The Effect of Natural Resource Abundance on Economic Growth: Case of Indonesia

A Research Paper presented by:
Stenly
(Indonesia)

In partial fulfillment of the requirements for obtaining the degree of:
Master of Arts in Development Studies

Student Number:
420739as

Major:
Economics of Development

Members of the Examining Committee:
Dr. Elissaios Papyrakis
Dr. Lorenzo Pellegrini

The Hague, The Netherlands
August 2015

Disclaimer:

This document represents part of the author's study programme while at the Institute of Social Studies. The views stated therein are those of the author and not necessarily those of the Institute.

Inquiries:

Postal address:

Institute of Social Studies

P.O. Box 29776

2502 LT The Hague

The Netherlands

Location:

Kortenaerkade 12

2518 AX The Hague

The Netherlands

Telephone: +31 70 426 0460

Fax: +31 70 426 0799

Contents

List of Tables

List of Figures

List of Acronyms

BPS	: Badan Pusat Statistik (Statistics Central Agency)
GDP	: Gross Domestic Products
GRDP	: Gross Regional Domestic Products
MMSCF	: Million Standard Cubic Feet
OLS	: Ordinary Least Square
UNDP	: United Nations Development Programme
US	: United States

Acknowledgments

I would like to thank firstly to my supervisor, Dr. Elissaios Papyrakis , and my reader, Dr. Lorenzo Pellegrini for the support, knowledge, inspiration, motivation, and constructive feedback that I got from them during the process of this research paper, in particular in the most difficult stage of this project.

Secondly, I would also like to express my gratitude to Dr. Matthias Rieger. He has kindly assisted me during the early stage of this paper.

Thirdly, my high appreciation is also due to the officials of Statistics Indonesia both in the central office in Jakarta and in its branch office in the province of North Sulawesi, Indonesia. They have helped me with the data collecting.

Last but not least, I thank my friends and fellow students for the helps. This paper can also be completed because of their contribution by the encouragement they gave me and by willingly being my discussant.

Abstract

The effect of natural resource abundance on economic growth has long been discussed in many studies, and most of them show that resource abundance negatively affects growth. However, most of these studies are conducted at a cross-country level. This research paper tries to find out the impact of resource abundance on economic growth at a local level of Indonesia. By employing data at provincial level from 2004 until 2013 and using panel data analysis, this paper finds that in average natural resource abundance has a significant negative impact on economic growth in Indonesia. This paper also discovers that income, inflation, and crime are the possible transmission cannels, where natural resource of mining in Indonesia tends to increase income, but lower inflation and crime.

Relevance to Development Studies

The role of natural resource abundance in development is a not a new topic. On the one hand, theories from early developmental economics suggest that resource abundance is good for development. On the other hand, more modern literature suggesting that it is bad for development has flourished. These studies, however, are mostly conducted at cross-country level. This research paper tries to find out the effect of natural resource abundance on economic growth at the local level of Indonesia and also suggests the transmission channels. Thus, this paper becomes important because it contributes to the development studies, in particular in the development at a local level of a country.

Keywords

Natural resource abundance, Economic growth, Indonesia, Dutch Disease, Renewable and non-renewable resource, Transmission channels

CHAPTER 1
INTRODUCTION

This chapter is an introduction of this research paper. It consists of eight sections. The first one is the background of the study. The second one gives an explanation about the role of natural resource in Indonesia's development. The next three sections talk about research problem, significance of the study, and research objectives. The last three sections discuss research question, limitation of the study, and organization of the research.

1.1 Background of the Study

The attention of scholars, decision makers, and worldwide institutions has been widely attracted by the contradictory results of the impact of natural resource abundance on economic growth (Brunnschweiler and Bulte 2008). Gylfason identifies resource abundance into two categories, renewable and non-renewable. As the name suggests, renewable resource means resource that can be renewed, such as fisheries and forest, whereas non-renewable is the ones that cannot last forever, such as oil and minerals (Gylfason 2000). Even though various studies have been conducted to address the effect, it seems there has not been any consensus regarding what effect can be obtained by a country or a region being rich in natural resource. Is it good for growth, or the other way around? This question is kept being asked, yet no fixed agreement on that has been achieved. Thus, I believe that if I do research on this topic, it will be useful since I could make contribution by giving answers to the question on the role of natural resource abundance on economic growth.

Sachs and Warner (1995) suggest countries with high natural resource grow lower compared to the ones with scarce resource. Salti (2011) finds that resource abundance damages institutions, whereas the impact on growth relies on the sector sizes. Ding and Field (2005) agree that natural resource abundance is a curse, but they discover natural resource endowment affects growth positively. Apart from these authors, there may be various other academics that have tried to answer the question of what the impact of natural resource abundance on growth is. Some of them have suggested that it is bad, or in other words, the abundance is a curse. However, Brunnschweiler and Bulte (2008) question the empirical basis of many studies supporting this hypothesis. According to them, the basis that the academics use is ambiguous. Brunnschweiler and Bulte say that the most popular proxies used for resource abundance in those studies are in fact more suitable to denote resource dependence. Using multiple estimations by merging variables of resource abundance and resource dependence as well as institutional and constitutional variables, they discover that first;

resource dependence is determined by resource abundance, constitutions and institutions. Second, resource dependence has no effect on growth and the last is that resource abundance has a positive impact on both growth and institutional quality.

Although, there are various studies related to this topic, such as the ones briefly discussed above, most of the studies are at cross-country level. To my knowledge, only a few of them are conducted in regional level of a country, in particular Indonesia. Therefore, I conduct a study to examine the effect of natural resource abundance on economic growth in Indonesia by using data at provincial level, because the result is more relevant, useful, and applicable for local policy makers, and because I myself work as a local government employee in Indonesia. As the proxy of natural resource abundance, I use agriculture and mining from the two categories of renewable and non-renewable which are briefly explained in the first paragraph. This research paper mostly relies on data from Statistics Indonesia. However, there is some additional data used to enrich this paper is obtained from official institute in Indonesia, such as Directorate General of Oil and Gas, Directorate General of Plantation of Ministry of Agriculture, and National Development and Planning Agency. Data taken from United Nations Development Program and the World Bank is also used. In this paper, to analyze the impact of natural resource on economic growth, I apply quantitative approach by using panel data analysis and employing provincial level data across Indonesia. I differentiate natural resource into two categories, renewable and non-renewable resource. In addition to that, I use growth of per capita GRDP at 2000 constant price as the dependent variable to denote economic growth. The independent variable of natural resource abundance is denoted by the share of agriculture, livestock, forestry and fishery in GRDP at 2000 constant price to denote renewable resource of agriculture; and the share of mining and quarrying in GRDP at 2000 constant price to denote mining representing non-renewable resource. The effect of these two resource variables on the growth of provinces in Indonesia are then compared each other by using the same controlling variables of education, labor, inflation, crime, and income. The proxies for these variables are school participation rate of population aged 13-15 years, labor force participation rate, inflation rate, number of crime, and per capita GRDP in a row. All these data are in provincial level that is obtained from Statistics Indonesia.

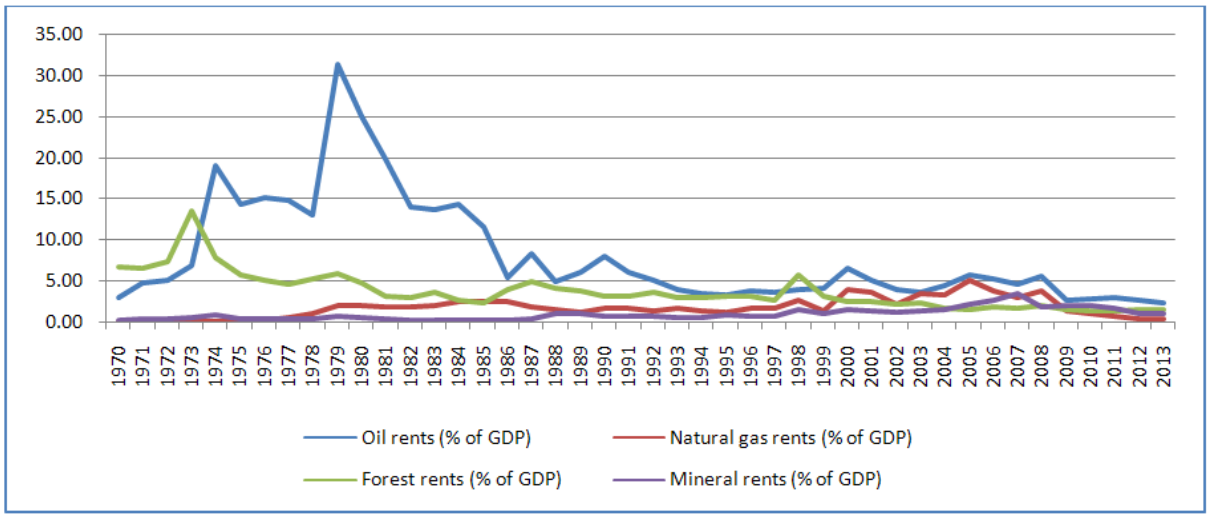
1.2 The Role of Natural Resource in the Development of Indonesia

Indonesia has long been known as one of the most endowed countries due to its richness in natural resources. According to Salim, one of Indonesia's economic architects during Soeharto's era, through natural resources extraction, Indonesia is able to finance its development (Salim, as cited in Tadjoeddin 2007). Resosudarmo explains that under Soeharto, Indonesia's second president, the

country's development was highly dependent on oil, gas, mining, and timber because they are the most practical way as income sources. At the beginning of his ruling time, Soeharto passed laws on foreign investment, forestry, and mining. This is not only because he understood that Indonesia is blessed with the resource abundance which is crucial to the country's development, but also he knew that the extraction of the resource abundance could not be done by local corporations, so it should involve international corporations (Resosudarmo 2005). This, according to Tadjoeddin (2007), makes natural resource in Indonesia started to be over exploited. Tadjoeddin further elaborates that other than the three main products of natural resource - oil, gas, and timber, Indonesia also relies much on other extracted goods, such as nickel and copper. Exxon Mobil in Aceh, Huffco in East Kalimantan, Caltex in Riau and Shell in East Kalimantan were several giant corporations getting involved in the oil extraction industry in Indonesia in 1970s. Oil became Indonesia's primary export and most important source of income. However, a decade later, the importance of oil as the country's financial source had fallen, whereas the role of other products such as liquid natural gas, timber, and minerals had become more important. The rise of the other products can be significantly seen in the middle of 1990s, where the country exported the highest LNG and plywood making it the largest exporter of the products in the world. Indonesia also came in the second place in terms of tin production, and world's number three as a copper exporting country (Tadjoeddin 2007).

Other than the previous explained products of natural resource, timber, as Tadjoeddin (2007) argues, is also another crucial resource. There was a rapid export increase in Indonesia, which was initiated by the rise of logs exports in the 70s, followed by plywood in the next two decades, and pulp and paper came later. Hill (2000) adds that these forest goods had to compete with the industry of textile, as the source of income, which came to the country in the 90s. Figure 1 shows that from 1970 until 2013, there is a negative trend in the role of natural resource on the country's income, which is denoted by its gross domestic product. Starting from around 1985, the role of oil in Indonesia's economy, as denoted by oil rents in the picture, fell, but the role of other commodities of natural resources started to rise, as denoted by gas, forest and mineral resources in the figure.

Figure 1. Indonesia's Natural Resource Rents as a percentage of Gross Domestic Product (GDP)



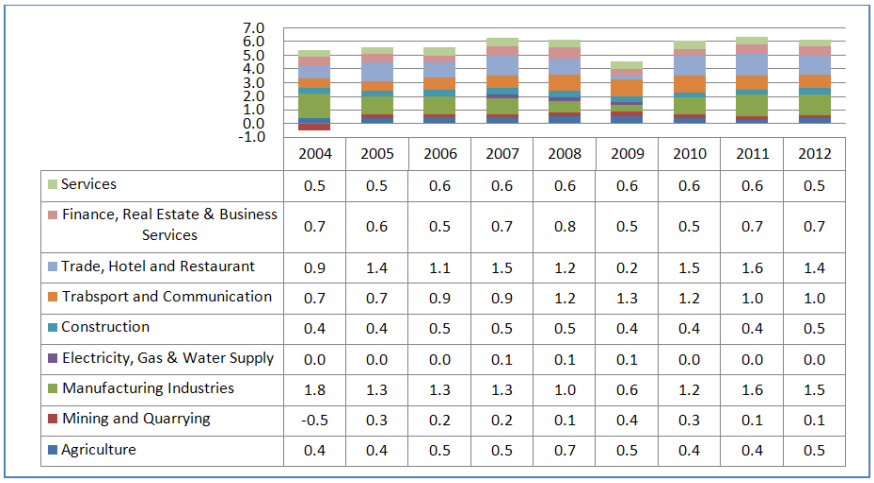
Source: World Bank Data

Tadjoeddin (2007) argues that the negative trend shows that natural resources has become less significant income source for Indonesia, in particular the income that comes from oil and gas. In addition to that, he further explains that the contribution of mineral and forestry products has also shown a negative trend. The fall of Soeharto in the late 1990s might be blamed as the factor that ends natural resource-base development in Indonesia. However, international world recognizes that it is due to Soeharto's era, known as the New Order, Indonesia has come to an improvement in social and economic life of its people with fairly low inequality (World Bank and ADB, as cited in Tadjoeddin 2007). Per capita income, from 1960s until the years before Asian financial crisis in 1998, increased four times higher, poverty decreased by 57 percent from 70 percent to 13 percent at the end of Soeharto's era. The rate of infant mortality significantly fell from 159 to 49 in a thousand births. Illiteracy rate for adults also dramatically dropped from 61 percent to 14 percent. In addition, from 1976 until 1996, Indonesia's Gini coefficient was mostly steady ranging from 0.32 to 0.35, which is considerably low based on worldwide standards. These are all, according to Tadjoeddin, due to not only the government policies, but also because of the role that was played by the government under Soeharto's administration, where its income is received from the extraction of natural resources (Tadjoeddin 2007: 14).

