The Contribution of Natural Resources on Economic Welfare In Indonesia

Palupi Anggraeni[1]
PhD Candidate, School of Environment, Griffith University, Australia

Peter Daniels, and Peter Davey
School of Environment Science, Griffith University, Australia

Abstract

The objective of this research is to examine the relationship between natural resource abundance and economic welfare at the national level of Indonesia. Four variables of institutional quality, investment level, education level, and industry value added are considered in the study as the moderating variables between economic welfare and natural resource rents. This study found that the results is not robust to conclude that the rent generated from natural resources is contribute to the economic welfare in Indonesia. Nevertheless, this study found there are three moderating variables that can become a support to strengthen the relationship between natural resources and economic welfare, these are institutional quality through improvement in the political stability, strengthening the accountability, stringent the regulations, and enforcing the rule of law; primary completion level; and industry value added.

Keywords: natural resources, economic welfare, Indonesia, investment, institution, primary completion level, industry value added.

[1] Palupi Anggraeni is a PhD candidate at School of Environment, Griffith University, Australia. She is also an officer at Directorate General of State Asset Management in Ministry of Finance of the Republic of Indonesia. Email address: upi.upiko@gmail.com

The Contribution of Natural Resources on Economic Welfare In Indonesia

Palupi Anggraeni, Peter Daniels, and Peter Davey, Griffith University

I. Introduction

The influence of the quality and quantity of environmental and natural resources upon growth in economic welfare has been widely accepted since the late 1960s (Toman, 2003). Natural resources, particularly mining assets, have been identified as one of the ten most significant variables influencing variation in long-term economic growth (GDP per capita) rates (Xavier, Doppelhofer, & Miller, 2004). However, the more general impact of natural resource endowments on a country's long-term welfare is unclear. Many developing low-income and lower middle-income countries that have rich endowments of natural resources (and resource-dependent economies) have low or stagnant growth rates. This phenomenon is called the "natural resource paradox" or "resource curse" (Atkinson & Hamilton, 2003; Auty, 2007; Brunnschweiler, 2008; Dietz, Neumayer, & De Soysa, 2007; Gaitan & Roe, 2012; Sachs & Warner, 1995).

Indonesia is a country which might be represented by the positive resource endowment and development view perceiving natural resource endowment to be a blessing. It is often considered to be a country that successfully overcame the resource curse during the 1970s and 1980s (Rosser, 2007). As a nation dependent on exhaustible natural resources, Indonesia was able to achieve positive rates of per capita GNP growth between 1980 and 1992 (Mikesell, 1997), and is grouped as one of only four countries among 65 resource-rich countries that achieved long term investment and per capita GNP growth (Gylfason, 2001). Even though this success was probably influenced by the nature of the relevant political and social context, as well as the economic opportunities from other countries such as foreign aid from the US and investment flows from Japan at that time (Rosser, 2004), Indonesia has managed to escape the resource curse (Hanif & Bria, 2016; Rosser, 2007).

Despite the claim that Indonesia is not suffering from the resource curse at an overall national level, the natural resource paradox can be found at the provincial level. As an archipelagic country, the natural resources in Indonesia occur asymmetrically, in that some provinces are endowed with natural resources while others are poor. However, many of the resource-rich provinces are amongst the least-developed regions in Indonesia (NRGI, 2015). One example of provinces that suffer from the natural resource curse is West Papua. This province is endowed with a vast resource of gold and has one of the biggest gold mines in the world; however, the province's poverty rate is one of the highest in Indonesia (Aji, 2015). The poverty rate in March 2017 was 25.10%, far above the national average poverty of 10.64% (Statistics Indonesia, 2017). This shows that the economic growth in Indonesia is not equally distributed.

At the national level, despite the positive economic performance that has been accomplished, an analysis using the concept of natural capital basis for sustainable development suggests that the Indonesian economy has neither followed a sustainable path nor progressed in the right direction to achieve substantial improvements in welfare related to natural resource use. This is justified because mineral extraction, forest resource depletion, and environmental degradation in Indonesia have been increasing, and are potentially exceeding sustainable

yield levels. Hence, this condition may jeopardise Indonesia's future sustainable development (Alisjahbana & Yusuf, 2004; Mollin, 2014). The high dependence of this country on natural resources was demonstrated when the export price of natural resource commodities decreased in 1982 and caused a major decline in the gross investment of Indonesia. This suggests that Indonesia had not invested adequately in productive industries that could offset the reduction in resource-based export earnings (Mikesell, 1997). Furthermore, Indonesia encounters problems of inequality, high vulnerability of the poor and the persistence of different kinds of poverty (World Bank, 2016).

To improve this situation, the Indonesian government has been moving towards a focus upon inclusive and environmentally sustainable growth, where natural resource management sectors have received high priority support (ADB, 2015). Research by Atkinson and Hamilton (2003) suggests that resource mismanagement in a country, by not prudently saving and investing the rents derived from the resource extraction, is a problem for sustainability. The 2015 report from the Asian Development Bank (ADB) stated that sustainable growth goals will require an improvement in environmental and natural resource management, by strengthening institutions in rehabilitation and conservation.

