Conceicao and Ferreira, 2000:2). Next inequality measurement method is Williamson index, unlike the Gini index and Theil index which measured income inequality per group population, Williamson index was used to measure economic activity inequality across region. Because of that reason, this study uses Williamson index as a measurement method for inequality level. Basically, the provincial inequality level according to Williamson index is the economic gap between districts/city inside the province region. And the formula of Williamson index is:

$$V_w = \frac{\sqrt{\sum_{i=1}^{n}(y_i - y)^2 \left(\frac{f_i}{n}\right)}}{y} \qquad 0 < V_w < 1$$

Where:

Vw	: Williamson Indeks
yi	: GDP per-capita of region *i*
y	: Average GDP per-capita of all region
fi	: Population number of region i
n	: Total population in all region

This study will use the Williamson index as a main indicator for inequality level, but the Gini index will also be used in the analysis as a robustness test to give more reliable and convincing results. The reason why Williamson is chosen as inequality level in measurement is because according to Sjafrizal (1997) Williamson index is the most representative indicator to measure development disparity across region (intra and inter regional region development) because it can give some advantage that other index did not give such as; First, Williamson index can measure the inter region and across region disparity at the same time so it can give broader analysis; Second, this index can also measure the contribution of each region to national development process which can give important information in policy decision.

2.2 The relationship between Fiscal Decentralization, Economic Growth and Inequality

To linked one indicator to another, a channel that connects the relationship between them is needed. There are many theories that linked fiscal decentralization, economic growth and inequality through several possible channels. Theory pointed out by Barro (1988) is used in this study to analyze the direct effect of fiscal decentralization on economic growth. Moreover, Barro (2013) also pointed out that besides the direct effect, fiscal decentralization can also indirectly affect economic growth through several possible channels. On the other hand, Prud'Homme (1995), Shankar and Shah (2003) and Gil et.al. (2004) provide arguments that describe the relationship between fiscal decentralization and inequality level.

2.2.1 Fiscal Decentralization effect on economic growth

The fiscal decentralization and economic growth model used in this study was formulated based on Barro (1988) research on government spending in endogenous growth models. Modifying the basic endogenous growth model, Barro (1988) incorporate public sector to the model by considering the role of public services as an input to private production. He modified Cobb-Douglass production function by adding government role (g):

$$y = f(k,g) = Ak^{1-\alpha}g^{\alpha} \qquad (1)$$

with g is the public services provided to household producer, k is the private producer's/household quantity of capital, and A is the technological progress. He then assumes that the government doing no production at all, they provide public services by buying the output from the private sector. This purchasing transaction is which Barro believes correspond to the input of the private sector in Cobb-Douglass equation above. So basically the government and private sector have the same production function. Started by assuming that all government expenditure is financed from tax revenue with a flat income tax rate, he then derived the equation to get the marginal product of capital (f(k)):

$$f(k) = (1-\alpha)\, A^{1/(1-\alpha)}\, \tau^{\alpha/(1-\alpha)}$$

From the equation above we can see that an increase in revenue and expenditure ratio (represented by τ) also increases the marginal product of capital (output). In other words government spending can improve output.

Even though many theories pointed out that fiscal decentralization can improve economic growth, but some empirical research came out with the opposite result. Like Vazquez and McNab (2001), by using unbalanced panel data from 180 countries around the world they test the effect of fiscal decentralization on economic growth and price stability. They failed to find the connection between fiscal decentralization and economic growth in developing countries, and in developed countries they found out that fiscal decentralization had a negative direct impact on economic growth. Even though the result shows negative relationship, but they found the positive and significant effect of fiscal decentralization on price stability in all countries' level. Based on this research, they then do another research in 2006 (Vazquez and McNab, 2006) that came out with different result than before. Using the same fiscal decentralization measurement (fiscal decentralization as a share of sub national revenue to total revenue) but with more update data and more countries sample, they found out that even though the direct effect of fiscal decentralization on economic growth is negative, but the positive effect created by fiscal decentralization in macro stability has reduced the negative effect on growth, and low inflation in stabilizing macro condition can improve economic growth. So by creating macro stability, fiscal decentralization can improve economic growth. Other research is by Aisyah (2012) who analyze the impact of fiscal decentralization on economic growth in Indonesia from 1999 to 2003, conducting a research in provincial level, she concludes that fiscal decentralization significantly and positively affects economic growth, but the effect itself is very small. Then Grossman (1992) who conduct a research on fiscal decentralization and economic growth in USA and Australia found out that fiscal decentralization can have positive impact on economic growth if the fiscal dependence of state government on the commonwealth can be reduced.

On the other hand, Davoodi and Zou (1998) who analyze fiscal decentralization in 46 countries between periods 1970 – 1989 found out that the impact of fiscal decentralization on economic growth is negative in developing countries while for developed countries they cannot find any significant relationship. They argued that developed countries are too homogenous than developing countries, so there is not much cross country variation in their panel data for developed countries that is why they cannot found any significant relationship between fiscal decentralization and economic growth in developed countries. While for the developing countries, the negative relationship can happen for several reasons. First, local government

makes spending on the wrong item that is actually less importance for their economy. Secondly, wrong revenue assignment where local government uses central government tax instrument. And third, central government still has major role in collecting revenue and spending decisions. Other research who concludes negative relationship between fiscal decentralization and economic growth is Zhang and Zou (2001) for the case of China fiscal decentralization policy, they conclude that instead of revenue and expenditure convergence that improve economic growth, but the divergence of revenue and expenditure in China that can increase economic growth.

Even though earlier research discussed above mostly came out with negative direct relationship, but the successful of countries like China and other East Asian countries in conducting fiscal decentralization policy is a reason to believe that if it managed correctly, fiscal decentralization policy is good for economic growth. As Aleksander (2012) said that a country that had better administrative and technical capability can have more successful and effective fiscal decentralization policy.

2.2.2 Fiscal decentralization effect on inequality

The common argument that saying fiscal decentralization can be good for inequality level is based on an argument by Musgrave (1959) and Oates (1972). They said that by devoting fiscal power to lower level government will lead to higher efficiency in public services (Oates: 1993 in Ezcurra and Pascual: 2008). Furthermore, Ezcurra and Pascual (2008) argued that the efficiency improvement could happen because local government can allocate resources according to the need and preferences of public better than central government because they are much closer to the public. Based on this argument, many believe fiscal decentralization also bringing government closer to the public. On the other hand, some also argued that centralized government is better in term of income distribution, because they have more knowledge for channeling resources from rich region to poor regions (Prud'Homme, 1995). But the research done by Birdsall, Ross and Sabot (1995) in East Asian countries found out that the improving economic growth in East Asia can be associated with the low inequality condition which they have successfully created, because low inequality condition have a positive impact on economic growth.

Despite the different argumentation among economists, there are several possible channelss (besides one that already mention above) that can link fiscal decentralization to reduced inequality level. First, fiscal decentralization can make poorer region offer better tax system so they can stimulate investors come to their region (Prud'Homme, 1995); Second, with fiscal decentralization system, poor region can create a more flexible labor market (Shankar and Shah, 2003); Third, bring political power away from the central government and its close region which then contributes to the falling territorial imbalance existence (Gil et.al., 2004); and many other possible channel. These several positive conclusions about fiscal decentralization and inequality across region become the basic arguments in this study to consider that fiscal decentralization can reduce inequality level.

There are also many empirical research has been done to analyze the relationship between fiscal decentralization and inequality. For example, Sepulveda and Vazquez (2011) found out that fiscal decentralization can help a country to reduce the inequality level across the region. Their research involved 56 countries consist of 34 developing countries and 22 developed countries.

After doing panel data estimation, they conclude that if the government had more than 20% share of the economy, fiscal decentralization can reduce the poverty and inequality level. Furthermore, they added that the fiscal decentralization policy can reduce inequality because it increase the amount of public resources transferred directly to the poor which then increase the disposable income of the poor. Other research that supports their finding was the research done by Ezcurra and Pascual (2008). After conducting a research in several European Union countries and employ a two way fixed effects panel data model they conclude that the devolution of power in term of fiscal policy from central government to its lower level government can reduce the regional inequality level. Furthermore, they said that fiscal decentralization policy can reduce the inequality level because it can make distribution across region become more balance so it will create economic equality across region. Next research that also found a negative relationship between fiscal decentralization and inequality level is the research by Lessman (2009), he stated that even though no significant relationship sign in the poor region, but in rich region, low level of inequality can be associated with high level of fiscal decentralization. Furthermore, Lessman (2012) concludes that there are several conditions a country should have if they want to successfully reduced regional economic disparities with fiscal decentralization policy, those condition such as; a strong fiscal reallocation system, the length of existing disparities, and the country's wealth. Kyriacou et.al. (2013) support Lessman conclusion by saying that government quality is an important factor that can mediate the relationship between regional disparities and fiscal decentralization. Their argument was based on their research in 24 OECD countries from 1984 to 2006. They discover that fiscal decentralization policy in countries with high quality government setting can create an economic convergence across region, but the opposite happened for those who have poor quality governance, where fiscal decentralization creates economic divergence across region.