Under the administration of Susilo Bambang Yudhoyono, Indonesia's sixth president, the country had a relatively stable economic growth. Based on data taken from Statistics Indonesia and used in a report called *Data dan Informasi Kinerja Pembangunan 2004-2012* (Data and Information of Development Performance 2004-2012) produced by Bappenas (National Planning and Development Agency) and BPS (Statistics Indonesia), in 2004, the first year of Yudhoyono's ruling

time, Indonesia recorded a 5 percent growth and gradually increased until 2012 that hit a growth of 6.2 percent. However, due to an economic crisis that occurred in the U.S. in 2009, Indonesia, as nearly all other countries in the world, experienced a lower economic growth at 4.5 percent. The report shows that there was a decline in industrial growth from 2005. However, it started to show an increase and narrowing the gap with economic growth since the third quarter of 2009. In 2011 and 2012, non oil and gas industry grew higher than the economic growth. This is due to the industry of food, drink and cacao, transportation, and textile. These subsectors contribute significantly to the absorption of labor resulting in a rise in the growth of employment in formal sectors. The future challenge would be on how to accelerate the industrial growth to make it as the main driver of national economic growth. The report also reveals that Indonesia's economic growth showing a positive trend from 2004 until 2012 is in fact as a result of household consumption and government expenditure that help the country to grow positively in the middle of economic crisis that shocked the world in 2008. The relatively stable economy in Indonesia improves people's purchasing power and attracts domestic and foreign investors to invest in the country (Bappenas and BPS 2013).

Figure 2. The Source of Economic Growth by Industrial Origin



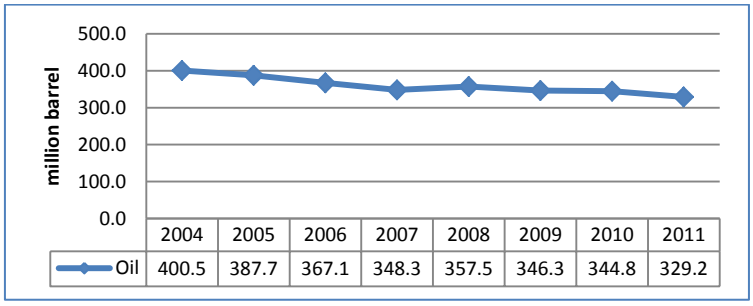
	2004	2005	2006	2007	2008	2009	2010	2011	2012
Services	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.5
Finance, Real Estate & Business Services	0.7	0.6	0.5	0.7	0.8	0.5	0.5	0.7	0.7
Trade, Hotel and Restaurant	0.9	1.4	1.1	1.5	1.2	0.2	1.5	1.6	1.4
Trabsport and Communication	0.7	0.7	0.9	0.9	1.2	1.3	1.2	1.0	1.0
Construction	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.5
Electricity, Gas & Water Supply	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0
Manufacturing Industries	1.8	1.3	1.3	1.3	1.0	0.6	1.2	1.6	1.5
Mining and Quarrying	-0.5	0.3	0.2	0.2	0.1	0.4	0.3	0.1	0.1
Agriculture	0.4	0.4	0.5	0.5	0.7	0.5	0.4	0.4	0.5

Source: Statistics Indonesia

In connection with the role of natural resource in the economy of Indonesia, it is no longer an important contributor to the country's economy. As shown in figure 2, which is taken from Data and Information of Development Performance 2004-2012 from Bappenas and BPS (2013), manufacturing industry together with the industry of trade, hotel, and restaurant were two main driven sectors that helped Indonesia to grow positively from 2004 until 2012. These two sectors were also the most crucial sources for the country's economic growth in the middle of global economic downturn. In

2004, sector of mining and quarrying contributed negatively to the growth although it managed to have a positive contribution in the following years, but it was still reasonably low.

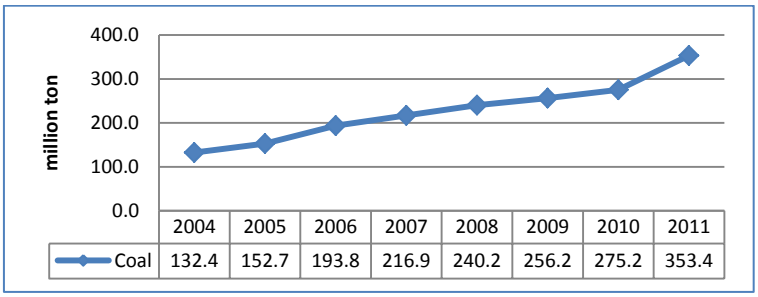
Figure 3. Oil Production in 2004 – 2012



	2004	2005	2006	2007	2008	2009	2010	2011
Oil	400.5	387.7	367.1	348.3	357.5	346.3	344.8	329.2

Source: Directorate General of Oil and Gas

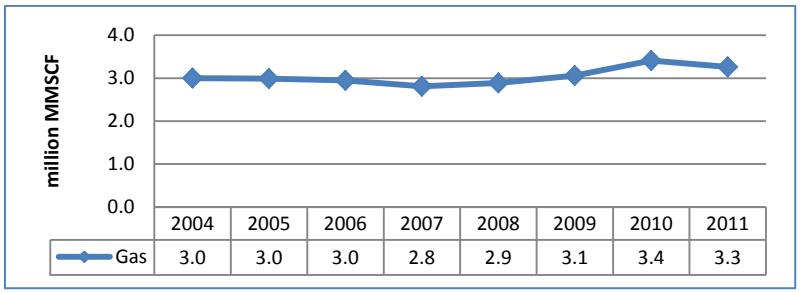
Figure 4. Coal Production in 2004 – 2012



	2004	2005	2006	2007	2008	2009	2010	2011
Coal	132.4	152.7	193.8	216.9	240.2	256.2	275.2	353.4

Source: Directorate General of Oil and Gas

Figure 5. Gas Production in 2004 – 2012



	2004	2005	2006	2007	2008	2009	2010	2011
Gas	3.0	3.0	3.0	2.8	2.9	3.1	3.4	3.3

Source: Directorate General of Oil and Gas

Figure 3, 4, and 5 are also taken from Data and Information of Development Performance 2004-2012 from Bappenas and BPS (2013). Figure 3 shows that from 2004 until 2011, production of oil demonstrated a decreasing trend. It started with 400.5 million barrel production in the initial year and then decreased gradually to 348.3 million barrel production in 2007. A year later the oil production increased, but then decreased again and recorded a total production of 329.2 million barrel oil in 2011. A different trend is shown in other commodity, coal. Figure 4 demonstrated a

continuous positive trend in its production. In 2004, Indonesia recorded a 132.4 million ton coal production. The number kept increasing in the following years. The country managed to produce the commodity more than two times larger in 2011 as compared to the early period of 2004. The trend in the production of gas in Indonesia, as shown in figure 5, is different with the other two commodities. From 2004 to 2006, Indonesia produced 3 million MMSCF gas. In the next two years, the production decreased slightly, but it started to increase again in 2007 and managed to hit a new record of production of 3.4 million MMSCF gas in 2010. However, in 2011, the production of gas declined again, but it was still above the total production of 2004.

As reported in the Data and Information of Development Performance 2004-2012, even though the role of natural resource on the development of Indonesia becomes less significant, in general, economic growth in provinces in Indonesia in 2012 is higher than that of 2004, when Yudhoyono was elected as the president of Indonesia. However, compared to national growth, there are only a third of provinces in the country growing higher than the national growth. Provinces in the eastern part of Indonesia generally have a higher growth compared to their counterpart in the West. The report also reveals that GRDP per capita increased during the period of 2004 until 2012, where five provinces - Jakarta, East Kalimantan, Riau, West Papua, and Kepulauan Riau - have higher GRDP per capita compared to the national level. There is also a decline in a number of people living under poverty line in the country, according to the report. The difference of poverty percentage is still high in 2004 and 2012, where the percentage of people living under poverty line in east Indonesia is above the national level. Papua, West Papua, Maluku, and NTT are provinces with higher percentage of poor people compared to other provinces in the country. In addition, the report shows a decline in unemployment in 2004 and 2012. South Sulawesi, Riau and Gorontalo are three provinces with the largest reduction. However, unemployment is still a problem to Banten, Jakarta, West Java, and Aceh. Furthermore, in all provinces, human development index improves. However, the disparity of human development between provinces in the West and in the East of Indonesia is still high, and more than half of the provinces have human development index below the national index (Bappenas and BPS 2013).

1.3 Research Problem

Indonesians have long been taught in school that their country is blessed with an abundance of natural resource that can be found across the nation. Data from Directorate General of Oil and Gas of Indonesia shows that, in 2011 the country oil potential is as much as 4 million barrel, but with a production of less than 10 percent of its potential. In the same year, Indonesia's palm oil production, as recorded by Directorate General of Plantation of Ministry of Agriculture, reaches 23,096,000 ton (Bappenas and BPS 2013). These figures should have indicated the potential that this country has to

make it more progressed in terms of economy and welfare of its own people. However, it seems that the numbers can fool. Indonesia's human development index, as released by UNDP, is 0.678 and its poverty headcount ratio at $1.25 a day, as calculated by the World Bank, is 16.2%. These numbers make the country kept in struggling within the category of low middle income country.

Within provinces in Indonesia, there is still inequality. Papua, for example, is blessed with natural endowments, but the percentage of people who lives under poverty line is 31.98% of its total population. Meanwhile, Jakarta, with almost no natural resource, has only 3.75% of people living under poverty line, based on data from BPS. This phenomenon of the relationship of natural resource abundance on the welfare of people in general has been tried to be explained by various scholars. Most studies are conducted at the level of cross-country and, where welfare is indicated by economic growth. Realizing that there are not many studies which are carried out at a regional level of a country, I am motivated to do such a study to find out the relationship between natural resources abundance on economic growth at the local level of Indonesia.

1.4 Significance of the Study

The paper will add to the literature on development studies since it attempts to analyze the impact of natural resource abundance on economic growth in Indonesia. There have been numerous studies come out with mixed results of whether resource abundance is good or bad for economic growth of a country. This makes this topic is still open for a debate. Despite of the large studies that have been conducted, to the best of my knowledge, there are only a few similar studies taking regional sample of a country, in particular Indonesia. Thus, by doing such a study in the case of Indonesia, the result of this paper might be more useful for local policy makers in Indonesia on the advantage or disadvantage of programs related to natural resources.

1.5 Research Objectives

The aim of this research paper is to find the effect of natural resource abundance on economic growth in Indonesia. Various studies have been conducted with respect to the relationship between the abundance and growth. The result is still debatable. Some studies prove natural resource is good for growth, but some others find it bad. In addition, the studies are mostly carried out at the level of cross-country, and only a few of them are done at the regional level within a country. Since the author of this paper works as a local government employee in Indonesia, so it is more relevant and more useful to do a study to find out the effect of resource abundance on economic growth at the local level of Indonesia. Moreover, after the effect is obtained, the next purpose of this study is to find out the possible transmission channels.

1.6 Research Questions

As indicated in the research objectives part above, there are more than one question that this paper tries to address. The questions can be seen as follows.

Main research question:

- What is the effect of natural resource abundance on economic growth in Indonesia?

Additional question:

- What are the possible transmission channels?

1.7 Limitations

The main challenge that I face in carrying out this research is that some data are not available. Today, Indonesia comprises of 33 provinces, but I decide to drop three of them from the observation because they are new provinces. Thus, they do not have some data for the period study that is used by the author, from 2004 until 2013. Even so, with only 30 provinces remaining, there are still missing values that might affect the result. In addition to that, the employed proxies to denote resource abundance in this paper are in the form of the share of mining and the share of agriculture in GRDP which might be more appropriate to be a measure of dependence rather than abundance. The paper is supposed to answer the research questions. Yet this limitations need to be taken into account.

1.8 Organization of the Research

This research paper, in general, is structured as follows. Chapter one provides an introduction of the research. Chapter 2 discusses literature review used by the author. Chapter 3 presents in more detail about the methodology that is utilized to examine the effect of natural resource abundance on economic growth in Indonesia. Chapter 4 portrays the result and analysis. Chapter V closes this research paper with conclusion.

CHAPTER 2

LITERATURE REVIEW

This chapter reviews the literature which is used in this research paper. It is divided into three sections. The first section discusses the nature of natural resource abundance. The second section provides theoretical framework, and the last one presents empirical evidences. The last section is divided into three subsections. The first and the second one provide studies discussing the impact of non-renewable and renewable resources on economic growth. The third subsection presents studies on the impact of controlling variables – education, labor, inflation, crime, and income – on economic growth.

2.1 The Nature of Natural Resource Abundance

This research paper discusses about the impact of natural resource abundance on economic growth. Unlike most studies which analyze the impact of the resource abundance on growth at a cross-country level; this study is at a local level of a country, in particular, Indonesia. Thus, data that is used in this paper is also at a local level of provinces of Indonesia. In this work, I differentiate natural resource abundance into two categories, renewable and non-renewable resource. The reason is that because I want to see whether these two types of resources have similar or different impact on growth of economy in Indonesia. Before going further, it is important to understand the definition of natural resources. Stiglitz (1980) gives a presumably definition of natural resource. According to him, natural resource is all goods or things that nature gives and it is not manufactured by human being. This definition, however, is not very accurate. He admits that because people is likely to think that the examples of natural resources, such as oil, need human's intervention to alter them into a usable product. The activity which is done by human, he adds, can also affect the supply of other examples of the resource, such as fish. Thus, this author thinks that it would be better to classify natural resource into several cases – exhaustible natural resource, renewable natural resource, inexhaustible but non-augmentable resource, and recyclable resource. Since this research paper mainly talks about renewable and non-renewable resources, so, I am principally concerned about the first two types of natural resources offered by Stiglitz. According to him, the exhaustible or non-renewable resource, such as oil, is a resource where its stock is fixed and limited and also cannot be renewed and augmented. In addition to that, he provides definition for renewable resource, such as fish, which he defines as the opposite to the non-renewable one because its stock can be

maintained, renewed or increased after utilization if the resource is not over consumed (Stiglitz 1980:38).

In this paper, I use agriculture as the example of renewable resource and mining as the example of non-renewable resource. There are various studies that have been conducted by using these two types of natural resource to examine impact of the abundance of the resource on economic growth. For example, Sachs and Warner (1995) employ the share of primary-product export in GDP and the share of mineral production in GDP as the proxies of resource abundance. The second proxy can be considered as non-renewable resource denoted by mining. In another empirical study, share of agriculture in GDP is used to denote renewable resource of agriculture (Gylfason 2000). In my study, to denote non-renewable resource of mining, I use share of mining and quarrying in GRDP at 2000 constant price, whereas share of agriculture, livestock, forestry and fishery in GRDP at 2000 constant price is employed as the proxy of renewable resource of agriculture. However, the proxies might not be appropriate to describe the nature of natural resource abundance as it should be. Brunnschweiler and Bulte (2008) claim that the percentage of resource exports to GDP, the popular used proxy in many studies in the same topic, are strange. According to them, the percentage is more correctly to be considered as a measure of dependence or intensity rather than being used to denote abundance. They further explain that the denominator of the percentage or the ratio clearly quantifies the scale of other economic activities. For this reason, if it is divided by the volume of economy, it entails that the variable of the ratio or percentage is dependent on economic strategies and institutions which create them. Therefore, according to Wright and Czelusta (2004), there is a tendency that the ratio or percentage of the resource dependence might get problems of endogeneity. In addition, in the regression of economic growth, the ratio might be better to not be treated as an exogenous explanatory variable (Wright and Czelusta 2004). In a final point, Brunnschweiler and Bulte (2008) advise that the proxy of natural resource abundance would be better if it indicates the supply of the resource, whereas the conventional proxies is more to describe dependence on a resource indicating the degree at which point a country has or does not have access to different income sources apart from the extraction of natural resource (Brunnschweiler and Bulte 2008:261). Having said that, I prefer using the conventional proxy for natural resource abundance, which is in the form of ratio of the resource in GRDP to the one suggested Brunnschweiler and Bulte due to data limitation at provincial level that is needed in my study.

2.2 Theoretical Framework

There has been interesting fact showing that countries blessed with natural resource abundance are frequently less successful, in terms economic growth, compared to countries which are not blessed

with similar endowments. Several theories have been trying to give answers to this oddity from the perspective of social and economy.

2.2.1 Social Perspective

From the perspective of social, it is logical to claim that being rich might make ones lazy. An argument from a philosopher from France, Jean Bodin gives justification for this claim by saying:

> "Men of a fat and fertile soil are most commonly effeminate and cowards; whereas contrariwise a barren country makes men temperate by necessity, and by consequence careful, vigilant, and industrious" (Jean Bodin 1576, as cited in Sachs and Warner 1995: 4).

Gylfason (2000) argues that by being endowed with natural resources, there is a tendency to correlate it with certain political and influential groups in industries related to natural resources. Using their political power, the rent seeking actors will attempt to influence the government to change its economic policies to benefit their groups at the cost of people in general. According to this author, the existence of rents in natural resource market leads to the possibilities of massive rent-seeking activities, and at the end, turns the resources in a different direction from economic activities which are more socially beneficial (Gylfason (2000: 554). Prior to Gylfason, Lanna and Tonell (1995) also come with similar claim. They say that countries with rich natural resource are more vulnerable to rent-seeking activities than those of poor natural resource countries. This is due to political power in the rich resource countries tends to take the rents which are obtained by the abundance of natural resource. A study from Gelb, a senior financial economist in the country economics department at the World Bank (1998) supports both studies above.

2.2.1 Economic Perspective

Meanwhile, in the sense of economy, the oddity of the inverse relationship between growth and natural resource can be explained through the model the Dutch disease. In general, as explained by Gylfason, the disease can be detected via the capacity of industries, which is related to natural resource, to survive by rent extraction, and the capacity to be able to grow with higher real exchange rates and allocate more money to pay wage with a higher rate compared to other industries should spend. It then results in the lost of competitiveness of these industries due to cheap imports in local and global markets. As a result, export for manufacturing and other non-primary products usually declines. It might impede growth since export and its composition are important for growth. Gylfason tries to give explanation on two different points of view of people

looking the so-called the Dutch disease, either it is as a disease or not. According to him, people looking it as an illness are worried because growth and diversification might be negatively affected by the promoted reallocation of resources among various sectors. Judging from this aspect, the adverse correlation between resource abundance and growth, as records show, can be an indication of the Dutch disease (Gylfason 2000: 564).

To explain about the Dutch disease, Sachs and Warner (1995) split economy into three sectors of tradable natural resource, tradable manufacturing (non-resource), and non-traded sector. If the endowment of natural resource is greater, then the demand for products, which are not traded, is soaring. As a result, labor and capital that go to manufacturing sector is lower. In other words, if natural resource is abundant, the production of tradable goods is focused on natural resource than in manufacturing sectors. In addition, labor and capital that might have been allocated to manufacturing sectors are absorbed in the non-traded one. Consequently, if there is a resource boom in economy, as we can expect, non-traded products sector will likely to get bigger, whereas the manufacturing sectors will likely to get smaller. Although, the contraction in manufacturing sectors is not dangerous for growth, it can be considered as a disease. However, Sachs and Warner further elaborate, the Dutch disease can really be an ailment if unusual things regarding the growth sources in manufacturing sector occur. The contraction in manufacturing sector, as a consequence of abundant natural resource, is able to result in an unproductive fall of growth if the sector is portrayed by externalities in manufacture (Sachs and Warner 1995: 6).

2.3 Empirical Evidences

2.3.1 Non-Renewable Resource on Growth

There are numerous studies that have been done related to the topic of natural resource impact on economic growth. One of the prominent studies is from Sachs and Warner (1995) who suggests that, from the period of 1971 to 1989, rich-resource countries have a tendency to grow slower then those which are poor in terms of natural resources. They argue the fact that the poor-resource countries can perform better than the rich-resource ones has long been existed in the history of economic world. For instance, Netherlands, which is not as rich as Spain, in terms of natural resource, had better economy in the seventieth century. Two hundred years later, the resource-poor Switzerland and Japan surpassed the resource-rich Russia. The same pattern happens in the last three decades, where resource-poor East Asia countries, such as Korea, Taiwan, Hong Kong, and Singapore have been economically successful. In contrast, Mexico, Nigeria, and Venezuela, which are blessed with oil, have been failed economically. The negative relationship between natural resource abundance and growth, Sachs and Warner find, remains valid after controlling for variables, such as initial per

capita income, trade policy, state efficiency, and investment rates, found to be vital to performance of economy. This negative correlation is examined by studying the cross-country impact of being resource-rich on trade policy, efficient bureaucracy and other key factors of growth.

In this study Sachs and Warner uses the share of primary-product export in GDP in 1971 to denote natural resource abundance. By including initial income and taking it as constant, they find that within the period of two decades, a lower growth is correlated with higher share of primary-product export with coefficient of -6.920 and statistically significant of t-ratio at -3.28. They employ several variables - namely openness, investment, bureaucracy, standard deviation of the of external terms-of trade index, and ratio of income share - to test whether they have a significant relationship with economic growth if resource measure is included, and to also figure out whether share of primary-product export, they use, is sensitive if those additional variables are taken into account. The result is the share of primary-product export to GDP is still significant. In addition, there is a significant relationship between growth and openness, investment, and bureaucracy, but the relationship between growth and the last two additional variables mentioned above is respectively insignificant (Sachs and Warner 1995: 10). The effect of honest and efficient bureaucracy on growth has been tested and by Mauro who finds that the inverse relationship between corruption, investment, and growth is statistically and economically significant. He also discovers that by employing ethno linguistic fractionalization index, the relationship is robust, and being efficient in bureaucracy, as shown by the result, leads to not only high investment, but also growth (Mauro 1995: 705).

In line with Mauro's, some other studies, such as the ones from Hodge et al. (2011) and Hwang et al. (2011) approve that corruption is also bad for growth. Sachs and Warner have not yet satisfied with the consistency of the result. They omit two insignificant variables above and take into account regional dummy variables representing Asia, Sub-Saharan Africa, and Latin America. The result remains significant, where Sub-Saharan African is the only significant dummy variable with negative coefficient which simply indicates that these countries have lower growth from 1971 to 1989. Meanwhile, the effect of resource abundance is relatively the same compared to previous results. Other ways these two authors use to check the robustness of the impact of natural resource on growth is by omitting several countries from the sample, and employing different proxies for natural resource abundance. Oman and Saudi Arabia are dropped because they have extremely high share of primary-product exports in GDP and also low growth. Bahrain, Iraq, Kuwait, and United Arab Emirate are excluded due to data unavailability for GDP and due to having low growth. The inclusion of these six countries in the regression makes the relationship between resource and growth even stronger. With regards to alternative proxies, Sachs and Warner utilize share of mineral production

in GDP in 1971, fraction of primary exports in total exports in 1971, and log of land area per person in 1971 as alternatives to share of primary-product exports in GDP in 1971, their first and preferred measures of natural resource. The result is similar. They all have an inverse relationship with growth.

2.3.2 Renewable Resource on Growth

Before turning to specifically discuss renewable resource and growth, it is important to see in more comprehensive a study by Gylfason (2000). Corresponding to Sachs and Warner's study above, Gylfason also empirically analyzes natural resource abundance on economic growth in countries which are in transition. He claims that as long as the resources are managed appropriately to make sure its sustainability, then the resources could be a dependable source of steady profit. He adds that the abundance of the resource usually comes with repeated booms that in turn increases production and at the end strengthen the economy. However, Gylfason argues that, as shown by evidences, being abundant in natural resources might be considered as the cause of why economic growth of numerous countries eventually retarding. Thus, the economic advantage from the booms, he adds, would not be endless. In the study, he gives example of a country discovering an oil reserve or a mineral deposit in its territorial. For a moment, as income increases, the discovery of the new natural resources will positively affect the country's national economy. Nevertheless, if in consequence, the country's long run economic growth retards, whereas others do not change, it means that the country will in fact get poorer compared to the situation where the oil reserve or mineral deposit was not discovered. Gylfason portrays it as a 'mixed blessing' or a 'curse' assuming that the natural resources are not properly managed. It is undeniable that the resources make a country richer for a moment, but with the sacrifice of the long run economic growth of the country. Moreover, record shows that there appears to be insignificant difference in this aspect between renewable as well as non-renewable resources (Gylfason 2000: 546).

In connection with renewable resources, as the subheading suggests, Gylfason takes agriculture as a proxy of natural resource abundance to represent renewable resource in his study. This is because the data he uses indicates that countries in central part of Europe and in the east of the continent as well as in central Asia altogether have been estimated to own 50 percent of agricultural land as the share of its total natural capital, whereas forests and protected areas contributes only 12 percent and the rest 38 percent belongs to minerals and fossil fuels. He explains further that, in terms of natural resources, transition economies is richer then those of high and middle income countries, so transition economies as a whole has a potential to suffer from negative effect of the abundance on economic growth. Countries such as Russia and Turkmenistan are also vulnerable to this impact. As suggested in his earlier work, countries greatly relying on agriculture tend to have

lower growth compared to those relying on services (Gylfason 1999). To prove this trend, he does another test by using per capita income of 162 countries and the average share of agriculture in GDP of those countries from 1960 to 1997. It results in -0.19 for correlation and 2.52 for t-statistic. It means there is a statistically significant association between the two. He claims that the association is strong because the average rate of per capita income every year is 1.1 percent, whereas the result shows that every 10-point rise in the share of agriculture in GDP means per capita growth declines by nearly 0.4 percent (Gylfason 2000:550).

To further examine this adverse association, this author split the countries into there groups, but still in the same period of 1960 to 1997. The first one is those comprises of 43 countries, whose share of agriculture contribute to not more than 10 percent of GDP. The second group comprises of 41 countries with 10 to 20 percent share of agriculture in GDP. The last group has economic growth of 20 percent or above, that comprises of 71 countries. The first group has 2.1 percent of average rate of per capita growth yearly. The second one grows at 1.2 percent, while the last one is only 0.5 percent. He shows that between the first and the last growth has statistically significant difference at the level of 5 percent. It is also significant between the first and the second growth, but at the level of 10 percent. Between the second and the last growth, has insignificant difference. This result suggests that countries whose agriculture contributes heavily to GDP have significantly lower growth compared to those whose agriculture contributes less to GDP (Gylfason 2000: 551). Gylfason argues that the result is not something unexpected. Drastic change in the standard of living across the globe in the second millennium has been due to industrialization and service introduction. According to him, to become rich, countries, including the so-called transition economies, should progress from relying heavily on agriculture to industry and finally services. He adds that looking for solutions in order to not being dependent on agriculture in the absence of main distractions to accelerate the sustained industrial development, that relate to manufacture, trade and services, will be the key tests for the transition economies. The whole process needs not only economic strategies but also institutional structures that will, in turn, bring about better growth in the long run (Gylfason 2000: 552).

2.3.3 Controlling Variables on Growth

In addition to natural resource abundance, I employ several determinants of economic growth and use them as controlling variables. They are education, labor, inflation, crime, and income. The effects of these determinants on the performance of economy have been discussed in numerous studies.