2.2.3 Fiscal decentralization indirect effect on economic growth through inequality

As we discussed earlier, fiscal decentralization can give direct effect on economic growth and inequality level, and since inequality level can also have a direct effect on economic growth (Birdsall, Ross and Sabot; 1955), so theoretically fiscal decentralization can also affect economic growth indirectly through its effect on inequality level. Barro (2000) pointed out that, inequality can affect economic growth through four possible channels: Credit market imperfections, political economy, social interest and saving rates. On the political economy channel, according to Barro (2000) "If the mean income in an economy exceeds the median income, then a system of majority voting tends to favor redistribution of resources from rich to poor. These redistributions may involve explicit transfer payments but can also involve public-expenditure programs and regulatory policies." Barro (2000) then added that redistribution through the political process, for example the transfer payment and decentralized tax, finance policy can bring effect that distort economic decision, or in other word, the higher the redistribution of resources tend to create more distortion which will affect economic growth. Furthermore he concludes that high level of inequality can reduce economic growth. Meanwhile, the relationship of fiscal decentralization and inequality according Ezcurra and Pascual (2008) is that fiscal decentralization can reduce regional inequality through redistribution of resources, and by changing the inequality level theoretically it can affect the economic growth on that region. Moreover, a contradictive result discussed before between theory and empiric research on the relationship fiscal decentralization and economic growth makes us argued that maybe even

though the direct effect of fiscal decentralization on economic growth is negative, but there are other factors that influenced by fiscal decentralization that can make economic growth improving. A research by Fadli (2014) had discovered that fiscal decentralization affects economic growth directly and indirectly. By using a quantitative method and path analysis, he analyzes regions in Indonesia and then conclude that fiscal decentralization have a direct and indirect effect on economic growth and regional disparity. Although his research only proves the existence of the indirect effect of fiscal decentralization on economic growth without any further explanation on why and how big, but the research by Vazquez and McNab (2001) discussed earlier shows that one of the positive indirect effect of fiscal decentralization on economic growth is through creating price stability or low inflation level. Their research was in line with World Bank (1997) conclusion that there are several channels that fiscal decentralization can indirectly improve economic growth such as creating macro stability and reduced inequality level. Low inequality level can support economic growth was pointed out by Ostry et.al. (2014). Their research found out that economic equality can help creating a rapid and durable economic growth. On the other hand, inequality is disadvantages for growth because the existence of high inequality in a country indicates that societies will put more effort on reducing inequality by redistribute more, but this effort can creates an adverse effect on economic growth. That is why from this point of view, this study will not only analyzes the direct effect, but also try to analyze the indirect effect of fiscal decentralization on economic growth through inequality level.

Chapter 3
Data and Methodology

This chapter describe about the data, models, hypotheses, and methodology used in this study. Then there is also an explanation about variables used in the estimation and expected result based on the theory and earlier research discussed before.

3.1 Hypothesis

As we discussed earlier, fiscal decentralization, economic growth and inequality can have significant relationship through several possible channels. Fiscal decentralization can have positive direct effect on economic growth (Barro, 1988; and Davoodi and Zou, 1998), while fiscal decentralization reducing inequality by equal redistributive resources across region (Ezcuerra and pascual, 2008), so from its effect on reducing inequality, this study believed that fiscal decentralization also have positive effect indirectly to economic growth. And based on this understanding, this study developed a hypothesis:

"Fiscal decentralization positively affects economic growth directly and indirectly through reducing inequality."

3.2 Data, period and methods used

This study will analyze the effect of fiscal decentralization on regional economic development across province in Indonesia for ten years period from 2004 to 2013. This period was chosen based on the availability of the data because the latest and complete data for provincial level only available since 2004. There are 34 provinces in Indonesia, but because of the data availability and one province just formed recently (Kalimantan Utara province was formed in 2013), so the study will only analyze across 33 provinces in Indonesia. The data used in this study were taken from Indonesia Central Statistics Agency (BPS) for data such as Gross Domestic Product (GDP), population, School enrolment rate, employment level etc. and from Ministry of Finance of Republic of Indonesia for data involving Provincial Finance issue.

This study will be done with the help of Stata software. And since the data used in this study is panel data, so the analysis will be done by using Seemingly Unrelated Regression (SUREG and XTSUR) and three stages least square method (REG3). The result of those two method will be compared, then choose one that have more meaningful result for analysis.

3.3 Models and variables used in the research

3.3.1 Dependant Variables and main explanatory variable

There are two models and two dependant variables used in this study. First model uses provincial economic growth as dependant variable, and second model uses provincial inequality level as it dependant variable. Provincial inequality level in the second model also used as explanatory variable in the first model. Meanwhile, the main explanatory variable that we want to analyze is fiscal decentralization, this variable were used in both models. Provincial growth of GDP in percentage (growth) is used as dependant variable following the World Bank (2004) classification of economic growth, where they define economic growth as the increase of GDP

of a country in one year period. Second dependant variable which also used as explanatory model in first model is provincial inequality level (ine). There many ways to measure inequality level such as Gini index, Theil Index or Williamson index, as we discussed earlier in this study, Williamson index will be used because these index shows the different on economic activity across region which is suits the study on regional economic development (Sjafrizal, 2012). The main explanatory variable and our study objective is fiscal decentralization (fd). To measure fiscal decentralization, this study uses indicators of fiscal decentralization derived from IMF's Government Finance Statistics (2001). Many research and study on fiscal decentralization also uses indicators form GFS such as Davoodi and Zou (1998), Murshed and Tadjoedin (2008), Aisyah (2012), Zhang and Zou (2001) and many others. According to IMF, there are five indicators can be used to measure fiscal decentralization:

a) Sub national revenues as percentage of Gross Domestic Products (GDP)
b) Sub national expenditure as percentage of Gross Domestic Products (GDP)
c) Sub national revenue as percentage of total revenues
d) Sub national expenditure as percentage of total expenditure
e) Vertical Imbalance

Furthermore, GFS broken down revenue into tax revenue, non-tax revenue such as retribution, higher level government transfer and grants. The break downs of expenditure can be classified into current and capital expenditure but excluding the interest payment. Meanwhile, what GFS means with vertical imbalance is the dependency level of local government to central government. This indicator can be measured by the shared of the amount of fund transferred from central government to local government as revenue to finance their expenditure.

Based on the description, this study will used the first indicators "sub national revenues as percentage of GDP" as a measure for fiscal decentralization. Since this study is across province, so the measurement of fiscal decentralization used is provincial total revenues as percentage of provincial GDP. This study will also analyze the result if using other indicators such as fiscal decentralization as a provincial total expenditure as a share of provincial GDP, the purpose of doing so is to do a robustness test and make a comparison between revenue decentralization and expenditure decentralization. The fiscal decentralization indicators measurement used in this study same as the measurement used by Aisyah (2012) who also do a research on Fiscal decentralization in state level (equal to province level in Indonesia Government system) where she adopt the measurement used by Murshed and Tadjoedin (2008) who conduct a research about fiscal decentralization at district level in Java Indonesia. They use the district government economic size relative to local income (local government expenditure as a share of GDP) as a fiscal decentralization indicator measurement as a proxy for the state capacity.

a) Model 1

$$G_{it} = \beta_1 + \beta_2 ine_{it} + \beta_3 fd_{it} + \beta_4 taxr_{it} + \beta_5 X_{it} + \varepsilon_{it}$$

This model was adapted from Davoodi and Zou (1998) and Barro (1988) with modification pertinence to Indonesia fiscal decentralization policy and province characteristics. As explain before, the dependant variable used is provincial **economic growth (G)** which is yearly growth

of provincial GDP, $\boldsymbol{i}$ correspond to province, while $\boldsymbol{t}$ correspond to year. The explanatory variables used are provincial **inequality level (ine)**, **fiscal decentralization (fd)** and **tax ratio (taxr)**. The use of tax ratio as explanatory variable because taxes charged by sub-national government level can have distortion effects on economy (jin & fu Zou, 2005), so this study uses provincial tax rate, measured by total tax collected by regional government (not central tax) in the province as a share of provincial GDP, to get the distortion effect at the provincial level. According to tarigan (2005) the improvement of tax revenue will also provide a better public service for community, so the relationship between tax and economic growth is expected to be positive. According to the theory discussed earlier in this study, the expected relationship result between fiscal decentralization and economic growth is positive relationship where fiscal decentralization lead to increasing economic growth, while between inequality level and economic growth the result were expected to be negative, where the decreasing value of inequality will lead to improvement in economic growth.

This study also uses control variables (**X**) to improve the robustness of the variable's coefficient. First control variables used in this model are investment ratio **(invr)** which is provincial government spending on infrastructure as a share of provincial GDP. This variable used as a proxy for Capital and to control the provincial welfare. According to lessman (2009) the better the infrastructure build by government for the society the higher the welfare of the society. Second control variable used is logarithmic form of **transfer fund (ln_fund)** which is allocation fund from central government to local government to help them stimulate their economic activity so the poor local government can catch up the growth of rich local government. Lessmann (2009) stated that interregional transfer and unconditional grants from the central government to create convergence among regions are one of the channels to redistributive resources between regions that is why this study uses allocation fund from central government (fund) as a control variable. Furthermore, (lessman, 2009) pointed out that the sign of the relationship between transfer fund and economic growth were still unclear because theoretically it can stimulate the growth of infrastructure investment, but on the other hand it also can "retard the structural change in poor regions". So the relationship can positive and can be also negative. Third control variables used is **secondary school enrollment rate (hc)**, following the model of Davoodi and Zou (1998) and Tarigan (2005) this variable were used as a proxy variables for human capital. Next control variable used is **population growth (pop)**, some previous research (Davoodi and Zou, 1998; Zhang and Zou, 2001) uses population growth as a control variable because basically growth of population usually linear with growth of labor, so theoretically it has positive relationship with economic growth. Furthermore, population growth variable also used to control the provincial size effects (Lessman, 2009). The last control variable used is logarithmic form of **per capita GDP** in previous year **($\ln\_gdpcap_{t-1}$)**.

b) Model 2

$$ine_{it} = \partial_1 + \partial_2 fd_{it} + \partial_3 agremp_{it} + \partial_4 X_{it} + \varepsilon_{it}$$

This model was adapted from model proposed by Lessman (1955) and Kuznets (1955) also with modification pertinence to Indonesia fiscal decentralization policy and provincial characteristics. The dependant variable used is **inequality level (ine)** measured by Williamson index. While the explanatory variables are **fiscal decentralization (fd)** and **ratio of employment work on**

agriculture, forestry and fisheries sector (agremp). As Kuznets (1955) suggest in Lesmann (2009), the consideration on using variable share of employment work in agricultural sector (agremp) in regression is because of the farm based economies usually has higher inequality level than those who do not, while on the other hand if the share of labor force worked in manufacturing sector is high the inequality will be lower. So Kuznets believes that the relationship between agriculture employment ratio sector and inequality are negative. Meanwhile, the relationship between fiscal decentralization (fd) and inequality level (ine) were expected to be negative, where the higher the degree of fiscal decentralization the lower the inequality level in that region.