2.3.3.1 Education

King and Levine (1993) introduce the logarithm of the initial secondary school enrollment rate as the proxy for education as one of independent variables. They look at the relationship between education and economic growth. The number shows that it is statistically positive and significant, which means higher rates of initial secondary school enrolment are linked to a more rapid successive economic growth. Similar to King and Levine, Papyrakis and Gerlagh (2004) also use variable of educational quality. They employ the log of the average number of years of secondary schooling from 1970 to 1989 to denote this variable. The impact of education, together with independent variables they use, such as investment, openness, and terms of trade, is in line with other similar studies suggesting that higher economic growth relates to a high ration of investment, a higher index of openness, lower initial per capita income, term of trade decline and a higher educational quality (Sachs and Warner 1995, 1997, 1999b; Sala-I-Martin 1997; Mo 2001).

Unlike the previous authors, Coulombe and Tremblay (2006) employ literacy test scores of 14 OECD countries as the indicator of human capital started from 1960 to 1995 with 5 years period. The result from their study is that the indicator positively and significantly affects GDP per capita, the productivity of labor, and the rate of growth that occur in the process to steady state. Since these two authors also use data of schooling as a variable of literacy that is taken from Fuente and Domenech (2002) to give an explanation for possible errors of measurement, the result shows that their preferred indicator of literacy test score is better than the schooling one, in terms of the information about the countries' growth that it provides. In addition to that, the result entails that there is a 7 percent roughly rise of aggregate productivity of labor if the labor has the skill that is obtained from an addition of one year of education. Moreover Coulombe and Tremblay prove that female literacy affects growth stronger than male literacy. Furthermore, they find that the allocation of investment in human capital might be crucial to growth. Countries' economic growth, according to them, is more responsive to the level in average of education compared to the percentage of labor with high level of education (Coulombe and Tremblay 2006: 2).

2.3.3.2 Labor

Labor has also been considered as an important factor that can make economy performs better. This has been discussed by various studies. Paudel and Parera (2009), for example, conduct a study to prove whether it is true that labor is crucial for growth in the case of Sri Lanka. In this study, they employ time series data from the period of 1950 until 2006. They conclude that labor force positively affects Sri Lanka's economic growth. Another empirical work is done by Tsani et al. (2013) who examine the association between female labor participation and economic growth in the South

Mediterranean nations. The results validate the U-shaped link between the rates of female labor participation and economic growth suggesting that the low participation in the South Mediterranean countries can be explained by special features of the latter nations in the region. These authors also advocate that the effect of the low rates of female labor participation on economy might be insignificant, but it might be significant if the participation rises due to the removal of impediments that hinder women from entering labor market.

The impact of labor on economic growth is also tested by Yuliyusman and Ismail (2014), but they look at the role of foreign labor in the economic growth of Malaysia. They employ panel data of manufacturing, services, and construction sectors from 1990 until 2010. The findings propose that both trained and semi-trained foreign workers in Malaysia significantly and positively affect the country's growth in the long run. This indicates that the gain from employing these workers can be attained by the country in the long run, so they must be hired for a longer time. According to their findings, in the short run, these types of workers have a positive impact on Malaysia's economy, but the impact is insignificant. In addition to that, the authors discover that in both long run and short run, untrained workers have a negative impact on the country's economic growth. Similar to Yuliyusman and Ismail, Christofides et al. (2007) propose that employing foreign workers can positively affect economy is determined by the level of education the workers have and the skill posses to them. In the case of Cyprus, as in their study, foreign workers with high education and skill tend to increase economic growth in the country, whereas those who are not educated and unskilled tend to lower the growth. These findings support the result from a study conducted by Stadler who puts emphasis on promoting education and skill of workers. He argues that an improvement in the skill of labor is the thing that plays an important role in growth, not an increase in the quantity of the labor (Stadler 2003).

2.3.3.3 Inflation

Another factor that can affect economic growth is inflation. The relationship between inflation and economic growth has also been widely examined by economists. Some find that inflation has a positive relationship with growth. Others find it has no correlation between the two, and some others even find that it is negatively associated. In his study, Lucas (1973) suggests that inflation is positively correlated with growth. He reports the findings from empirical evidences of the tradeoffs between real output and inflation. It is done based on time series data of 18 nations started from 1951 until 1967. He proposes that the change of price is positively correlated with output is due to the misunderstanding of the merchants to interpret movements of general price as the relative price changes. Firstly, he explains that the average output does not go up once there are changes in rates

of average inflation. Secondly, he adds, if average prices variance is larger, then the tradeoffs will be worse (Lucas 1973: 333). This positive relationship is also found by Sarel (1996). In his paper, which attempts to analyze whether there are non-linear effects of inflation on economic growth, Sarel discovers that inflation does not significantly affect economic growth. It is likely that inflation has a slight positive correlation with the growth, he adds. However, he also finds that inflation affects economic growth negatively if its rate is high. This relationship is statistically significant and robust to any changes (Sarel 1996: 213).

Similarly, Barro (1995) proves that this negative association exists. By using data of a hundred nations from 1960 until 1990, he examines the effects of inflation on economic growth. He finds that when average inflation rises by 10 percentage points annually, the growth rate of per capita GDP declines by 0.2 until 0.3 percentage points annually. Investment is also reduced by 0.5 until 0.6 percentage points. This negative relationship holds when several credible instruments are utilized in the procedure of statistics. Nevertheless, the statistically significant relationship between inflation and growth in this study comes when high inflation is used in the sample. Another negative relationship is also suggested by a study conducted by Alexander (1997). He uses the sample of twenty OECD countries, employs data ranging from 1974 to 1991, and applies a pooled time series and cross section approach. This author discovers that the negative effect of inflation on economic growth outweighs its positive effect. Similar to Alexander, Kormendi and Meguire (1985) find there is no evidence of positive relationship between inflation and economic growth in their study. In fact, it is negatively correlated. Kilic and Arica (2014) add the list of the negative relationship literature with their study.

Coming with different result, several economists propose that there is no relationship between these two variables. Bhatia (1960) argues that there is no systematic correlation between changes in price and economic growth. If the correlation exists, it is not the same for every country. It is adversely correlated in Japan and Germany, but a tendency to shift in the same direction happens in both Canada and Sweden. This author further claims the relationship between inflation and economic growth is low in the majority of experiences (Bhatia 1960: 102). In addition to Bhatia's finding, Vaona and Schiavo (2007) discovers that in advanced countries, if inflation rate is less then 12 percent, it does not significantly affect economic growth, whereas the threshold for developing countries is still unclear due to high unpredictability of growth trends. When it comes to threshold level of inflation, economists come with different estimated figures. Mubarik (2005) argues that threshold inflation level that can be harmful for economic growth is 9 percent; a one percent higher is suggested by Thirlwall and Barton (1971) at the level of 10 percent; and Levine and Zervos (1993) propose 40 percent as the red alert for economic performances.

2.3.3.4 Crime

Another important variable that I use in this research paper as one of the controlling variables is crime. It has been a common knowledge that crime can considerably affect the life of people in general. Due to crime, people can suffer from huge costs, such as security expenses or even loss of life. There are many studies have been conducted to measure the magnitude of the cost that is caused by crime. One of them is done by Anderson. He discovers that, 11.9% of the GDP of the U.S. is, in fact, the percentage of the country's yearly costs due to crime (Anderson 1999). In their sudy, Detotto and Otranto (2010) argue that crime has similar behavior to tax. As tax does, crime also dampens local investment as well as the foreign direct one; crime lessens the power of firms to compete. In addition, it is able to change resources and in the long run, it can result in insecurity as well as ineffectiveness. With regard to effect of crime on economic growth, various studies have been carried out to address this issue. Pellegrini and Gerlagh look at the effect of corruption, a form of crime, on economic growth either directly or indirectly through which the performance of economy is affected by corruption. The channels are investment, schooling, trade openness, and political instability. They carry out the study by applying the same technique as introduced by Mo (2000, 2001). They conclude that via the effect of corruption on investment and trade strategies, economic performance is impeded by this corruption (Pellegrini and Gerlagh 2004). Similarly, this negative relationship is supported by a study conducted by Mauro (1995). By employing subjective indices of honest and efficient bureaucracy, he concludes that corruption significantly reduces investment and economic growth.

Unlike the two earlier studies, Lambsdorff (2003) examines the effect of corruption on capital productivity. He classifies corruption into several elements, which are the quality of bureaucracy, the liberty of civil society, the stability of government, and law and order. The last element is found to be not significant, whereas the others are significant and positively affected productivity. After adding variable of the quality of bureaucracy in the regression, the result becomes not significant which implies that the negative impact of corruption on productivity is due to its relationship with the absence of the quality of bureaucracy. Apart from corruption, different forms of criminal proxy are also used in several studies to find out the correlation between crime and economic growth. By using murder rates as the proxy of crime, Peri (2004) finds that murder rates leads to low economic development. In other words, there is a negative relationship between crime and growth. In line with Peri, Cardenas (2007) finds similar result. He looks for the potential factors that cause a decline in Colombia's economic growth. In comparison to Colombia's GDP growth in 1950 and 1979, the country grows at 2 percent lower, started from 1980 onward, where it has an annual average growth of 3 percent. The result of his study reveals that nations whose rate of homicide is high have a lower

level of not only economic growth, but also per capita incomes. Thus, high rate of homicide in Colombia plays an important role with the country's economic growth slow down. Another form of crime, terrorism is also examined. Gaibulloev and Sandler (2008) discover that local and international terrorism has a negative effect on the growth of per capita income in countries located in the West of Europe from the period of 1971 until 2004. This inverse relationship leads to a reduction in investment that is pro-growth and also an increase in the expenditure of government which has no impacts on growth (Gaibulloev and Sandler 2008: 422).

2.3.3.5 Income

There are studies that take income as an important factor of economic growth. Most of them use initial income per capita. Papyrakis and Gerlagh (2007) take into account initial income per capita. This is because they want to test the hypothesis of conditional convergence holds in their study by keeping other explanatory variables they employ constant. The hypothesis is that higher growth is related to lower initial income per capita. Consequently, the growth that is denoted by per capita economic growth from the period of the study of 1986 to 2000 depends on initial per capita income, natural resource abundance, and other explanatory variables. According to these two authors, it is the level of income that can result in welfare, not the economic growth. In this study they estimate the economic growth on no other variables except for initial income per capita in 1986 by using ordinary least square method. The income levels data, that Papyrakis and Gerlagh use, is obtained from Bureau of Economic Analysis of the US Ministry of Commerce. The result is in favor of the conditional convergence hypothesis, where regions with lower initial income have a tendency to grow higher that those of regions with higher initial income.

Papyrakis and Gerlagh suggest to not interpreting the result by claiming that regions which are blessed with natural resource have a low growth because they are close to their level of steady state following of what they call "a positive resource income shock". However, the impacts of the convergence, according to them, can be seen in the variable of initial income. Once the negative impacts of the resource abundance on economic growth continues to exist, the permanent effect of a one percent rise in the income from natural resource climbs to three percent. As a result of a continual increase by one standard deviation, the income in the long run falls by approximately 16 percent. What is tried to be explained by these figures is that natural resource might improve wealth in the short run, but in the long run, economy will suffer from the resource curse because the disadvantages of being resource-rich outnumbers its advantages. The authors give Alaska as an example of region in the US with this experience. Although, Alaska is blessed with enormous

reserves of oil and fishing banks, no other regions in the US have negative rate of growth in income as Alaska does (Papyrakis and Gerlagh 2007: 1017-1018).

2.3.4 Studies at a Regional Level

Most literature discussing the topic of natural resource curse are conducted at cross-country level. Only a few of them try to find out the impact of the resource on growth at a local level of a country. Since this paper aims to know the impact of the abundance on economic growth of Indonesia, so it is also important to look at several of those few studies conducted in a country's local level. One of them is from Papyrakis and Gerlagh (2007) who analyze the correlation between natural resource abundance and economic growth in the state level of the United States. Not only discovering that natural resource abundance promotes corruption and crowds out investment, schooling, and R&D expenditure; they also confirm these effects are able to enlighten the negative impact of the resource abundance on economic growth. In their study, they do not differentiate natural resource as in proposed in this paper. Using OLS for the estimate method, they simply take the share of the primary sector's production in GDP in 1986, which also means the share of the production of agriculture, forestry, fishing and mining as the proxy of the resource abundance. The result is in line with the hypothesis claiming that regions with scarce natural resource have a tendency to grow faster in comparison to the ones with large natural resource. They prove that economic growth has a very significant and negative correlation with natural resource abundance. The authors further elaborate that with the exception of the level of initial income, regions in the observed country of the US obviously have different characteristics of economy which are crucial to economic growth. If income from the production of primary sector rises by one percent, economic growth falls by 0.047%. If there is a rise of one standard deviation (0.06) in the income that is obtained from natural resource, growth will be declined by approximately 0.28 percent annually. The impact is huge because when it is compared to a rise of initial income obtained from other sectors apart from the primary one, the fall in economic growth is relatively small at 0.018 percent annually.

There are also some studies which are more specific to agriculture, one out of two types of natural resource used in this paper. Katircioglu (2006) conducts a study to examine the agricultural sector's effect on North Cyprus' economy. He employs yearly data from 1975 to 2002 to figure out the relationship between the growth of agriculture and the growth of economy using Granger causality test. Prior to that, he applies unit root tests to examine whether the considered variables are stationary or not. Katircioglu offers two findings in his study. The first one suggests that the growth of agriculture output and real GDP, the proxy of economic growth he uses, are stationary. As a result, both of them are obviously co-integrated and in long haul equilibrium correlation. The

second finding is that there is an indication of two-direction causation between the two variables in the long haul. This study implies that the sector of agriculture is still crucial to North Cyprus' economy despite of the country suffers from political difficulties. The contribution, however, shows a decreasing trend over the years (Katircioglu 2006). In his other study, Katircioglu (2004-2005) examines the correlation between economic growth and agriculture using data from 1977 to 2002, but in this study, he adds the sector of industries and services from the same period of time. The result is not different from his earlier work. Agriculture is still crucial to the country's economic development in the long haul and in an opposite direction. Economic growth promotes agricultural development (Katircioglu 2004-2005). In line with Katircioglu, Tiffin and Irz (2006) also discover that agriculture is important to economy because it encourages the growth of gross domestic product in particular in developing countries. They conduct the study by using Granger causality test in the panel data of 85 countries. The relationship is, however, unclear for developed countries.

Anatoher work looking at the relationship between agriculture and economy is from Konya and Singh (2009). They examine the correlation between India's GDP, exports, and imports from 1950 to 2004. They focus on two main sectors of the country's economy – agriculture and manufacturing. In this study, they apply unit root test, co-integration and Granger casualty. The result is still in favor of the earlier discussed studies. Agriculture promotes economic growth in the case of India. Since this research paper is about Indonesia, so it is more relevant to take an example of a study conducted in its neighboring countries, such as Thailand. In Thailand, agriculture is a crucial part of the country's economy. Jatuporn et al. (2011) proves this statement valid. The causality of agriculture and economic growth in Thailand is investigated by using data from 1961 to 2009. To find out the long haul association and the impact transmission between variables used, they employ unit root, Granger causality, the Wald (χ^2) coefficient statistic, and generalized variance decomposition tests. They use the value of gross domestic product of agriculture as the proxy for the variable of agriculture, whereas to denote the variable of economic growth, these authors use total value of gross domestic products as its proxy. The result suggests that there is a long haul two-direction relationship between agriculture and economic growth in Thailand. In addition, economic growth is found to be a major determinant of an increase in the growth of agriculture in the country. As a concluding remark, they argue that, based on this study, agriculture is likely to be a successful sector for the development of Thailand (Jatuporn et al. 2011: 231).

Now, the question is how it is in Indonesia. Not only looking at the relationship between agriculture and economic growth as discussed earlier, but also looking at the correlation between mining, the other type of natural resource preferred in this paper, and economic growth in Indonesia. This question will be addressed in the results and analysis chapter of this research paper.

CHAPTER 3
METHODOLOGY

This chapter presents methodology that is used in this research paper. It is structured in three sections. The first one discusses data and where it comes from. The second one elaborates the variables which are employed in this paper. The last one is the methodology which explains how the impact of natural resource abundance on economic growth is analyzed.

3.1 Data

In conducting this research, I mostly rely on data taken from Statistics Indonesia that is locally known as BPS, which stands for *Badan Pusat Statistik*. Statistics Indonesia is an official institution of Indonesia which is directly responsible to the president of the republic of Indonesia, and is in charge of conducting surveys which are related to statistics. The examples of the surveys it conducts are surveys on social and economics, manufacturing, population, labor force, and poverty. They are conducted on national, provincial, and municipal level across the archipelago. The result of its surveys is mainly used by either central or local government of Indonesia. However, data that this institution produces is also available for people in general. It can be easily accessed through its website. This institution has branches across the country, which currently has 33 provinces. However, in this research paper, not all data from 33 provinces is employed, only data from 30 provinces is used. Data from three of them were excluded because these provinces - Kepulauan Riau, Sulwaesi Barat, and Papua Barat - are newly established due to proliferation of administrative regions, and they do not have much data from the required span that is needed in this paper from 2004 until 2013. Data in national level is provided by central office of Statistics Indonesia, while data in provincial level is provided by each of its provincial branches. This research paper does not only rely on data from statistics Indonesia. To enrich the content of the paper, I also incorporate some data from other official institutions either national or international institutions. For instance, data from Directorate General of Oil and Gas and Directorate General of Plantation of Ministry of Agriculture is also used together with data from global institution such as United Nations Development Program and the World Bank.

3.2 Variables

In this paper, I employ one dependent variable, two main independent variables, and five other independent variables as controlling variables. They are all at provincial level and obtain from statistics Indonesia. Growth is used, in this research, as the dependent variable and denoted by

growth of per capita GRDP at 2000 Constant Price. One of the previous studies that used similar variable as the dependent variable is the one conducted by Gylfason (2000), but he uses growth in national level instead of provincial level, which is used in this paper. The aim of this paper is to find out the impact of natural resource abundance on economic growth. Thus, the main independent variable is the one utilized as the proxies of the resource abundance. In this research paper, natural resource is categorized into non-renewable and renewable resources. The first main independent variable that I incorporate is mining. To denote this variable, I choose the share of mining and quarrying in GRDP at 2000 constant price. A work from Sachs and Warner (1995), which employs the share of mineral production in GDP, is an example of a study that uses a non-renewable resource as an Independent variable. To represent renewable independent variable, I take agriculture. This variable is denoted by the share of agriculture, livestock, forestry and fishery in GRDP at 2000 constant price. One of the similar studies, which analyzes the impact of agriculture on economic growth is also the same study briefly discussed above from Gylfason (2000). However, in his study, he takes value added in agriculture as the proxy of agriculture variable.

Apart from these two main variables, I also utilize several controlling variables. They are school participation rate of population aged 13-15 years as the proxy of education, labor force participation rate as the proxy of labor, inflation rate to denote inflation, number of crime to denote crime, and per capita GRDP to denote income. These variables are used to check the robustness of the impact of natural resource abundance on economic growth.

3.3 Methodology

In analyzing the impact of natural resource abundance on economic growth in this research paper, I apply panel data analysis. Natural resource abundance is grouped into non-renewable and renewable resources. Consequently, I propose the following two equation models to represent each type of the resource abundance.

Non-renewable Resource:

$$Growth_{it} = \alpha_0 + \alpha_1 Mining_{it} + \alpha_2 Education_{it} + \alpha_3 Labor_{it} + \alpha_4 Inflation_{it} + \alpha_5 Crime_{it} + \alpha_6 Income_{it} + \epsilon_{it}$$

Renewable Resource:

$$Growth_{it} = \beta_0 + \beta_1 Agriculture_{it} + \beta_2 Education_{it} + \beta_3 Labor_{it} + \beta_4 Inflation_{it} + \beta_5 Crime_{it} + \beta_6 Income_{it} + \epsilon_{it}$$

To test the impact of the abundance on growth, I use two methods of Fixed Effects and Random Effects. Firstly, I examine the effect of mining alone on economic growth with both methods without

any other independent variables. Then, apart from conducting a Hausman Test, the result from the methods is compared to find which method is more preferable. Secondly, I look at the impact of agriculture, another main independent variable, on economic growth. The same procedure, as the one used in mining, the first independent variable, was conducted. Thirdly, I check whether the result of the effect of mining on growth is different due to changes by adding controlling variables on the regression. Again, I compare the result of both Fixed Effects and Random Effects, and also conduct a Hausman Test to check which method is better. Fourthly, I do the same thing for the independent variable of agriculture in the third case. Fifthly, another robustness check is performed. I drop three provinces with the largest average share of natural resource abundance from 2004 until 2013, but also at the same time have low economic growth. Similar procedure is performed as in previous cases to find out whether there is a change in the result. However, the effect of agriculture on growth is not tested in the last case because it has been proved not significant in the fourth case. Lastly, I add robust command on stata, software of data analysis that I use in this research paper, and conduct another regression. Similar procedure with the earlier ones is taken to examine the impact of both mining and agriculture on economic growth. The result is then compared to the ones before the addition of robust command on the regression.

The final step is that after examining the impact of natural resources abundance economic growth. I find out possible transmission channels by testing the impact of both proxies for the resource abundance on each of variables which are used in this research paper as controlling variables, except for labor. In this regression, economic growth is no longer the dependent variable. Education, inflation, crime, and income become the dependent variable, whereas mining and agriculture are as the independent variables.

CHAPTER 4
RESULTS AND ANALYSIS

This chapter provides results and analysis of this research paper. It is divided into two sections. The first one provides the impact of natural resource abundance on economic growth in Indonesia. The second one reports the possible transmission channels.

4.1 The Effect of Natural Resource Abundance on Economic Growth

I begin with two equation models which are used to show the relationship between natural resources and economic growth. In this study, I classify the resources into two different types - renewable and non-renewable resources. As shown in descriptive statistics of table 1, there are eight variables which are utilized in the models – growth, mining, agriculture, education, labor, inflation, crime, and income. Basically, the models have similar variables, except for the main independent variables. The dependent variable and controlling variables for the two models are the same. In the first model the main independent variable is mining. This variable, in my study, represents non-renewable resources. In the second model, agriculture is used to represent renewable resource as the main independent variable. To denote renewable resource, I use the share of agriculture, livestock, forestry and fishery in gross regional domestic product (GRDP) at 2000 constant price, whereas non-renewable resource is indicated by the share of mining and quarrying in GRDP at 2000 constant price. Meanwhile, both models share the same dependent variable of economic growth and similar controlling variables of education, labor, inflation, crime, and income. The proxy for economic growth, which is employed in the model, is growth of per capita GRDP at 2000 constant price. Labor is indicated by labor force participation rate, and per capita GRDP is used as the proxy of income.

I use 10 years data of 30 provinces in Indonesia taken from Statistics Indonesia ranging from 2004 until 2013. Thus, there are 300 observations in my study. However, for some variables, such as education, inflation, and crime; there are some missing values due to the unavailability of the data. Education, which is denoted by school participation rate of population aged 13-15 years, has only 299 observations because data for Aceh province in 2005 is not available. Inflation has also incomplete data for all provinces. The provinces of Kepulauan Bangka Belitung and Gorontalo do not have this data for 2004, so the total observation for this variable is 298. Similar number of observation also happens with the variable of crime, which is denoted by number of crimes.

Kepulauan Bangka Belitung and Maluku Utara are the two provinces contributing to the incompleteness of the observation. Both provinces have no data of 2004 for this variable.

Table 1. Descriptive Statistics

Variable		Mean	Std. Dev.	Min	Max	Observations	
growth	overall	3.705	3.878	-27.660	32.100	N =	300
	between		2.023	-2.925	6.308	n =	30
	within		3.327	-23.636	36.124	T =	10
mining	overall	10.262	13.995	0.100	64.610	N =	300
	between		13.888	0.106	50.502	n =	30
	within		2.962	-7.038	29.212	T =	10
agriculture	overall	24.077	10.083	0.070	45.510	N =	300
	between		10.093	0.084	41.374	n =	30
	within		1.693	18.103	30.292	T =	10
literacy	overall	86.446	5.567	67.000	98.350	N =	299
	between		4.815	74.717	94.650	n =	30
	within		2.941	75.108	94.898	T-bar =	9.967
labor	overall	67.866	4.553	59.080	80.990	N =	300
	between		4.219	61.835	77.396	n =	30
	within		1.861	61.840	74.064	T =	10
inflation	overall	-0.557	23.726	-76.180	35.140	N =	298
	between		1.728	-2.866	5.274	n =	30
	within		23.669	-75.685	35.046	T -bar =	9.933
crime	overall	8.771	0.992	6.213	11.061	N =	298
	between		0.929	6.830	10.949	n =	30
	within		0.397	6.934	9.937	T =	9.933
income	overall	15.733	0.618	14.561	17.684	N =	300
	between		0.615	14.760	17.476	n =	30
	within		0.120	15.470	16.017	T =	10

Source: Own Construction by using Stata

My goal is to test whether both agriculture and mining have an impact on growth by using both Fixed Effects and Random Effects. At first, I run a regression to know the impact of mining on growth without any other independent variables. As reported in table 2, by using Fixed Effects, the result shows the estimated coefficient is 0.039, and the t-ratio is 0.57. What is meant by the numbers is

that on average mining has a positive impact on growth but it is not statistically significant. This is not similar to the literature. By using Random Effects, the result demonstrates that the coefficient is -0.085, and the z-ratio is -4.24. The result between Random Effects and the previous method is different. This method shows that on average mining has a negative impact on growth, and it is statistically significant at the 1 percent level. The economic intuition of the result is that each 1 percent increase in mining, there is going to be a decline in growth by 0.085 percent. Since the result is in line with the literature and more meaningful than Fixed Effects, Random Effects is likely better. To prove this assumption, I conduct a Hausman Test. As we can see in table 2, the test validates the assumption by showing that the method is more preferable because the value of prob>chi2 is greater than 5 percent.

Table 2. The Effect of Mining on Economic Growth

Fixed Effects		**Random Effects**		**Hausman Test**
coef	0.039	coef	-0.085	Prob>chi2 = 0.059
t	0.57	z	-4.24***	Random Effects
P>|t|	0.568	P>|z|	0.000	
Constant	3.303	Constant	4.572	
Standard Error	0.068	Standard Error	0.020	
R-Sq: Overall	0.105	R-Sq: Overall	0.105	
Number of Obs	300	Number of Obs	300	

Note: Superscript *** corresponds to a 1% level of significance

Source: Own Construction by Using Stata

In the second regression, the thing I try to examine is the impact of agriculture on growth. Similar to the first case, I run a regression without any other variables apart from agriculture and economic growth. As we can see in table 3, Fixed Effects shows that on average there is an inverse relationship between agriculture and growth that is illustrated by its negative estimated coefficient of -0.320. The association is also statistically significant at the level of 1 percent. It is proven by the value of the t-ratio of -2.71. In the economic sense, the numbers mean that if there is a 1 percent rise in agriculture, growth will fall by 0.320 percent. The result from this method is in line with the literature used in the research paper. Move on to Random Effects, the result is different. As table 3 shows, with an estimated coefficient of 0.014 and z-ratio of 0.39, it confirms that on average there is an insignificant and positive relationship between agriculture and growth. The result is not in favor of the literature. Comparing the result between the two methods, it looks like Fixed Effects is better

than Random Effects. However, to prove whether the statement is accurate, I perform another Hausman Test. The test shows that prob>chi2 = 0.003, which is less than 5 percent. Thus, it validates the statement that Fixed Effects method is better than Random Effects.