Same as in previous model, this model also use several control variables (**X**) to improve the robustness of the variable's coefficient. First control variable used is **Investment ratio (invr)** which is total provincial government spending on physical infrastructure as a share of GDP, as explained before in the previous models, investment ratio is used to control the size of the welfare province (social values). It means that the higher the spending in infrastructure the richer the province is and can contribute more benefit to society which then reduce the inequality level (lessman, 2009). Second control variable used is **population growth (pop)**, The use population growth (pop) as a control variables is to control the provincial size effects (lessman, 2009). The next control variables used are logarithmic form of **per capita GDP (ln_gdpcap)** in the following year and logarithmic form of central government **transfer fund (ln_fund)**. Lesmann (2009: 13) said that "a wealthier country has a larger scope for redistributive policies through transmission channels besides interregional grants and transfers". The wealth of a country can be measured by GDP per capita in the following year (ln_gdpcap) that is why this study used it as a control variable, and the fund transferred by central government (ln_fund) to regional government can be used to measure the interregional grants and transfers channels.

3.4 Statistic Descriptive

As mention before, this study uses data taken from Indonesia Central Statistics Agency (BPS) and Ministry of Finance. There are 11 variables used with two variables as dependent variables (growth and inequality). The object of the analysis is in 33 Provinces across Indonesia with the period between 2004 and 2013 so if the data is complete there are 330 data for each variable used. The description of the data condition is described in table below:

Table 1
Statistic Descriptive

Var.	obs	Mean	std.dev	min	max
Growth	330	0.058	0.042	-0.225	0.364
Fd	329	0.434	0.452	0.262	2.951
Ine	329	0.581	0.238	0.11	0.99
Taxr	329	0.027	0.017	0.001	0.15
Invr	329	0.112	0.146	0.01	1.2
HC	325	0.582	0.083	0.39	0.81
Pop	330	8.512	91.333	-0.244	1191
ln_fund	329	8.786	0.864	6.453	10.831
ln_gdpcap	329	8.868	0.694	7.653	10.778
ln_gdpcap_{t-1}	326	8.825	0.697	7.581	10.729
Agremp	324	0.468	0.162	0.01	0.83

From the table above we can see that the standard deviation value of population growth variable (pop) is very high, and the maximum value is 1191 (in percentage). This high value exists because of the regional autonomy policy in Indonesia where there are several new districts and provinces formed in Indonesia during 2004 to 2013 such as Sulawesi Barat and Gorontalo Provinces which formed in 2004. Kalimantan Utara Province which was formed in 2012 was excluded from the object of the study. Because the population data for these new provinces in 2003 was not available, so the population growths in 2004 are the number of population.

3.5 Robustness test

As discussed earlier, indicators measurement of fiscal decentralization can be vary, so does the Inequality level measurement. Considering the sensitiveness of our result because of the indicators measurement variables used in the regression, this study will repeat the analysis using an alternative fiscal decentralization and inequality level indicators measurement. The purpose of doing so is to do robustness test on the estimation result obtained before. The alternative indicator use for fiscal decentralization is total provincial expenditure as a share of provincial GDP where some researcher describe it as expenditure decentralization (Murshed and Tadjoedin, 2008) and the alternative indicator use for inequality level is gini index.

Chapter 4
Estimation Result

This chapter will discuss about the estimation result of fiscal decentralization effect on inequality level and economic growth. To analyze whether fiscal decentralization has different impact on economic growth and inequality in low term and midterms, the estimation will be done based on yearly data and 5 years average data. The estimation using yearly data will be done first, then the 5 years average data.

4.1 Yearly data

To discover the estimation method that gives the best result, the data will be estimated using all three estimation method (SUREG, REG3 and XTSUR) and compare the result given. In the end only the method that methodologically shows more meaningful results will be used to make a conclusion.

4.1.1. Estimation result using Seemingly Unrelated Regression (SUR) with pooled OLS

The result using this estimation is as follow:

Table 2

	SUREG OLS		SUREG OLS + Fixed effect	
Dependant Var. / **Independent Var.**	**Growth**	**Inequality (ine)**	**Growth**	**Inequality (ine)**
Inequality (ine)	-0.021*****	-	0.040	-
	(0.012)		(0.026)	
Fiscal Dec. (fd)	0.003	0.038	-0.021	0.0135
	(0.012)	(0.058)	(0.021)	(0.043)
tax ratio (taxr)	0.070	-	-0.060	-
	(0.161)	-	(0.288)	-
investment ratio (invr)	-0.011	-0.414******	-0.012	0.055
	(0.035)	(0.169)	(0.031)	(0.664)
human capital (hc)	-0.063******	-	-0.027	-
	(0.031)	-	(0.071)	-
Population growth (pop)	0.0004	0.155	0.046	0.143
	(0.004)	(0.260)	(0.048)	(0.097)
transfer fund (ln_fund)	0.0004	0.134*******	0.029*****	-0.137*****
	(0.036)	(0.015)	(0.009)	(0.019)
prev. GDP p.c (ln_gdpcap01)	0.007	-	-0.029	-
	(0.005)	-	(0.009)	-
sec. 1 employ. (agremp)	-	0.129	-	-0.014
	-	(0.089)	-	(0.605)
GDP p.c (ln_gdpcap)	-	-0.006	-	0.259*****
	-	(0.023)	-	(0.064)
c	0.038	-0.576*******	-0.067	-0.358
	(0.037)	(0.221)	(0.206)	(0.466)
Fixed Effect	No	No	Yes	Yes
R-square	0.028	0.231	0.3154	0.902
P > F	0.3104	0	0	0

Number of observations: 323
Number in parentheses are standard error
***significant at 1%;**significant at 5%; *significant at 10%

*Complete SUREG OLS fixed effect regression table result in appendix table A.6

The result using simple seemingly unrelated regression (SUREG) with pooled ordinary least square (OLS) estimation method shows that fiscal decentralization variables positively affect inequality and economic growth, but the coefficient value is not significant even at 10% significant level. So using this estimation we failed to find any significant relationship between

fiscal decentralization and inequality and economic growth. Furthermore, based on the estimation result there are only two variables that has significant relationship with economic growth which is inequality level and human capital. The inequality level (ine) variable coefficient shows -0.021 value significant at 10% level, which means if the government can decreased the inequality level by 1%, they can improve economic growth by 0.021%, this founding similar with the theory that saying low inequality level is good for economic growth. Second variable that also has significant relationship with economic growth is human capital (hc) which is the secondary school enrollment rate. The estimation result shows that every 1% increasing value of people enrolled in secondary school level will affect the economic growth decreased by 0.063%, this result quite surprising because almost every growth model theory says that the increasing human capital value is a positive effect for economic growth. On the other hand, the estimation result for the second model (inequality as dependant variable) shows that there are two independent variables that significantly affect inequality level. First variable that has significant effect on inequality level according to this estimation is investment ratio (invr) which is the total provincial government spending on physical infrastructure with coefficient value of -0.414 (significant at 1% level), the negative value means if the investment ratio is increasing 1%, the inequality level will be decreasing 0.414%. The result supports theory pointed out by Lessman (2009) that says the more government increase their spending on infrastructure the wealthier the people will become and reduce inequality level. Second variable that has significant relationship with inequality level is central government allocation fund (ln_fund) with coefficient value of 0.134 significant at 1% level. These coefficient value shows that if central government increase their allocation fund ratio to local government by 1%, this will make inequality level across region also increase by 0.134%.

Second estimation model (SUREG with fixed effect) gives us almost the same results with the previous one. Even though provincial fixed effect included in the model, the relationship between fiscal decentralization and economic growth and inequality level still shows a non-significant relationship. In first equation model, where economic growth is our dependant variable, besides central government allocation fund (ln_fund) variable, others explanatory variables such as inequality level (ine), fiscal decentralization (fd), tax ratio over GDP (taxr), investment ratio over GDP (invr), secondary school enrollment rate as a proxy for human capital (hc), population growth (pop) and previous year of per capita GDP shows non-significant relationship with economic growth. The only significant variable (ln_fund) shows that if the allocation fund from central government increased by 1%, it will gives direct effect to improve economic growth by 0.029%. Same as in the growth equation model, second equation model with inequality level as a dependant variable, the results shows that only central government allocation fund (ln_fund significant at 1% level) and per capita GDP in the year (ln_gdpcap significant at 1% level) that have significant effect on inequality level. Others variables such as ratio of employment who work in agriculture, forestry and fishery sectors (agremp), investment ratio (invr) and population growth (pop) cannot shows significant relationships with inequality level. Based on the estimation results, if the per capita GDP in the following year increases 1%, the inequality level will also increase by 0.259%. Theoretically, increasing GDP per capita should lowering the inequality level, the possible answer to explain the opposite results in the estimation is that the increasing wealth can only be enjoyed by several people especially high income peoples, poor people still remain untouched by the increasing economy. Even though we failed

to discover the significant relationship between fiscal decentralization, inequality level and economic growth from the estimation, but the interesting part from the result is that transfer fund variables (ln_fund) significantly affect both inequality level and economic growth. The effect of transfer fund to inequality is -0.128 significant at 1% level, which means every 1% increase in central government transfer funds will increases inequality level by 0.128%. Theoretically, since inequality level also have effects on economic growth, so transfer fund will also indirectly influence economic growth, but since the coefficient value of inequality level is not significant in growth equation model, we cannot estimate the indirect effect of transfer fund to economic growth.