Table 3. The Effect of Agriculture on Economic Growth

Fixed Effects		**Random Effects**		**Hausman Test**
coef	-0.320	coef	0.014	Prob>chi2 = 0.003
t	-2.71***	z	0.39	Fixed Effects
P>|t|	0.007	P>|z|	0.693	
Constant	11.409	Constant	3.366	
Standard Error	0.118	Standard Error	0.036	
R-Sq: Overall	0.009	R-Sq: Overall	0.009	
Number of Obs	300	Number of Obs	300	

Note: Superscript *** corresponds to a 1% level of significance

Source: Own Construction by Using Stata

In the third regression, to check for robustness, I add other independent variables to the models. As explained earlier in this chapter, proxies of education, labor, inflation, crime, and income are also utilized in both models of renewable and non-renewable resources. Initially, I try to look at whether the result of the impact of mining on growth by using both methods of Fixed Effects and Random Effect would be different after the inclusion of those controlling variables. As reported in table 4, the result, for Fixed Effects, is an estimated coefficient of 0.061 and a t-ratio of 0.81. These figures imply that, on average, the relationship between growth and mining is positive and not statistically significant. This is not supported by previous empirical studies. Random Effects, on the other hand, portrays a more promising of an estimated coefficient of -0.083 and a z-ratio of -3.64. This numbers mean that, on average, there is an inverse relationship between growth and mining. In other words, the result suggests on average that there is a greatly statistically significant negative impact of mining on growth. It is significant at the 1 percent level. A more meaningful interpretation of the result is in the economic sense. An increase by 1 percent in mining will result in a decline in economic growth by 0.083 percent. Comparing the results between the two methods, Random Effects seems better than the other one because its result is in line with the literature that is used in this paper. To prove the validity of the postulation, a Hausman Test is carried out. Surprisingly, as provided in table 4, the test shows the value of prob>chi2 is 0.003, which is less than 5 percent. It means that Fixed Effects is a better method in comparison to Random Effects, although Random

Effects reveals more meaningful result. Compared to the first regression, where mining is the only independent variable, the result, in general, is not different. Fixed effects on both cases confirm positive and insignificant relationship between mining and growth. Random Effects on both cases also reveal similar result. Both have negative relationship and statistically significant. However, after the inclusion, the relationship becomes -0.6 less significant as compared the one before the inclusion, but it is still considered as statistically highly significant at z-ratio of -3.64. With regard to the preferable method, there is a difference of preference according to Hausman Test. Based on the test, in the first regression, as reported in table 2, Random Effects is likely better, but after the inclusion, Fixed Effects is more suggested. The full finding of the correlation between mining, controlling variables, and economic growth can be seen in table A1 in Appendix.

Table 4. The Effect of Mining on Economic Growth with Controlling Variables Inclusion

Fixed Effects		**Random Effects**		**Hausman Test**
coef	0.061	coef	-0.083	Prob>chi2 = 0.003
t	0.81	z	-3.64***	Fixed Effects
P>|t|	0.417	P>|z|	0.000	
Constant	-108.340	Constant	3.595	
Standard Error	0.075	Standard Error	0.023	
R-Sq: Overall	0.013	R-Sq: Overall	0.133	
Number of Obs	296	Number of Obs	296	

Note: Superscript *** corresponds to a 1% level of significance

Source: Own Construction by Using Stata

In the fourth regression, what I do is similar to the case of the third regression. I would like to find out whether the result of the effect of agriculture on growth, as proven in the second regression, will not be the same after all independent variables, used in the third regression, are also included in the model. By performing Fixed Effects method, the estimated coefficient, as shown in table 5, is -0.242 and the t-ratio is -1.24. It means that, on average, the relationship between agriculture and growth is negative but insignificant. The result does not meet the expectation because it is different with previous empirical studies. On a different note, the result for Random Effects is not the same. With an estimated coefficient of 0.018 and z-ratio of 0.39, the result for this method simply says that on average the relationship between agriculture and economic growth is positive. In addition to that, as in Fixed Effects method, the association is also not significant. The results of the two methods clarify that agriculture is not robust because none of the two methods

reveals an expected statistically significant relationship after the inclusion of controlling variables. As compared to the second regression, where agriculture is the only independent variable in the model, there is, at least, Fixed Effects that come with the expected coefficient of -0.320 and statistically significant t-ratio of -2.71 that is in line with the literature which is used in this research paper. Table A2 in Appendix shows the full result of the relationship between agriculture, controlling variables, and economic growth.

Table 5. The Effect of Agriculture on Economic Growth with Controlling Variables Inclusion

Fixed Effects		**Random Effects**		**Hausman Test**
coef	-0.242	coef	0.018	Prob>chi2 = 0.004
t	-1.24	z	0.39	Fixed Effects
P>|t|	0.217	P>|z|	0.694	
Constant	-66.408	Constant	8.669	
Standard Error	0.195	Standard Error	0.047	
R-Sq: Overall	0.006	R-Sq: Overall	0.066	
Number of Obs	296	Number of Obs	296	

Source: Own Construction by Using Stata

In the fifth regression, I also examine the robustness of the impact of natural resource on growth by taking into account the sensitivity of the result to outliers. Since the result of the impact of mining on growth after the inclusion of controlling variables provides better result as compared to the one with agriculture, so I decide not to include agriculture on this stage and focus only on mining. What I mean by outliers here is provinces with the largest share of natural resources and at the same time have a very low economic growth. I adopt this mechanism from a study conducted by Sachs and Warner (1995). To find out which provinces could potentially become outliers, I calculate the average share of mining and quarrying as percent of gross regional domestic product of each province from the period of 2004 until 2013. I also do the same procedure for the economic growth. The result can be seen in table 6. In the sample, there are three provinces in Indonesia which have the largest natural resources, as portrayed in figure 6. These provinces are Riau, Papua, and Kalimantan Timur. As reported in figure 7, together with Aceh, the three provinces are in the top chart of provinces with the lowest average economic growth from 2004 to 2013. Table 6 shows that Riau province has the largest natural resource in Indonesia with an average share of mining and quarrying of 50.5 percent from its total gross regional domestic product (GRDP) from 2004 to 2013, followed by Papua in the second place with an average share of mining and quarrying of 45.66

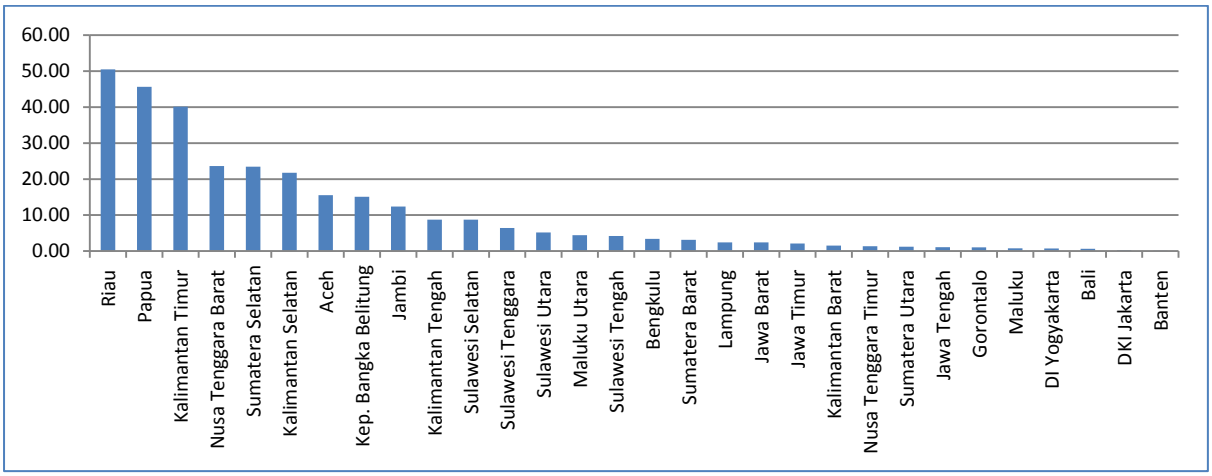
percent of its GRDP, and Kalimantan Timur comes at the third place with an average share of mining and quarrying of 40.13 percent from the province's total GRDP. The average growths of the same period of time of the three provinces are as low as -0.95 percent for Riau, -0.32 percent for Papua, and 0.29 percent for Kalimantan Timur. The presence of these provinces would tend to strengthen the estimated negative impact of mining. In other words, the exclusion of them will lessen the effect of mining on economic growth. To check whether this is a valid assumption, I drop them from the sample.

Table 6. Indonesia's Average Share of Mining and Economic Growth by Provinces from 2004 to 2013

NO	PROVINCE	AVERAGE SHARE OF MINING (IN PERCENTAGE)	AVERAGE ECONOMIC GROWTH (IN PERCENTAGE)
1	Riau	50.50	0.95
2	Papua	45.66	-0.32
3	Kalimantan Timur	40.13	0.29
4	Nusa Tenggara Barat	23.63	2.35
5	Sumatera Selatan	23.46	3.62
6	Kalimantan Selatan	21.74	3.71
7	Aceh	15.52	-2.93
8	Kep. Bangka Belitung	15.08	2.07
9	Jambi	12.38	4.92
10	Kalimantan Tengah	8.75	3.95
11	Sulawesi Selatan	8.73	5.72
12	Sulawesi Tenggara	6.41	5.87
13	Sulawesi Utara	5.16	5.67
14	Maluku Utara	4.39	3.69
15	Sulawesi Tengah	4.20	6.31
16	Bengkulu	3.39	4.25
17	Sumatera Barat	3.10	4.56
18	Lampung	2.42	4.26
19	Jawa Barat	2.41	4.17
20	Jawa Timur	2.11	5.62
21	Kalimantan Barat	1.52	4.00
22	Nusa Tenggara Timur	1.34	2.99
23	Sumatera Utara	1.19	4.50
24	Jawa Tengah	1.09	5.13
25	Gorontalo	1.05	5.52
26	Maluku	0.77	3.65
27	DI Yogyakarta	0.71	3.44
28	Bali	0.65	4.47
29	DKI Jakarta	0.27	4.87
30	Banten	0.11	3.85

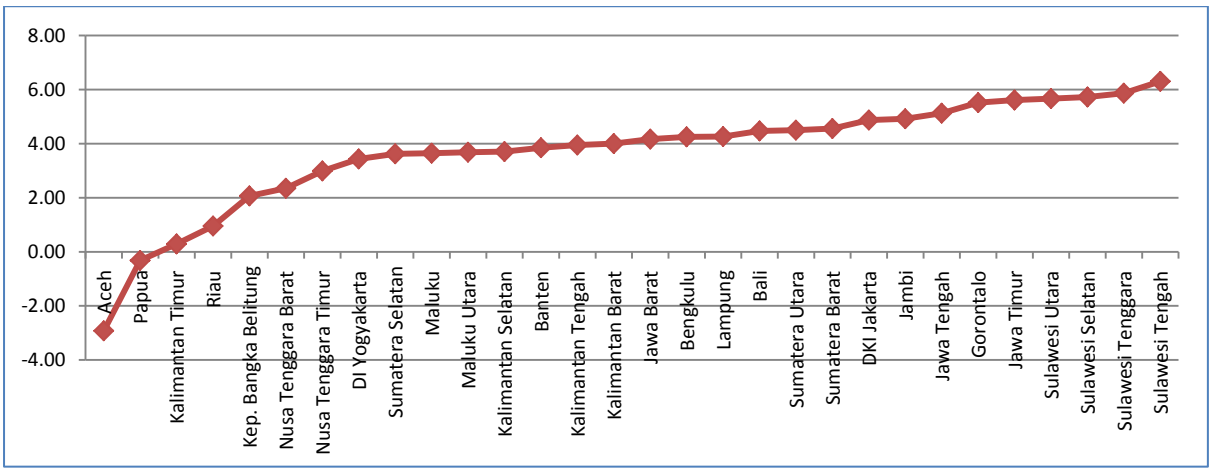
Source: Own Construction based on Statistics Indonesia's Data

Figure 6. Indonesia's Average Share of Mining by Provinces from 2004 to 2013



Source: Own Construction based on Statistics Indonesia's Data

Figure 7. Indonesia's Average Economic Growth by Provinces from 2004 to 2013



Source: Own Construction based on Statistics Indonesia's Data

The result for Fixed Effects, as provided in table 7, is not in line with the prominent literature. The relationship is not statistically significant even though it is negatively correlated. It has an estimated coefficient of -0.064 but with a t-ratio of -1.3. On the contrary, Random Effects suggests a better result. Based on this method, mining has a negative and statistically significant relationship with economic growth. The estimated coefficient for this method is -0.062, and the z-ratio is -1.97. It is significant at the 5 percent level. In the sense of economics, the interpretation of these numbers would be an increase by 1 percent in mining would result in a fall in economic growth by 0.062 percent. The Result from the method of Random Effects is in favor of literature which I use in this research paper. If we compare this result with the one in the third regression using Random Effects, where the estimated coefficient is -0.083 and z-ratio is -3.64, then it is proven that the exclusion of Riau, Papua, and Kalimantan Timur reduces the significance of the relationship between mining and

economic growth by -1.67. With regard to preferable method, by only comparing the results from both Fixed and Random Effects, it seems that the later is better. However, we need to prove whether the statement is valid or not. To do that, I conduct a Hausman Test. The finding, as reported in table 7, shows that prob>chi2 is 0.010, which is lower than 5 percent. It means that, based on the test, Fixed Effects is more preferable. Table A3 in Appendix reports the full result of this regression to see the correlation between all variables.

Table 7. The Effect of Mining on Economic Growth without Outliers

Fixed Effects		**Random Effects**		**Hausman Test**
coef	-0.064	coef	-0.062	Prob>chi2 = 0.010
t	-1.3	z	-1.97**	Fixed Effects
P>|t|	0.194	P>|z|	0.049	
Constant	-47.518	Constant	-10.367	
Standard Error	0.049	Standard Error	0.031	
R-Sq: Overall	0.034	R-Sq: Overall	0.106	
Number of Obs	266	Number of Obs	266	

Note: Superscript ** corresponds to a 5% level of significance

Source: Own Construction by Using Stata

In the last step, I did another regression, but I add robust command on it. The result is not very much different compared to the stages before the addition of the command. As we can see in table 8, by using Fixed Effects, the effect of mining on economic growth is not statistically significant and it has a positive direction. This relationship is not supported by the literature that is adopted in this paper. Random Effects, on the other hand, demonstrates a more meaningful finding, which is an expected negative relationship between mining and economic growth. This regression has an estimated coefficient of -0.085, and a t-ratio of -5.71. It is statistically significant at the 1 percent level of significance. The economic intuition behind the number is that a rise by 1 percent in mining would result in a fall in economic growth by 0.085 percent. Looking at the result alone, it seems that Random Effects is more preferable compared to Fixed Effects because it is in line with the literature. However, to test whether this assumption is valid, I conduct a Hausman Test. The result from the test confirms that the assumption is valid because the prob>chi2 is 0.059, which is greater than 5 percent.

In the second stage, where controlling variables were incorporated in the regression, the findings for both methods are similar to the previous stage. Fixed Effects results in insignificant

positive relationship between mining and economic growth, whereas the association is negative and highly significant at 1 percent level for Random Effects. The later method shows an estimated coefficient of -0.083 and a t-ratio of -7.08. It is significant at the level of 1 percent. The economic interpretation for the number is that when mining increase by 1 percent, there is a decline in economic growth by 0.083 percent. According Hausman, prob>chi2 is 0.003, which is lower than 5 percent. It implies that Fixed Effects is more preferable. However, based on the result, we can argue that Random Effects is better than Fixed Effects because its result is more meaningful and corresponding to the literature. The full finding of this stage is reported in table A4 in Appendix. The table shows the correlation between mining, controlling variables and economic growth with the addition of robust command on stata.

Table 8. The Effect of Mining on Growth after the Addition of Robust Command on Stata

Description	Fixed Effects		Random Effects		Hausman Test
Mining on Growth	coef	0.039	coef	-0.085	Prob>chi2 = 0.059
	t	0.31	z	-5.71***	Random Effects
	P>|t|	0.762	P>|z|	0.000	
	Constant	3.303	Constant	4.572	
	Robust St. Err.	0.128	Robust St. Err.	0.015	
	R-Sq: Overall	0.105	R-Sq: Overall	0.105	
	Number of Obs	300	Number of Obs	300	
Mining on Growth With Controlling Variabes	coef	0.061	coef	-0.083	Prob>chi2 = 0.003
	t	0.73	z	-7.08***	Fixed Effects
	P>|t|	0.473	P>|z|	0.000	
	Constant	-108.340	Constant	3.595	
	Robust St. Err.	0.084	Robust St. Err.	0.012	
	R-Sq: Overall	0.013	R-Sq: Overall	0.133	
	Number of Obs	296	Number of Obs	296	

Note: Superscript *** corresponds to a 1% level of significance

Source: Own Construction by Using Stata

The effect of agriculture on economic growth after the addition of robust command on the regression does not show better result as compared to its previous stages. As displayed in table 9, the relationship between the two variables has already not significant at the first stage, where the effect of agriculture alone on economic growth is regressed by using Fixed Effects and Random

Effects. However, both methods result in different direction of relationship between agriculture and growth. Fixed Effects confirms a negative relation, whereas Random Effects comes out with a positive relationship between agriculture and economic growth. The full result for this regression is given in table A5 in Appendix.

Table 9. The Effect of Agriculture on Growth after the Addition of Robust Command on Stata

Description	Fixed Effects		Random Effects		Hausman Test
Agriculture on Growth	coef	-0.320	coef	0.014	Prob>chi2 = 0.003
	t	-1.42	z	0.49	Fixed Effects
	P>|t|	0.167	P>|z|	0.626	
	Constant	11.409	Constant	3.366	
	Robust St. Err.	0.226	Robust St. Err.	0.029	
	R-Sq: Overall	0.009	R-Sq: Overall	0.009	
	Number of Obs	300	Number of Obs	300	
Agriculture on Growth with Controlling Variables	coef	-0.242	coef	0.018	Prob>chi2 = 0.004
	t	-0.85	z	0.54	Fixed Effects
	P>|t|	0.4	P>|z|	0.592	
	Constant	-66.408	Constant	8.669	
	Robust St. Err.	0.283	Robust St. Err.	0.034	
	R-Sq: Overall	0.006	R-Sq: Overall	0.066	
	Number of Obs	296	Number of Obs	296	

Source: Own Construction by Using Stata

Compared to the result before the addition of robust command on stata, the finding after the addition is not different. Both of them show that the effect of mining on economic growth is negative and statistically significant. Thus, the result from this paper confirms the findings from previous studies. When agriculture is used to denote natural resource, the result is also not very much different. However, before the addition, agriculture alone significantly and negatively affects economic growth by using Fixed Effects. After the addition, the effect is no longer statistically significant. When controlling variables were also incorporated in the regression, the result after the addition is not significant. This is similar to the one before the addition of robust command on stata.

4.2 Transmission Channels

In this section, I examine the possible transmission channels by estimating the effect of natural resource abundance on education, inflation, crime, and income. The proxies for these variables are the same as the ones used as the proxies for controlling variables in the previous regression. Before presenting the empirical result, I discuss the variables and then assess the possibility for them to become a transmission channel.

The first transmission channel I consider in this research paper is the effect of natural resource abundance on education. An empirical study from Gylfason et al. proves that there is a negative relationship between the rates of school enrolment in all levels of schools and natural resource abundance. They show that big primary sectors, which rely on natural resource abundance, hold back the emergence of secondary sectors via real exchange rate. For this reason, the need for higher education to work in the secondary sectors is declined (Gylfason et al 1999)

The next transmission channel I examine is the relationship between natural resource abundance and inflation. Kim and Willett look at the statement that inflation negatively affects economic growth through the effect of oil supply shock. This effect leads to an increase in inflation, and eventually hampers economic growth. Their findings support this statement. However, they also discover that, in developed nations, the oil price shocks decrease the estimated effects of inflation on economic growth. The impact of the shocks in developing countries is found to be minor (Kim and Willett 2000).

Another transmission channel is the impact of natural resource abundance on crime. As proposed by Mauro, being dependent in natural resource can stimulate corruption and rent seeking activity. Political leaders and their allies are tempted to obtain special permit to take advantage of the natural resources and sell them abroad. He concludes that resource dependence has a significant relationship with corruption, as measured by worse corruption index. This is later connected to the bad performance of economic growth (Mauro 1995). Unlike the previous author, van der Ploeg looks at the effect of production and resource income on conflict. According to him, the effect is different. On the one hand, when production income is high, the probability of conflict to arise will be less because warfare becomes less attractive. On the other hand, when resource income is high, the tendency of conflict to occur is also high because the warfare has become more attractive (van der Ploeg 2011). If conflict or crime exists, then it might be a warning. According to Detotto and Otranto, crime acts similar to tax. It harms investment and hampers the competitiveness of companies that later can result in insecurity and inefficiency (Detotto and Otranto 2010). This might not be good for economy in general because the production of natural resource goods by resource-based companies might be inhibited.

As the last transmission channel, I consider the association between natural resources and income. Based on a study from de Gregorio and Bravo-Ortega, natural resources abundance is able to increase income via higher human capital. In their study, they add that the one that has a negative relationship with economic growth is the share of natural resources in total exports, whereas the share of natural resources in GDP has a positive relationship with income. The authors suggest that these findings show that resource-rich nations benefit more from the endowments (de Gregorio and Bravo-Ortega 2005).

Turning to the empirical results, table 10 shows the impact of natural resource abundance, denoted by mining, on education, inflation, crime, and income. As seen in the table, mining has a negative impact on education, inflation and crime, whereas on income, it has a positive effect. In other words, in the case of Indonesia, the natural resource abundance, indicated by mining, leads to lower education, inflation, and crime. On a different note, this resource abundance leads to higher income. However, the impact for education is not statistically significant. In contrast, inflation, crime and income have a significant relationship with mining as indicated by the z-ratios of -1.99, -1.88, and 2.9 in a row. The impact of mining on inflation is significant at the level of 5 percent, whereas its impact on crime and income is significant at the level of 10 percent and 1 percent in a row.

Table 10. Indirect Transmission Channels for Mining

	Education	Inflation	Crime	Income
Constant Coefficient	86.648	-0.083	9.04	15.65
Mining Coefficient	-0.017	-0.046	-0.027	0.008
Robust Standard Errors	0.062	0.023	0.015	0.003
z	-0.28	-1.99**	-1.88*	2.9***
P>|z|	0.781	0.047	0.061	0.004
R-sq: Overall	0.013	0	0.002	0.187
Number of Groups	30	30	30	30

Note: Superscripts *, **, and *** correspond to a 10%, 5%, and 1% level of significance

Source: Own Construction by Using Stata

When the proxy for natural resource is changed to be agriculture, the results, as provided in Table, 11, are all statistically significant. The z-ratios of Education, inflation, and income are -3.99, -3.35, -8.61 respectively. They are all significant at 1 percent level of significance. The z-ratio of crime is -2.32. It is significant at the level of 5 percent. The results indicate that in the case of Indonesia,

natural resource abundance, as indicated by agriculture, leads to a lower education, inflation, crime, and income.

Table 11. Indirect Transmission Channels for Agriculture

	Education	Inflation	Crime	Income
Constant Coefficient	98.134	2.146	9.927	17.05
Agriculture Coefficient	-0.484	-0.112	-0.048	-0.055
Robust Standard Errors	0.121	0.034	0.021	0.006
z	-3.99***	-3.35***	-2.32**	-8.61***
P>|z|	0	0.001	0.02	0
R-sq: Overall	0.04	0.002	0.225	0.544
Number of Groups	30	30	30	30

Note: Superscripts ** and *** correspond to a 5% and 1% level of significance

Source: Own Construction by Using Stata

CHAPTER 5
CONCLUSION

There has been a long debate on what role an abundance of natural resource can play in a country's economic growth. Most contribution comes from cross-country studies. Those studies show that rich-natural resource countries tend to have lower economic growth compared to poor-natural resource countries. In this research paper, I would like to make contribution to this topic by doing a research on a local level of a country. This study is important because, to the best of my knowledge, there are only few works that have been conducted at a regional level, in particular Indonesia. By using panel data of 30 provinces in Indonesia, which I obtained from Statistics Indonesia, I try to examine the impact of natural resource abundance on economic growth in the country. Natural resource in this context is differentiated into non-renewable resources of mining and renewable resources of agriculture.

To test the effect of natural resource abundance on economic growth, I apply two methods of panel data analysis – fixed effects and random effects. I find that, if mining is used to denote natural resource abundance, on average it has a negative impact on economic growth in Indonesia. In other words, on average it tends to lower the growth in the country. The relationship between these two variables is statistically significant. The finding does not change when controlling variables of education, inflation, crime, and income are incorporated in the regression. It also results in similar finding when outliers are excluded from regression. If agriculture is used to denote resource abundance, it is only significant when agriculture is regressed without any controlling variables.

In addition to that, I look at the possible transmission channels by regressing mining and agriculture with the variables of education, inflation, crime, and income. I find that if mining is used as a measure of resource abundance, it leads to a lower education, inflation, and crime and it results in a higher income. Nevertheless, the impact is not statistically significant on education, but statistically significant on inflation, crime and income. If agriculture is the measure of natural resource abundance, it has a statistically significant negative relationship with all other variables indicating that agriculture tends to lower education, inflation, crime, and income.

It is undeniable that data limitation often becomes problem for empirical studies at a local level of a country. Some data on the required period of time of the studies, or the more appropriate proxies for a variable are often not available. For example, the proxies I employ to denote mining and agriculture in this research paper are in the form of the share of the two sectors in gross regional domestic product. Thus, it might be more appropriate to be considered them as a measure

of dependence, rather than abundance. However, due to the limitation of data at provincial level, these proxies were chosen to be the measure of natural resource abundance. In addition, as a result of the unavailability of some data, 3 out of 33 provinces in Indonesia should be excluded from the sample in this research. For this reason, I need to acknowledge that there might be a limitation in the accuracy of the empirical findings. I expect further research regarding this topic will take into account and address these data problems so that it can result in a more precise finding.

References

Alexander, W.R.J. (1997) 'Inflation and Economic Growth: Evidence from a Growth Equation', *Applied Economics* 29(2): 233-238.

Anderson, D.A. (1999) 'The Aggregate Burden of Crime', *The journal of law & economics* 42(2): 611-642.

Bappenas and BPS (2013) 'Data dan Informasi Kinerja Pembangunan 2004-2012'.

Barro, R.J. (1995) 'Inflation and Economic Growth', *Bank of England. Quarterly Bulletin* 35(2): 166.

Bhatia, R.J. (1960) 'Inflation, Deflation, and Economic Development', *Staff Papers - International Monetary Fund* 8(1): 101-114.

Brunnschweiler, C.N. and E.H. Bulte (2008) 'The Resource Curse Revisited and Revised: A Tale of Paradoxes and Red Herrings', *Journal of Environmental Economics and Management* 55(3): 248

Cardenas, M. (2007) 'Economic Growth in Colombia: A Reversal of 'Fortune'?', *Ensayos sobre Politica Economica* (53): 220-259.