4.1.2. Estimation result with Three Stage least square (REG3)

Next estimation method is by using three stages least square method (REG3), the difference between this estimation methods with simple SUREG OLS before is that this estimation method taken into account the data as panel data while the previous estimation did not. So theoretically it should give a better result than before. The estimation result using this method is described in the table 3 below:

Table 3

	REG3		REG3 + Fixed effect	
Dependant Var. / **Independent Var.**	**Growth**	**Inequality (ine)**	**Growth**	**Inequality (ine)**
Inequality (ine)	-0.331***	-	0.201	-
	(0.112)	-	(0.365)	-
Fiscal Dec. (fd)	0.036*	0.037	-0.022	0.014
	(0.020)	(0.058)	(0.022)	(0.043)
tax ratio (taxr)	-1.072*	-	-0.032	-
	(0.634)	-	(0.375)	-
investment ratio (invr)	-0.157**	-0.420**	-0.021	0.054
	(0.069)	(0.088)	(0.039)	(0.066)
human capital (hc)	-0.053	-	-0.033	-
	(0.033)	-	(0.073)	-
Population growth (pop)	0.037	0.158	0.055	0.144
	(0.061)	(0.260)	(0.055)	(0.097)
transfer fund (ln_fund)	0.045***	0.134***	0.049	-0.138***
	(0.017)	(0.015)	(0.050)	(0.019)
prev. GDP p.c (ln_gdpcapt-1)	0.0001	-	-0.059	-
	(0.005)	-	(0.084)	-
sec. 1 employ. (agremp)	-	0.147*	-	-0.024
	-	(0.088)	-	(0.055)
GDP p.c (ln_gdpcap)	-	-0.006	-	0.257
	-	(0.023)	-	(0.063)
C	-0.094	-0.496	-0.046	-0.332
	(0.065)	(0.219)	(0.222)	(0.461)
Fixed Effect	No	No	Yes	Yes
R-square	-1.763	0.217	0.232	0.902
P > F	0	0	0	0

Number of observations: 323
Number in parentheses are standard error
***significant at 1%;**significant at 5%; *significant at 10%

*Complete REG3+fixed effect regression table result in appendix table A.7

As seen in table 3, the high significant coefficient level of inequality variable (significant at 1% level) result assert the previous estimation that inequality has a negative relationship with economic growth where economic growth can be improved by reducing inequality level. Here we can also see that fiscal decentralization positively affects economic growth directly, but the effect is too small (0.036 at 10% significant level), where if government want to improve economic growth by 2% say from 3% to 5% they can do it by improving decentralization ratio as much as 55.56% (2%/0.036%). On the other hand, from the second equation model where inequality as dependent variable, we failed to find the effect of fiscal decentralization on inequality level because the coefficient value is not significant at any level. the variables that have a significant effect on inequality level as described in table above is investment ratio, central government transfer fund and agriculture employment level. Furthermore, if we add the fixed effect model on the regression the result is no getting any better at all. Almost all variables in both equation model (growth and inequality) does not have a significant coefficient value to economic growth and inequality.

The estimation result above shows us that if we taken into account the data as panel data, it will give us better estimation results with more significant variables. But Even though the three stages least square method gives a better result than before, but we still failed to find the relationship between fiscal decentralization and inequality which will reject the hypotheses that fiscal decentralization also indirectly influence economic growth through inequality level. So we still we have to do further analysis to make sure the relationship between fiscal decentralization, inequality and economic growth.

4.1.3. Estimation result with Random effect Seemingly Unrelated Regression (xtsur)

Since the fixed effect model failed in finding the relationship between fiscal decentralization, inequality and economic growth, the next estimation will use seemingly unrelated regression for random effect model (xtsur). Same as three stage least square estimation regression (REG3) before this seemingly unrelated regression model for random effect (xtsur) also consider and treated the data as panel data. The result of the estimation is presented in the table 4 below.

As we can see in the table 4, the result by using seemingly unrelated regression with random effect model (xtsur) give us better result with more significant coefficients variables with high significant level. Random effect model gives relatively better result than the fixed effect model is maybe because variables used in the model such as economic growth and inequality level or secondary school enrollment rate as a proxy for human capital did not experience big changes over time, changes in economic growth usually only lie between 0.5% - 1%, the same also happened to inequality level. This relatively small changes over time can make analysis using fixed effect model more unreliable, as Williams (2015) said that "in a fixed effect model, subjects serve as their own controls" so "if subjects change little, or not at all, across time, a fixed effect model may not work very well or even at all."

Table 4

Dependant Var. **Independent Var.**	**Growth**	**Inequality (ine)**
Inequality (ine)	-0.658*** (0.017)	-
Fiscal Dec. (fd)	-0.159*** (0.0178)	-0.289*** (0.014)
tax ratio (taxr)	0.391 (0.248)	- -
investment ratio (invr)	-0.130*** (0.033)	-0.0800213*** (0.027)
human capital (hc)	0.272*** (0.057)	- -
Population growth (pop)	0.003 (0.052)	0.107*** (0.040)
transfer fund (ln_fund)	0.047*** (0.006)	0.080*** (0.003)
Prev.GDPp.c (ln_gdpcapt-1)	-0.024*** (0.007)	- -
sec. 1 employ. (agremp)	- -	0.079*** (0.018)
GDP p.c (ln_gdpcap)	- -	0.009* (0.004)
Iteration 1	0.62040141	
Iteration 2	2.061e-07	
Number of observations: 323 Number in parentheses are standard error ***significant at 1%; ** significant at 5%; *significant at 10%		

Furthermore, based on the result described in the table 4 above, the effect of fiscal decentralization directly to economic growth and indirectly through inequality level is significant. So we can say that fiscal decentralization had significant relationship with inequality and economic growth. In the second equation model with inequality level as dependent variable, the effect of fiscal decentralization is -0.289 significant at 1% level. This means that fiscal decentralization has negative relationship with inequality level, holding other variables constant, if the value of fiscal decentralization increases 1%, will make inequality level decreasing by 0.289%. Another variable which also has a negative relationship with inequality level is investment ratio (invr) with every 1% increase in investment decrease inequality level by 0.080%. Meanwhile, other explanatory variables in the model such as level of employment who work in agriculture sector (agremp), growth of population (pop), transfer fund (ln_fund), and per capita GDP (ln_gdp) have a positive relationship, which means increased value of these variables will also increase inequality level as big as their coefficient values.

In economic growth equation model, besides fiscal decentralization variable, other explanatory variables which also have significant relationship is inequality level (ine), investment ratio (invr), human capital (hc), transfer funds (ln_fund), and per capita GDP in previous years, all of these variables coefficient are significant at 1% significant level. Furthermore, there are only two variables; tax ratio over GDP (taxr) and population growth (pop) which did not show significant relationship with economic growth. Based on the coefficient value, variables which have the highest significant effect on economic growth is inequality level where every 1% decreasing value

of inequality level makes economic growth improve by 0.658%. The positive coefficient value of variable tax ratio (taxr), human capital (hc), central government transfer fund (ln_fund) is linear with the theory discussed before where the increasing value of these variables could improve economic growth. But the most important thing to analyze is the fiscal decentralization (fd) variables since it was our main objective of the study. Based on the estimation results, fiscal decentralization has negative effect on economic growths with every 1% increase in fiscal decentralization makes economic growth decreased by 0.159%. It looks like the results were different with the theory discussed earlier in this study that fiscal decentralization lead to economic growth improvement. But the coefficient value is just showing us the direct effect of fiscal decentralization on economic growth, this study believes that fiscal decentralization also has indirect effect on economic growth through reducing inequality. So to measure the total effect of fiscal decentralization on economic growth, we have to measure the direct effect value and indirect effect value. Direct effect coefficient value already shown in the table, to measure the indirect effect, we can do it by multiplying the coefficient value of fiscal decentralization effect on inequality level with the coefficient value of the inequality effect on economic growth. So, the total effect of fiscal decentralization on economic growth is:

Total Effect	=	Direct Effect + Indirect effect
	=	-0.159 + (-0.289*-0.658)
	=	-0.159 + 0.190
	=	**0.039**

So instead of negative relationships, fiscal decentralization total effect on economic growth is positive. The total effect coefficient value shows us that holding other variables constant, if the fiscal decentralization value increases 1% the economic growth will improve by 0.039% in other words, if government want to increase economic growth by 5% say from 5% to 10%, they can do it by increasing decentralization level ratio by 128.205%.

The positive effect given by fiscal decentralization policy on economic growth through reducing inequality level, shows that fiscal decentralization policy in Indonesia has successfully distributed resources fairly and equally across provinces, this fair resource distribution helps low economic growth province stimulate their economy and improve their economic growth so they can catch up the economic growth level of advanced provinces.