Christofides, L.N., S. Clerides, C. Hadjiyiannis and M.S. Michael (2007) 'The Impact of Foreign Workers on the Labour Market of Cyprus', *Cyprus Economic Policy Review* 1(2): 37-49.

Coulombe, S. and J. Tremblay (2006) 'Literacy and Growth', *Topics in Macroeconomics* 6(2): 1-32.

de Gregorio, J. and C. Bravo-Ortega (2005) 'The Relative Richness of the Poor? Natural Resources, Human Capital, and Economic Growth', *Policy Research Working Paper Series 3484, The World Bank*.

de la Fuente, A. and R. Domenech (2002) 'Human Capital in Growth Regressions: How Much Difference does Data Quality make? an Update and further Results', No. DP3587.

Detotto, C. and E. Otranto (2010) 'Does Crime Affect Economic Growth?', *Kyklos* 63(3): 330-345.

Ding, N. and B.C. Field (2005) 'Natural Resource Abundance and Economic Growth', *Land Economics* 81(4): 496-502.

Gaibulloev, K. and T. Sandler (2008) 'Growth Consequences of Terrorism in Western Europe', *Kyklos* 61(3): 411-424.

Gelb, A.H. and The International Bank for Reconstruction and Development (1988) *Oil Windfalls: Blessing Or Curse?* New York: Oxford University Press.

Gylfason, T. (1999) 'Exports, Inflation and Growth', *World Development* 27(6): 1031-1057.

Gylfason, T. (2000) 'Resources, Agriculture, and Economic Growth in Economies in Transition', *Kyklos [H.W.Wilson - SSA]* 53(4): 545-580.

Gylfason, T. (2001) 'Natural Resources, Education, and Economic Development', *European Economic Review* 45(4/6): 847-859.

Gylfason, T., T.T. Herbertsson and G. Zoega (1999) 'A Mixed Blessing: Natural Resources and Economic Growth'*, Macroeconomic Dynamics* 3(2): 204-225.

Hill, H.1. (2000) *The Indonesian Economy.* (2nd edn) Cambridge [etc.]: Cambridge University Press.

Hodge, A., S. Shankar, D.S.P. Rao and A. Duhs (2011) 'Exploring the Links between Corruption and Growth'*, Review of development economics* 15(3): 474-490.

Hwang, J., K. Jung and E. Lim (2011) *Corruption and Growth in Ethnically Fragmented World.* Vol. 44. Tennessee State University.

Jatuporn, C., L. Chien, P. Sukprasert and S. Thaipakdee (2011) 'Does a Long-Run Relationship Exist between Agriculture and Economic Growth in Thailand?'*, International journal of economics and finance* 3(3): 227-233.

Katircioglu, S. T. (2004-2005) 'Co-integration and Causality between GDP, agriculture, industry and service growth in North Cyprus: Evidence from time series data, 1977-2002', *Review of Social, Economic and Business Studies* 5/6(Fall): 173-187.

Katircioglu, S.T. (2006) 'Causality between Agriculture and Economic Growth in a Small Nation Under Political Isolation: A Case from North Cyprus'*, International Journal of Social Economics* 33(4): 331-343.

Kilic, C. and F. Arica (2014) 'Economic Freedom, Inflation Rate and their Impact on Economic Growth: A Panel Data Analysis'*, Romanian Journal of Economic Forecasting* 17(1): 160-176.

Kim, S. and T.D. Willett (2000) 'Is the Negative Correlation between Inflation and Growth Real? an Analysis of the Effects of the Oil Supply Shocks'*, Applied Economics Letters* 7(3): 141-147.

King, R.G. and R. Levine (1993) 'Finance and Growth - Schumpeter might be Right'*, Quarterly Journal of Economics* CVIII(3): 717-737.

Konya, L. and J.P. Singh (2009) 'Causality between International Trade and Gross Domestic Product: The Case of the Indian Agricultural and Manufacturing Sectors'*, International Journal of Economics and Business Research* 1(1): 61-75.

Kormendi, R.C. and P.G. Meguire (1985) 'Macroeconomic Determinants of Growth: Cross-Country Evidence'*, Journal of Monetary Economics* 16(2): 141-163.

Lambsdorff, J. (2003) 'How Corruption Affects Productivity'*, Kyklos* 56(4): 457-474.

Lane, P.R. and A. Tornell (1995) 'Power Concentration and Growth' Harvard Institute of Economic Research Working Papers, January 1995.

Levine, R. and S.J. Zervos (1993) 'What we have Learned about Policy and Growth from Cross-Country Regressions?'*, The American Economic Review* 83(2): 426-430.

Lucas, R.E. (1973) 'Some International Evidence on Output-Inflation Tradeoffs'*, The American Economic Review* 63(3): 326-334.

Lucas, R.E.,Jr (1998) *On the Mechanics of Economic Development.*

Mauro, P. (1995) 'Corruption and Growth'*, The quarterly journal of economics* 110(3): 681-712.

Mo, P. H. (2001) 'Corruption and economic growth', *Journal of Comparative Economics* 29 (1): 66–79.

Mo, P.H. (2000) 'Income inequality and economic growth', *Kyklos* 53: 293–315.

Mo, P.H. (2001) 'Corruption and economic growth', *Journal of Comparative Economics* 29: 66–79.

Mubarik, Y. A. (2005) 'Inflation and Growth: An Estimate of the Threshold Level of Inflation in Pakistan', *State Bank of Pakistan Research Bulletin* 1(1): 35-44.

Papyrakis, E. and R. Gerlagh (2004) 'The Resource Curse Hypothesis and its Transmission Channels'*, Journal of comparative economics* 32(1): 181-193.

Papyrakis, E. and R. Gerlagh (2007) 'Resource Abundance and Economic Growth in the United States'*, European Economic Review* 51(4): 1011-1039.

Paudel, R.C. and N. Perera (2009) 'Foreign Debt, Trade Openness, Labor Force and Economic Growth: Evidence from Sri Lanka'*, IUP Journal of Applied Economics* 8(1): 57.

Pellegrini, L. and R. Gerlagh (2004) 'Corruption's Effect on Growth and its Transmission Channels'*, Kyklos* 57(3): 429-456.

Peri, G. (2004) 'Socio-Cultural Variables and Economic Success: Evidence from Italian Provinces 1951-1991'*, Topics in macroeconomics* 4(1): 1-34.

Resosudarmo, B.P. (2005) *The Politics and Economics of Indonesia's Natural Resources: Introduction.*

Sachs, J.D. and A.M. Warner (1995) 'Natural Resource Abundance and Economic Growth'National Bureau of Economic Research.

Sachs, J.D. and A.M. Warner (1997) 'Fundamental sources of long-run growth', *American Economic Review* 87 (2): 184–188.

Sachs, J.D. and A.M. Warner (1999b) 'Natural resource intensity and economic growth', Chapter 2 in: Mayer, Jörg, Chambers, Brian, Ayisha, Farooq (Eds.), *Development Policies in Natural Resource Economics*. Edward Elgar, Cheltenham, UK.

Sala-i-Martin, X.X. (1997) 'I just Ran Two Million Regressions'*, The American Economic Review* 87(2): 178-183.

Salti, N. (2011) 'Natural-Resource Wealth: Elbow Grease Or Fuel for Poverty?'*, Journal of Institutional and Theoretical Economics JITE* 167(3): 536.

Sarel, M. (1996) 'Nonlinear Effects of Inflation on Economic Growth'*, Staff papers* 43(1): 199-215.

Stadler, M. (2003) 'Innovation and Growth: The Role of Labor-Force Qualification'.

Tadjoeddin, Z.M. (2007) ‘A Future Resource Curse in Indonesia: The Political Economy of Natural Resources, Conflict and Development’, *CRISE Working Paper* No. 35. Oxford: Centre for Research on Inequality, Human Security and Ethnicity.

Thirlwall, A.P. and A.C. Barton (1971) 'Inflation and Growth: The International Evidence'*, PSL Quarterly Review* 24(98): 263-275.

Tiffin, R. and X. Irz (2006) 'Is Agriculture the Engine of Growth?'*, Agricultural Economics* 35(1): 79-89.

Tsani, S., L. Paroussos, C. Fragiadakis, I. Charalambidis and P. Capros (2013) 'Female Labour Force Participation and Economic Growth in the South Mediterranean Countries'*, Economics Letters* 120(2): 323-328.

van der Ploeg, F. (2011) 'Natural Resources: Curse Or Blessing?'*, Journal of Economic Literature* 49(2): 366-420.

Vaona, A. and S. Schiavo (2007) 'Nonparametric and Semiparametric Evidence on the Long-Run Effects of Inflation on Growth'*, Economics Letters* 94(3): 452-458.

Yuliyusman, F. and R. Ismail (2014) 'Foreign Labour on Malaysian Growth'*, Journal of Economic Integration* 29(4): 657.

World Bank (2015). Data on Indonesia’s Natural Resource Rents as a percentage of Gross Domestic Product (GDP) <http://www.data.worldbank.org/indicator> accessed 20.07.2015.

Wright, G. and J. Czelusta (2004) 'Why Economies Slow: The Myth of the Resource Curse'. M E Sharpe Inc.

Appendices

Table A1. Correlation between mining and controlling variables on economic growth

growth	Fixed Effects				Random Effects			
	coef.	Std. Err	t	P>|t|	coef.	Std. Err	t	P>|t|
mining	0.061	0.075	0.81	0.417	-0.083	0.023	-3.64***	0.000
education	-0.226	0.100	-2.26**	0.024	-0.069	0.050	-1.38	0.169
labor	0.155	0.111	1.39	0.166	0.026	0.057	0.46	0.645
inflation	0.011	0.009	1.13	0.259	0.018	0.009	2.08**	0.038
crime	0.583	0.576	1.01	0.312	0.411	0.310	1.32	0.185
income	7.336	2.590	2.83***	0.005	0.103	0.615	0.17	0.867
constant	-108.340	34.966	-3.1	0.002	3.595	9.253	0.39	0.698

Superscripts ** and *** correspond to a 5% and 1% level of significance

Source: Own Construction by Using Stata

Table A2. Correlation between agriculture and controlling variables on economic growth

growth	Fixed Effects				Random Effects			
	coef.	Std. Err	t	P>|t|	coef.	Std. Err	t	P>|t|
agriculture	-0.242	0.195	-1.24	0.217	0.018	0.047	0.39	0.694
education	-0.227	0.099	-2.29**	0.023	-0.021	0.054	-0.39	0.694
labor	0.170	0.112	1.51	0.131	0.035	0.065	0.54	0.588
inflation	0.010	0.009	1.05	0.293	0.018	0.009	2.08**	0.038
crime	0.493	0.546	0.9	0.367	0.772	0.333	2.32**	0.020
income	5.070	3.412	1.49	0.138	-0.806	0.792	-1.02	0.308
constant	-66.408	52.189	-1.27	0.204	8.669	13.423	0.65	0.518

Note: Superscript ** corresponds to a 5% level of significance

Source: Own Construction by Using Stata

Table A3. Correlation between mining and controlling variables on economic growth without outliers

growth	Fixed Effects				Random Effects			
	coef.	Std. Err	t	P>|t|	coef.	Std. Err	t	P>|t|
mining	-0.064	0.049	-1.3	0.194	-0.062	0.031	-1.97**	0.049
education	-0.040	0.047	-0.86	0.392	-0.003	0.033	-0.1	0.921
labor	0.041	0.050	0.83	0.408	0.038	0.041	0.91	0.362
inflation	0.002	0.004	0.47	0.640	0.006	0.004	1.48	0.139
crime	0.303	0.246	1.23	0.220	0.355	0.206	1.72*	0.085
income	3.203	1.182	2.71***	0.007	0.608	0.556	1.09	0.274
constant	-47.518	15.420	-3.08	0.002	-10.367	7.788	-1.33	0.183

Note: Superscripts *, **, and *** correspond to a 10%, 5%, and 1% level of significance

Source: Own Construction by Using Stata

Table A4. Correlation between mining and controlling variables on economic growth with robust command addition

growth	Fixed Effects				Random Effects			
	coef.	Std. Err	t	P>|t|	coef.	Std. Err	t	P>|t|
mining	0.061	0.084	0.73	0.473	-0.083	0.012	-7.08***	0.000
education	-0.226	0.214	-1.06	0.298	-0.069	0.044	-1.55	0.120
labor	0.155	0.122	1.27	0.216	0.026	0.045	0.59	0.557
inflation	0.011	0.010	1.01	0.322	0.018	0.012	1.51	0.130
crime	0.583	0.483	1.21	0.238	0.411	0.188	2.18**	0.029
income	7.336	4.721	1.55	0.131	0.103	0.360	0.29	0.775
constant	-108.340	65.617	-1.65	0.110	3.595	4.345	0.83	0.408

Note: Superscripts ** and *** correspond to a 5% and 1% level of significance

Source: Own Construction by Using Stata

Table A5. Correlation between agriculture and controlling variables on economic growth with robust command addition

growth	Fixed Effects				Random Effects			
	coef.	Std. Err	t	P>|t|	coef.	Std. Err	t	P>|t|
agriculture	-0.242	0.283	-0.85	0.400	0.018	0.034	0.54	0.592
education	-0.227	0.212	-1.07	0.293	-0.021	0.040	-0.53	0.598
labor	0.170	0.121	1.4	0.172	0.035	0.048	0.73	0.465
inflation	0.010	0.009	1.02	0.315	0.018	0.012	1.5	0.133
crime	0.493	0.549	0.9	0.376	0.772	0.248	3.11***	0.002
income	5.070	3.546	1.43	0.163	-0.806	0.649	-1.24	0.214
constant	-66.408	47.029	-1.41	0.169	8.669	9.786	0.89	0.376

Note: Superscript *** corresponds to a 1% level of significance

Source: Own Construction by Using Stata