4.1.4. Robustness Test

To improve the robustness on the result, this study runs the estimation again but with other indicator measurement of fiscal decentralization explained by IMF Government Financial Statistics (GFS). The alternative indicator for fiscal decentralization measurement used is total provincial expenditure as a share of provincial GDP. If the estimation result using alternative indicators does not have big different than the previous result, then it will support the conclusion of this study. The estimation result is presented in table 5 below:

Table 5

Dependant Var. / Independent Var.	Growth	Inequality (ine)
Inequality (ine)	-0.655*** (0.018)	- -
Fiscal Dec. Exp. (fd_xp)	-0.181*** (0.025)	-0.410** (0.019)
tax ratio (taxr)	0.316 (0.252)	- -
investment ratio (invr)	-0.058 (0.501)	-0.286** (0.039)
human capital (hc)	0.249*** (0.058)	- -
Population growth (pop)	-0.0001 (0.053)	0.085** -0.041
transfer fund (ln_fund)	0.044*** (0.006)	0.078** -0.007
Prev.GDPp.c (ln_gdpcapt-1)	-0.017** (0.007)	- -
sec. 1 employ. (agremp)	- -	0.077** -0.018
GDP p.c (ln_gdpcap)	- -	0.007 -0.004
Iteration 1	0.61686529	
Iteration 2	1.705e-07	
Number of observations: 323 Number in parentheses are standard error ***significant at 1%; ** significant at 5%; *significant at 10%		

Based on the table 5, we can see that even though the fiscal decentralization indicator was changed but the result is relatively similar with estimation before. Fiscal decentralization has negative direct effect on inequality level and economic growth (both significant at 1% level), and the total effect of fiscal decentralization on economic growth is also positive. The fiscal decentralization total effect on economic growth calculation is:

Total Effect = Direct effect + Indirect effect
= -0.181 + (-0.410 * -0.655)
= -0.181 + 0.268
= **0.087**

This estimation result supports the previous estimation result where fiscal decentralization relationship with inequality is negative and fiscal decentralization total effect on economic growth is positive. This study also has done estimation with alternative variable indicator for inequality level (Gini index) but the result shows an insignificant coefficient for fiscal decentralization in both growth and inequality equation model (Result in appendix table A.9) so we failed to find the relationship if using Gini index as a proxy for inequality level, on the other hand, as discussed before according to Sjafrizal (1997) Williamson index is the most representative indicator to measure development disparity across region.

4.1.5. Analysis with regional and fiscal decentralization level dummy variables

After finding the significant relationship between fiscal decentralization, inequality and economic growth, next step is to analyze the different effect given between provinces. This analysis is done to discover whether the different decentralization level can give different effect or not, also to analyze whether the effect is different in each province. This kind of analysis also useful to help central government to determine the decentralization level devoted to each province, because some province need to be decentralize more to help them grow and others still need central government intensive supervision. To do the analysis, first, to analyze the effect on each Province, 33 dummy province variables will be created and included in the estimation. Second, provinces will be categorized based on decentralization level to prove that higher decentralization level can give higher impact on economic growth. More over based on three estimation method results given before, the Seemingly Unrelated Regression (SUR) estimation that gives the best results is the estimation using random effect model (Xtsur), so further analysis on this study will use this kind of estimation to do analysis on the effect of fiscal decentralization on regional economic development.

Unfortunately, when 33 provinces dummy variables included in the estimation, the fiscal decentralization coefficient variable in both growth and inequality equation model shows insignificant result (see table A.8 in appendix) and most of the provinces dummy variables also shows insignificant coefficient result, so this study failed to conclude the different effect level for each province. But the estimation result shows highly significant coefficient variable for the negative relationship between inequality and economic growth (significant at 1% level), this resultant support previous finding that low inequality can help improve economic growth.

Since the estimation with 33 province dummy variables shows insignificant result, this study then groups the provinces into 5 regions based on the location and characteristic of 5 major islands in Indonesia (Sumatra, Java, Kalimantan, Sulawesi and Papua islands). By doing this, hopefully the estimation result shows the different effect of fiscal decentralization in each region, which can help Indonesia Government in determining the fiscal decentralization policy level based on the region. The estimation results for analysis using 5 region group provinces dummy variables and 3 decentralization level are presented in table 6

Table 6 below describe that, when the province categorized into three fiscal decentralization level categories, provinces that is more decentralized have different effect than others. The estimation results show us that fiscal decentralization significantly affects inequality level and economic growth directly (significant at 1% significant level), and inequality level also have a significant effect on economic growth (significant at 1% significant level) so we can conclude that fiscal decentralization affect economic growth directly and indirectly through inequality level. The direct effect of fiscal decentralization on economic growth is -0.191, which means if fiscal decentralization decrease by 1% the economic growth will also decrease by 0.191%. Same as the previous estimation the biggest impact on economic growth is given by inequality level, where if inequality level can be reduced 1%, the economic growth can improve by 0.705%.

Table 6

Dependant Var. / Independent Var.		Growth	Inequality (ine)	Growth	Inequality (ine)
Inequality (ine)		-0.705*** (0.014)	-	-0.649*** (0.019)	-
Fiscal Dec. (fd)		-0.191*** (0.014)	-0.273*** (0.012)	-0.189*** (0.019)	-0.331*** (0.015)
tax ratio (taxr)		0.779*** (0.208)	- -	0.513* (0.306)	- -
investment ratio (invr)		-0.097*** (0.0267)	-0.038 (0.024)	-0.131*** (0.034)	-0.071** (0.028)
human capital (hc)		0.109** (0.045)	- -	0.189*** (0.063)	- -
Population growth (pop)		-0.022 (0.042)	0.142*** (0.034)	-0.009 (0.0542)	0.122*** (0.042)
transfer fund (ln_fund)		0.039*** (0.004)	0.072* (0.003)	0.052*** (0.006)	0.088*** (0.004)
prev. GDP p.c (ln_gdpcap01)		0.004 (0.006)	- -	0.001*** (0.009)	- -
sec. 1 employ. (agremp)		- -	0.056*** (0.0154)	- -	0.115*** (0.020)
GDP p.c (ln_gdpcap)		- -	-0.009** (0.004)	- -	0.033*** (0.005)
Dummy Variable:					
FD Level:	fd_level2	0.010 (0.010)	0.063*** (0.008)	- -	- -
	fd_level3	0.0001 (0.014)	0.070*** (0.012)	- -	- -
Region:	Region1	- -	- -	-0.278*** (0.034)	-0.493*** (0.029)
	Region2	- -	- -	-0.195*** (0.030)	-0.327*** (0.027)
	Region3	- -	- -	-0.316*** (0.091)	-0.429*** (0.034)
	Region4	- -	- -	-0.732** (0.033)	-0.152*** (0.031)
Iteration 1		0.62040141		0.6008263	
Iteration 2		2.061e-07		4.909e-07	

Number of observations: 323
Number in parentheses are standard error
***significant at 1%; ** significant at 5%; *significant at 10%

Meanwhile, the coefficient value of fiscal decentralization effect on inequality level is -0.273, meaning if fiscal decentralization level increases 1%, it will reduce inequality level by 0.273%. So the indirect effect of fiscal decentralization on economic growth through inequality is 0.193 (-0.705*-0.273). So the total effect of fiscal decentralization on economic growth is 0.002. But remember, we concluded fiscal decentralization level dummy variables in the estimation so it means that this value is only for the provinces in our base group estimation which is the top eleven provinces that have higher fiscal decentralization levels in Indonesia and the effect could be different in another province which has different fiscal decentralization level. For provinces with mid-level fiscal decentralization category, the total effect is measured by adding the fiscal decentralization level dummy variable direct and indirect effect. The indirect effect of mid fiscal decentralization province level dummy variable is -0.045 (fd_level2 effect on inequality

coefficient value 0.063 multiply by -0.705 inequality effect on growth coefficient value) so the total effect is -0.035 (-0.045 + 0.010). Which means, holding other variables constant, if fiscal decentralization increases, the effect on economic growth in the mid decentralize province level is 0.035 smaller than the high decentralize province. But since the p value of the mid decentralize province dummy variable (fd_level2) shows non-significant value even at 10% level, so we cannot conclude the existence of fiscal decentralization effect on economic growth in the mid decentralize province compare to the high decentralize province. Although the dummy variable value in the growth equation shows non-significant results, but the variables in inequality equation models is significant and the inequality coefficient in economic growth is also significant, we can say that there is a significant indirect effect of fiscal decentralization on economic growth in mid decentralize province through inequality level, so we can conclude that the effect of fiscal decentralization on economic growth in there is 0.045 smaller than in higher level decentralize province group. Same thing also apply for least decentralize province, the indirect effect of dummy decentralization level (fd_level3) on economic growth is -0.049 (fd_level3 coefficient 0.071 multiply by -0.705 the inequality effect on growth coefficient value) and the direct effect is 0.0002 but not significant at any level, so the total dummy variable effect for least decentralize provinces is only the indirect effect through inequality level -0.049, it means the fiscal decentralization total effect on economic growth in least decentralize province in fd_level3 category is 0.049 smaller than in higher decentralize province (fd_level1) category.

On the other hand, if we categorize the province into five categories based on the location (see table A.1 in appendix) in 5 major islands in Indonesia will give us the difference value between one region to other region which become our base group region, in this case we use region 5 consist of eastern province in Indonesia as our base group for analysis. The estimation result shows us that the indirect effect of fiscal decentralization on economic growth in region 5 is 0.215 which we get from multiplying the fiscal decentralization effect on inequality coefficient value (-0.033) with inequality effect on the economic growth coefficient value (-0.649), and the direct effect of fiscal decentralization on economic growth is -0.189 which then give us the total effect of fiscal decentralization on economic growth is 0.026 (0.215 + -0.189). It means, holding other variables constant, the increase 1% on fiscal decentralization in region 5 can create improvement economic growth in those regions by 0.026%. Table 7 below shows us the calculation of total dummy variable effect in other region:

Table 7
Dummy Variables (region) total effect calculation

Dummy Variable	Direct effect on growth	Indirect through inequality			Total DV effect
		effect on inequality	inequality effect on growth	Total indirect	
region1	-0.278	-0.493	-0.649	0.320	**0.042**
region2	-0.195	-0.327	-0.649	0.213	**0.018**
region3	-0.316	-0.429	-0.649	0.279	**-0.037**
region4	-0.073	-0.152	-0.649	0.099	**0.026**

From the table above we can conclude that the total effect of fiscal decentralization on economic growth in region 1 is 0.042 higher than its effect in region 1, in other word, if 10% increase in fiscal decentralization variable measurement can give effect on the improvement of economic growth by 0.263% (10% x 0.026) in region 5, the same increasing fiscal decentralization value in region 1 will give them improvement in economic growth 0.305% (0.263 + 0.042). Almost the same conclusions also apply for region 2 and region 4, but the different effect value between these two regions and region 5 is different with region 1. For region 2, if the same changes (whether its increase or decrease) applied on fiscal decentralization in region 5 and region 2, the effect on economic growth in region 2 will be 0.018 higher than in region 5. While in region 4, the difference is 0.026 higher than in region 5. The negative total effect value for region 3 does not mean the fiscal decentralization variable has negative relationship with economic growth in there, but it means that the total effect of fiscal decentralization on economic growth in region 3 is smaller 0.037 than in region 5. Important to understand that the total dummy region variable effect value in table 5, does not only apply for fiscal decentralization variable, but also to other explanatory variables which have significant coefficient values. For example, variables tax ratio (taxr, significant at 10% significant level) and human capital (hc, significant at 1% significant level), the estimation results show us that every increase in 1% tax ratio in region 5 will give a positive effect on economic growth by 0.513%, and every 1% increase in the secondary school enrollment rate in region 5 give positive change in economic growth by 0.189%, but this changes value is different if it happens in other region. The 0.513% increase of economic growth in region 5 because of the 1% increase in tax ratio variable, will give impact 0.042, 0.018 and 0.026 higher if it happens in region 1, 2 and 4, while the impact in region 3 is 0.037 lower than in region 5. The same conditions apply for human capital (hc) variable. For other significant explanatory variables such as investment ratio (invr) and transfer funds (ln_fund) where both shows significant coefficient at 1% significant level, the total effect measurement will be different than tax ratio variables describes before. It is because these two variables affect both inequality and economic growth so the total effect measurement should follow the fiscal decentralization total effect measurement with dummy variables discussed before. Moreover, based on the estimation result, we cannot conclude the relationship between population growth (pop) and previous per capita GDP (ln_gdpcap_{t-1}) variables because the coefficient values are not significant at any level.

4.2 5 years average data

This study next analysis is trying to find out the effect of fiscal decentralization on provincial economic growth and inequality level in mid-term. 5 years average data value for all variables used are calculated to get two mid-term period, period 1 (from 2004 to 2008) and period 2 (from 2009 - 2013). The data still in panel data form, but with less data observation than previous yearly analysis, so the SUR random effect estimation (xtsur) is also used for this analysis. The estimation result presented in table 8. Table 8 below shows us three estimation results, first estimation without dummy variable; second, estimation with fiscal decentralization level dummy variables; and third, estimation with region dummy variable. Same as the previous estimation, the base group used for fiscal decentralization dummy variables is top eleven provinces with higher fiscal decentralization ratio in Indonesia (fd_level1) and for region dummy variable this study used region 5 (east region province) as base group in the estimation. For the first estimation

without dummy variables, the coefficient value sign that shows the relationship between fiscal decentralization, inequality and economic growth is parallel with the theory by Vazquez and McNab (2001 and 2006) saying that fiscal decentralization can improve economic growth and reduce inequality level. But the p value of fiscal decentralization (fd) in both equation models shows insignificant results even at 10% significant level, so we cannot draw a conclusion about the effect of fiscal decentralization on economic growth and inequality level.

Table 8

Dep. Var. / **Independent Var.**	**Growth**	**(ine)**	**Growth**	**(ine)**	**Growth**	**(ine)**
(ine)	-0.109* (0.0179)	-	-0.048* (0.0171)	-	-0.0785329** (0.0176)	-
(fd)	0.016 (0.0305)	-0.078 (0.143)	0.008 (0.026)	-0.046 (0.149)	-0.0305699 (0.0287)	-0.2443745 (0.1495)
(taxr)	-0.329 (0.245)	- -	0.167 (0.240)	- -	-0.305699 (0.2373)	- -
(invr)	-0.057 (0.101)	-0.293 (0.460)	-0.058 (0.085)	-0.149 (0.484)	0.0379941 (0.0911)	-0.0567625 (0.4677)
(hc)	-0.059 (0.055)	- -	-0.082*** (0.043)	- -	-0.0698229 (0.0475)	- -
(pop)	-0.00006 (0.0001)	7.28e-06 (0.0004)	-0.00005 (0.0001)	0.00002 (0.0004)	-0.0000691 (0.0000)	0.0000487 (0.0004)
(ln_fund)	0.012** (0.006)	-0.029 (0.037)	0.007 (0.004)	-0.0094955 (0.0365)	0.0126647* (0.0048)	0.0110824 (0.0350337)
(ln_gdpcap1)	0.006 (0.006)	- -	0.009** (0.009)	- -	0.0082316 (0.0051)	- -
(agremp)	- -	0.304*** (0.143)	- -	0.5121643* (0.1865)	- -	0.42867** (0.1740)
(ln_gdpcap)	- -	0.085** (0.038)	- -	0.0343448 (0.0369)	- -	0.069455** (0.0350)
Dummy Var: fd_level2	- -	- -	-0.028* (0.008)	0.190758** (0.0907)	- -	- -
fd_level3	- -	- -	-0.023** (0.0109)	0.278278** (0.1101)	- -	- -
Region1	- -	- -	- -	- -	-0.0401997* (0.0125)	-0.271779** (0.1187)
Region2	- -	- -	- -	- -	-0.0331413** (0.0149)	-0.1311914 (0.1421)
Region3	- -	- -	- -	- -	-0.059349* (0.0161)	-0.4225054* (0.1416)
Region4	- -	- -	- -	- -	-0.0134814 (0.0123)	-0.3282095* (0.1153769)
Iteration 1	0.34893108		0.35082612		0.43453144	
Iteration 2	9.537e-07		8.596e-07		8.863e-07	
Number of observations: 66 Number in parentheses are standard error *significant at 1%; ** significant at 5%; ***significant at 10%						

Furthermore, next column shows the estimation results when the dummy variables added to the equation model (fiscal decentralization level (fd_level) and regional dummy variables (region)). Almost all the dummy variables coefficient value has significant p value at 5% significant level, so based on the coefficient value we can say that the impact of variables that affect inequality

level and economic growth in region 1, 2, 3 and 4 are smaller than its impact in region 5. Moreover, the impact of variables that affect economic growth in mid (fd_level2) and lower (fd_level3) decentralize provinces group is smaller than the impact in higher decentralized provinces (fd_level1). But since the p value of fiscal decentralization variables shows not significant value at any level, we failed to make conclusions on comparison effect of fiscal decentralization effect on inequality and economic growth across Provinces. One thing we can conclude from the estimation results is that the negative relationship of inequality level and economic growth. All three estimation results show significant p value at 1% significant level. So the estimation results show the same result with theory pointed out by Birdsall, Ross and Sabot (1995) that says low inequality level can improve economic growth.

Chapter 5
Conclusion

Fiscal decentralization policy in Indonesia based on act no. 25 Year 1999 was designed to help poor local government stimulate their economy to increase their economic growth, so they can catch up the development of the advanced local government. Besides improving local economic growth, fiscal decentralization policy also expected to reduce the economic inequality level across province in Indonesia, and reduced inequality level can add more improvement in economic growth. The data on provincial economic growth and inequality level in Indonesia during 2004 to 2013 shows the relationship between inequality level and economic growth. Provinces which had low inequality level among all provinces like Gorontalo, Kalimantan Tengah and Sulawesi Barat are categorized as provinces with high economic growth in Indonesia.
The negative relationship between inequality and economic growth also has proven in this study, almost all estimation results shows a high negative relationship between inequality level and economic growth. Moreover, its effect on economic growth was much higher than the fiscal decentralization direct effect on economic growth. This study also has proven that fiscal decentralization effect inequality level and economic growth, and its effect on inequality create indirect effect on economic growth. Even though the direct effect of fiscal decentralization on economic growth is negative, but the highly positive indirect effect through reducing inequality level has created positive total effect. Even though the effect is relatively small, this study agrees with theory pointed out by Vazques and McNabb (2001) that concludes the direct effect fiscal decentralization on economic growth is negative, but the indirect effect through other variables reduced the negative effect. In this case, the positive effect of fiscal decentralization on economic growth by reducing inequality level is higher than the negative direct effect, so fiscal decentralization does improve economic growth. The channel used by fiscal decentralization used to improve economic growth is by reducing the inequality level across provinces through better resource distribution.

Although the total effect is positive, but the negative direct effect of fiscal decentralization on economic growth across provinces in Indonesia shows there is still room for improvement in Indonesian fiscal decentralization policy. The more efficient resource allocation (Musgrave, 1959) which supposed to be created by this policy is not yet maximized. One possible answer for this is that even though local governments have more power in spending decision, but central governments still have a major role in revenue or taxing policy. Almost all of the major tax revenue such as income tax, tax on resources, and many others were determine and collected by central government, leaving local government with the relatively low value tax revenue like property tax, vehicle tax and others. Although central government provides transfer fund to local government but the amount of the fund transferred is also determined exclusively by central government. If local government can have more power in taxing authority, maybe their economy can improve more high and rapid than before.

Since we failed to find significant relationship between fiscal decentralization and economic growth in the midterm (5years average), therefore the conclusion of this study is only for year on year data analysis. Furthermore, besides positive relationship between fiscal decentralization and economic growth, this study also found out that the more the provinces is decentralized the

more economic growth improvement they will experience. On the other hand, if we talk the effect of fiscal decentralization on economic growth regionally, fiscal decentralization impact on economic growth for provinces in Moluccas, Nusa and Papua islands is smaller than the impact for provinces in Sumatra Island, Java and Bali Island, and Borneo Island, but the impact is relatively higher than the provinces in Sulawesi Island.

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APPENDIX

Table A.1

Province Sample and region classification

No	Province	Region		No	Province	Region
1	Nanggroe Aceh Darussalam	1		18	Kalimantan Barat	3
2	Sumatera Utara	1		19	Kalimantan Tengah	3
3	Sumatera Barat	1		20	Kalimantan Selatan	3
4	Riau	1		21	Kalimantan Timur	3
5	Kepulauan Riau	1		22	Sulawesi Utara	4
6	Jambi	1		23	Sulawesi Tengah	4
7	Sumatera Selatan	1		24	Sulawesi Selatan	4
8	Bengkulu	1		25	Sulawesi Barat	4
9	Lampung	1		26	Sulawesi Tenggara	4
10	Kepulauan Bangka Belitung	1		27	Gorontalo	4
11	DKI Jakarta	2		28	Nusa Tenggara Barat	5
12	Jawa Barat	2		29	Nusa Tenggara Timur	5
13	Jawa Tengah	2		30	Maluku	5
14	DI Yogyakarta	2		31	Papua	5
15	Jawa Timur	2		32	Maluku Utara	5
16	Banten	2		33	Papua Barat	5
17	Bali	2				

Table A.2

Province Classification According to fiscal decentralization level

Fd level	Fd ratio	Province	Fd level	fd ratio	Province	Fd level	fd ratio	Province
1	0.8	Papua	2	0.37	Papua Barat	3	0.25	Lampung
1	0.78	Maluku Utara	2	0.36	Sulawesi Tengah	3	0.23	Kal. Timur
1	0.75	Maluku	2	0.35	Nusa Tenggara Barat	3	0.22	Sum. Selatan
1	0.70	Gorontalo	2	0.33	Sulawesi Utara	3	0.19	Jawa Tengah
1	0.69	Nusa Tenggara Timur	2	0.32	Kep. Bangka Belitung	3	0.19	Riau
1	0.6	Sulawesi Barat	2	0.30	Kal. Selatan	3	0.17	Sum. Utara
1	0.53	Bengkulu	2	0.29	Bali	3	0.14	Kep. Riau
1	0.50	Sulawesi Tenggara	2	0.29	Kalimantan Barat	3	0.13	Jawa Barat
1	0.44	Kalimantan Tengah	2	0.29	Sulawesi Selatan	3	0.12	Jawa Timur
1	0.44	Ng. Aceh Darussalam	2	0.27	Sumatera Barat	3	0.12	Banten
1	0.42	Jambi	2	0.25	DI Yogyakarta	3	0.06	DKI Jakarta

Table A. 3

Province Average Growth and Inequality

No	Growth	Province		Williamson Index	Province
1	0.128	Papua Barat		0.977	Jawa Tengah
2	0.083	Sulawesi Tengah		0.941	Jawa Timur
3	0.080	Sulawesi Tenggara		0.928	Papua
4	0.075	Gorontalo		0.884	Nusa Tenggara Barat
5	0.073	Sulawesi Barat		0.864	Riau
6	0.070	Sulawesi Utara		0.8	Banten
7	0.070	Sulawesi Selatan		0.783	Sumatera Utara
8	0.068	Jambi		0.766	Sumatera Selatan
9	0.064	Kepulauan Riau		0.736	Jawa Barat
10	0.062	Kalimantan Tengah		0.718	Papua Barat
11	0.062	Jawa Timur		0.703	Ng. Aceh Darussalam
12	0.061	DKI Jakarta		0.681	Sulawesi Selatan
13	0.061	Sumatera Utara		0.679	Kalimantan Timur
14	0.061	Maluku Utara		0.63	Maluku
15	0.060	Bengkulu		0.612	Kepulauan Riau
16	0.060	Sumatera Barat		0.595	Sulawesi Tenggara
17	0.058	Jawa Barat		0.571	Nusa Tenggara Timur
18	0.058	Banten		0.529	DKI Jakarta
19	0.058	Bali		0.517	Sulawesi Utara
20	0.056	Jawa Tengah		0.51	Kalimantan Barat
21	0.056	Maluku		0.491	Sulawesi Tengah
22	0.055	Lampung		0.47	Lampung
23	0.055	Kalimantan Selatan		0.459	DI Yogyakarta
24	0.054	Sumatera Selatan		0.454	Bengkulu
25	0.053	Kalimantan Barat		0.444	Jambi
26	0.050	Nusa Tenggara Timur		0.438	Kalimantan Selatan
27	0.048	DI Yogyakarta		0.4	Sumatera Barat
28	0.047	Kep. Bangka Belitung		0.334	Bali
29	0.041	Riau		0.305	Kep. Bangka Belitung
30	0.039	Nusa Tenggara Barat		0.293	Gorontalo
31	0.032	Kalimantan Timur		0.276	Maluku Utara
32	0.029	Papua		0.184	Kalimantan Tengah
33	(0.014)	Ng. Aceh Darussalam		0.136	Sulawesi Barat

Table A.4
Variables Definition

Variable	Code	unit	Definition
Economic Growth	Growth	%	Yearly growth of provincial GDP
Inequality	ine	0 - 1	Provincial Williamson index
	gini	0 - 1	Provincial Gini index (alternative variable)
Fiscal Decentralization	fd	ratio	Provincial total Revenue as a share of provincial GDP
	fd_xp	ratio	Provincial total Expenditure as a share of provincial GDP (alternative variable)
Tax Ratio	taxr	ratio	Provincial Revenue from tax as a share of provincial GDP
Agriculture Employment	agremp	%	Share of employment who work in sector 1 (Agriculture and Fisheries) in province level
Investment Ratio	invr	ratio	Provincial Capital expenditure as a share of provincial GDP
Human Capital	hc	%	Provincial Secondary school rate enrollment
Population	pop	%	Yearly provincial population growth
Central Government Transfer Fund	ln_fund	ln	Amount of transfer fund from central government to local government in a province
GDP per Capita	ln_gdpcapt-1	ln	Provincial GDP per capita in previous year
	ln_gdpcap	ln	Provincial GDP per capita in following year

Table A.5
Variables correlation test result

	growth	ine	fd	taxr	invr	hc	pop	ln_fund	ln_gdpcapt-1	agremp	ln_gdpcap	gini	fd_xp
growth	1												
ine	-0.056	1											
fd	0.001	-0.103	1										
taxr	0.008	-0.293	0.273	1									
invr	-0.010	-0.140	0.765	0.193	1								
hc	-0.086	-0.009	0.030	0.279	-0.019	1							
pop	-0.065	-0.007	0.114	-0.030	0.118	-0.067	1						
ln_fund	-0.054	0.458	0.017	0.149	0.019	0.199	-0.076	1					
ln_gdpcap01	0.024	-0.167	-0.464	-0.091	-0.348	0.312	0.053	0.360	1				
agremp	0.046	-0.070	0.454	-0.221	0.418	-0.190	0.012	-0.161	-0.530	1			
ln_gdpcap	0.036	-0.167	-0.464	-0.086	-0.348	0.307	0.002	0.366	0.998	-0.531	1		
gini	0.176	0.111	0.280	0.466	0.169	0.157	-0.012	0.347	-0.027	-0.125	-0.019	1	
fd_xp	0.018	-0.127	0.988	0.271	0.786	0.029	0.111	0.008	-0.465	0.453	-0.465	0.270	1

***the value above o.8 shows strong correlation between variables**
****since ln_gdpcap and ln_gdpcapt-1 are not in the same equation so it is ok**
*****fd_xp is an alternative test for variable fd in robustness test**

Table A.6
Sureg with fixed effect

Dependant Var. **Independent Var.**	**Growth**	**Inequality (ine)**
Inequality (ine)	0.04 (0.026)	-
Fiscal Dec. (fd)	-0.021 (0.021)	0.014 (0.043)
tax ratio (taxr)	-0.06 (0.288)	- -
investment ratio (invr)	-0.012 (0.031)	0.055 (0.664)
human capital (hc)	-0.027 (0.071)	- -
Population growth (pop)	0.046 (0.048)	0.143 (0.097)
transfer fund (ln_fund)	0.029*** (0.009)	-0.137*** (0.019)
prev. GDP p.c (ln_gdpcapt-1)	-0.029 (0.009)	- -
sec. 1 employ. (agremp)	- -	-0.014 (0.605)
GDP p.c (ln_gdpcap)	- -	0.259*** (0.064)
c	-0.067 -0.206	(0.358) (0.466)
Dummy Variable: prov1	- -	- -
prov2	0.059*** (0.018)	0.099* (0.035)
prov3	0.090*** (0.019)	-0.337* (0.034)
prov4	0.052** (0.026)	-0.005 (0.055)
prov5	0.125*** (0.039)	-0.516* (0.088)
prov6	0.100*** (0.024)	-0.261* (0.037)
prov7	0.057*** (0.021)	0.055 (0.034)
prov8	0.106*** (0.025)	-0.276 (0.041)
prov9	0.071*** (0.026)	-0.159 (0.044)
prov10	0.116** (0.049)	-0.619 (0.107)
prov11	0.030 (0.028)	0.184 (0.049)
prov12	0.016 (0.031)	0.493 (0.056)
prov13	0.096*** (0.023)	-0.320 (0.038)
prov14	0.031	0.354

	(0.024)	(0.042)
prov15	0.076*	-0.208
	(0.024)	(0.034)
prov16	0.109*	-0.603
	(0.027)	(0.036)
prov17	0.089*	-0.343
	(0.026)	(0.035)
prov18	0.058	-0.317
	(0.039)	(0.085)
prov20	0.110	-0.289
	(0.021)	(0.036)
prov21	0.114	-0.257
	(0.023)	(0.035)
prov22	0.071	0.058
	(0.024)	(0.040)
prov23	0.149	-0.601***
	(0.032)	(0.046)
prov24	0.110	-0.105***
	(0.022)	(0.040)
prov25	0.107	-0.463***
	(0.032)	(0.036)
prov26	0.046	0.253***
	(0.026)	(0.050)
prov27	0.055	0.097
	(0.036)	(0.072)
prov28	0.094	0.036
	(0.034)	(0.066)
prov29	0.044	0.429
	(0.044)	(0.081)
prov30	0.123*	-0.360
	(0.035)	(0.067)
prov31	0.075*	0.001
	(0.023)	(0.040)
prov32	0.113*	-0.625***
	(0.032)	(0.046)
prov33	0.134*	-0.372***
	(0.039)	(0.065)
prov34	0.188*	-0.260**
	(0.041)	(0.090)
Fixed effect	Yes	Yes
R Square	0.3155	0.9020
P>F	0.0000	0.0000
Number of observations: 323 Number in parentheses are standard error ***significant at 1%; ** significant at 5%; *significant at 10%		

Table A.7
Reg3 with Fixed Effect

Dependant Var. Independent Var.	Growth	Inequality (ine)
Inequality (ine)	0.201 (0.365)	- -
Fiscal Dec. (fd)	-0.022 (0.022)	0.014 (0.043)
tax ratio (taxr)	-0.032 (0.375)	- -
investment ratio (invr)	-0.021 (0.039)	0.054 (0.066)
human capital (hc)	-0.033 (0.073)	- -
Population growth (pop)	0.055 (0.055)	0.144 (0.097)
transfer fund (ln_fund)	0.049 (0.050)	-0.138*** (0.019)
prev. GDP p.c (ln_gdpcapt-1)	-0.059 (0.084)	- -
sec. 1 employ. (agremp)	- -	-0.024 (0.055)
GDP p.c (ln_gdpcap)	- -	0.257 (0.063)
c	-0.046 (0.222)	-0.332 (0.461)
Dummy Variable: prov1	- -	- -
prov2	0.041 (0.043)	0.099 (0.035)
prov3	0.141 (0.122)	-0.338 (0.034)
prov4	0.045 (0.030)	-0.004 (0.055)
prov5	0.195 (0.171)	-0.517 (0.088)
prov6	0.139 (0.105)	-0.262 (0.037)
prov7	0.045 (0.030)	0.056 (0.034)
prov8	0.148 (0.111)	-0.277 (0.041)
prov9	0.095 (0.072)	-0.160 (0.044)
prov10	0.200 (0.205)	-0.620 (0.107)
prov11	-0.002 (0.070)	0.181 (0.048)
prov12	-0.063 (0.175)	0.490 (0.056)
prov13	0.145 (0.124)	-0.322 (0.038)
prov14	-0.028	0.352

	(0.132)	(0.042)
prov15	0.107	-0.207
	(0.084)	(0.034)
prov16	0.201	-0.602
	(0.220)	(0.036)
prov17	0.138	-0.344
	(0.132)	(0.034)
prov18	0.099	-0.316
	(0.103)	(0.085)
prov20	0.151	-0.290
	(0.106)	(0.035)
prov21	0.152	-0.258
	(0.098)	(0.035)
prov22	0.059	0.057
	(0.030)	(0.040)
prov23	0.243	-0.602
	(0.228)	(0.046)
prov24	0.124	-0.106
	(0.047)	(0.040)
prov25	0.176	-0.465
	(0.184)	(0.036)
prov26	0.005	0.250
	(0.085)	(0.049)
prov27	0.043	0.096
	(0.042)	(0.072)
prov28	0.090	0.034
	(0.036)	(0.066)
prov29	-0.028	0.430
	(0.157)	(0.081)
prov30	0.181	-0.361
	(0.147)	(0.067)
prov31	0.069	-0.003
	(0.024)	(0.040)
prov32	0.206	-0.626
	(0.230)	(0.046)
prov33	0.192	-0.375
	(0.158)	(0.065)
prov34	0.219	-0.257
	(0.085)	(0.090)
Fixed effect	Yes	Yes
R Square	0.232	0.902
P>F	0	0
Number of observations: 323 Number in parentheses are standard error ***significant at 1%; ** significant at 5%; *significant at 10%		

Table A.8
Xtsur with 33 Provinces Dummy Variable

Dependant Var. / Independent Var.	Growth	Inequality (ine)
Inequality (ine)	-0.471***	-
	(0.035)	-
Fiscal Dec. (fd)	-0.005	-0.021
	(0.024)	(0.020)
tax ratio (taxr)	-1.219**	-
	(0.319)	-
investment ratio (invr)	-0.067**	0.101***
	(0.033)	(0.037)
human capital (hc)	0.169	-
	(0.082)	-
Population growth (pop)	0.047	0.137***
	(0.050)	(0.038)
transfer fund (ln_fund)	-0.008	-0.106***
	(0.011)	(0.007)
prev. GDP p.c (ln_gdpcapt-1)	0.031***	-
	(0.011)	-
sec. 1 employ. (agremp)	-	-0.014
	-	(0.023)
GDP p.c (ln_gdpcap)	-	0.138***
	-	(0.008)
Dummy Variable:		
prov1	-0.046	0.249
	.	.
prov2	0.121**	0.485
	(0.067)	(0.057)
prov3	-0.032	0.099*
	(0.058)	(0.052)
prov4	0.094	0.488***
	(0.062)	(0.054)
prov5	0.036	0.118
	(0.059)	(0.056)
prov6	0.072	0.196
	(0.052)	(0.048)
prov7	0.141**	0.507
	(0.058)	(0.051)
prov8	0.025	0.130***
	(0.051)	(0.047)
prov9	0.024	0.235
	(0.053)	(0.048)
prov10	0.090	0.140
	(0.062)	(0.059)
prov11	0.217***	0.642
	(0.064)	(0.052)
prov12	0.345***	0.927
	(0.067)	(0.051)
prov13	0.000	0.135
	(0.057)	(0.050)
prov14	0.210	0.748
	(0.067)	(0.053)
prov15	0.030	0.229

	(0.056)	(0.051)
prov16	-0.104	-0.138
	(0.057)	(0.053)
prov17	0.029	0.121
	(0.057)	(0.052)
prov18	-0.017	0.257
	(0.064)	(0.058)
prov19	0.153	0.277
	(0.057)	(0.051)
prov20	0.097	0.221
	(0.055)	(0.050)
prov21	0.126	0.447
	(0.058)	(0.050)
prov22	-0.111**	-0.219**
	(0.052)	(0.049)
prov23	0.117**	0.361**
	(0.053)	(0.048)
prov24	-0.018	-0.039
	(0.053)	(0.050)
prov25	0.130***	0.598
	(0.055)	(0.047)
prov26	0.147***	0.474
	(0.052)	(0.046)
prov27	0.181	0.489
	(0.054)	(0.047)
prov28	0.337	0.821
	(0.061)	(0.050)
prov29	-0.002	0.045
	(0.046)	(0.043)
prov30	0.183	0.473***
	(0.049)	(0.045)
prov31	-0.107***	-0.172***
	(0.036)	(0.037)
prov32	Base	base
prov33	Omitted	omitted
Iteration 1	0.83080193	
Iteration 2	5.10E-07	
Number of observations: 323 Number in parentheses are standard error ***significant at 1%; ** significant at 5%; *significant at 10%		

Table A.9

Estimation result using Gini index as an alternative indicator for inequality level

Dependant Var. **Independent Var.**	**Growth**	**Inequality (ine)**
Gini	-0.252** (0.037)	- -
Fiscal Dec. (fd)	-0.003 (0.006)	0.040 (0.006)
tax ratio (taxr)	0.410*** (0.093)	- -
investment ratio (invr)	-0.006 (0.015)	-0.060*** (0.016)
human capital (hc)	-0.046** (0.020)	- -
Population growth (pop)	-0.013 (0.024)	0.004 (0.025)
transfer fund (ln_fund)	0.005*** (0.002)	0.021*** (0.002)
Prev.GDPp.c (ln_gdpcapt-1)	0.013*** (0.002)	- -
sec. 1 employ. (agremp)	- -	-0.011*** (0.009)
GDP p.c (ln_gdpcap)	- -	0.017*** (0.002)
Iteration 1	0.47842696	
Iteration 2	2.07E-07	
Number of observations: 317 Number in parentheses are standard error ***significant at 1%; ** significant at 5%; *significant at 10%		