Research suggests that complementing natural resources with good institutions is one of the key to social and economic success in a country. The quality of institutions is a very strong factor in improving welfare (Brunnschweiler, 2008) and in avoiding the resource curse taking hold in a country (Arezki & van der Ploeg, 2010; Bulte, Damania, & Deacon, 2003; Collier & Goderis, 2012; Mehlum, Moene, & Torvik, 2006). The institutional factor can be considered by measuring corruption, bureaucratic quality, and the rule of law (Dietz et al., 2007).

Other three factors are also going to be investigated in this study, these are investment, education, and industry value added. The factor of investment level is included in the discussion based on the work from Havranek, Horvath, and Zeynalov (2016) using meta-analysis study from previous selected studies in this particular area. They found several factors as important influences upon the natural resource and economic growth relationship, including the investment level.

The next factor considered in the study is education. It is said that educations are one crucial factors on economic growth. A research by Behbudi, Mamipour, and Karami (2010) suggest that the neglection of human capital development by not allocating enough expenditure in education has concluded as one of the cause of slow-growth in resource-rich countries. Shao and Yang (2014) supported this by saying that the investment in education plays crucial role on economic growth.

As the last factor considered in this study, industry value added was chosen based on one of the Government of Indonesia's regulation that ban exports of some minerals, in order to increase the development of domestic processing facilities and become an exporter of value-added industry products. It will be interesting to explore whether the policy to ban raw materials export in order to develop the downstream processing industries, can gives a positive contribution to economic welfare of Indonesia. Value added itself is defined as the difference between an industry's gross output (sales), and its intermediate input (the purchases of secondary input), while the process to adding more value for a product from its original state will make the product become more valuable (AgMRC, 2017). The value adding process can be done for all kind of products. In Moldova, a research by (Golban, 2014) concludes that high value added in horticultural products lead to high value revenues, high value wages, and result on the development of the country.

In this paper, the focus of the study is to examine four variables of institutional quality, investment level, education level, and industry value added, as the moderating variables between economic welfare and natural resource abundance. Among these four variables, industry value added is the only variable that most

likely has never been studied in previous literatures. This study will explore if this policy is effective to improve the economic welfare through the rents generated from natural resources.

Despite the fact that the other three variables of institutional quality, investment level, and education level have been analysed in many literatures, they are most likely focused on cross country analysis instead of time series analysis.

II. Literature Review

2.1 Natural Resources

The setup of the variable of natural resource abundance is significant because previous research has shown that the multiplicity of natural resource variables used in resource-welfare studies has empirically led to different results regarding the resource curse hypothesis (Brunnschweiler, 2008). To illustrate this, several studies have used natural resource exports percentage per GDP as the proxy of natural resources (Norrbin, Pipatchaipoom, & Bors, 2008; Sachs & Warner, 1995). Other research uses the share of rents generated from the natural resource sector per GDP (Atkinson & Hamilton, 2003), value of resource commodity exports (Bulte et al., 2003; Collier & Goderis, 2012; Dietz et al., 2007), and some employ the value of natural resource commodities (Ambrey, Fleming, & Manning, 2016; Brunnschweiler, 2008; Gaitan & Roe, 2012).

As Havranek et al. (2016) concluded, employing the measure of resource abundance such as natural resource rents data usually leads to a negative resource curse, which means that economic growth in a country is bolstered by the existence of its natural resources. In contrast, employing measures of resource dependence, such as the use of data of natural resource exports as a percentage per GDP in a study often leads to a positive result of resource curse, which means the natural resources are inhibiting the economic growth of a country.

Since this study intends to measure the contribution of the abundance of natural resources that Indonesia has to its welfare, a total natural resource rents (% of GDP) indicator published by the World Bank will be obtained as the proxy of natural resources. The indicator is the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents, which have been made available annually from 1990 until 2015.

2.2 Economic Welfare

For the concept of welfare, the limited nature of this specific study must be recognised as welfare is a very broad concept and there are many different associated terminologies, namely economic growth, economic welfare, sustainable development, human welfare, quality of life, and well-being. Even though the meaning of these terms are similar, they are not the same and give a different emphasis in their definition. For example, if economic growth focuses only on the measurement of output produced in a country, then economic welfare focuses on the impact of economic growth on material living standards rather than on production. Further, "sustainable development" concentrates on economic and social issues within environmental constraints (maintenance of natural capital), while human welfare, quality of life, and well-being are three terms that emphasize the value of human life such as a sense of security, social acceptance, and personal fulfilment (Jacobs & Slaus, 2010).

In order to limit welfare, this study will be specifically restricted to the examination of economic welfare. This concept is utilised to focus on the impact of economic growth including government services such as health and education for households and individuals, while also emphasizing income distribution and wealth in society. For its measurement, this study will use Adjusted Net Saving

(ANS)—a comprehensive measure of a country's rate of saving after accounting for investments in human capital, depreciation of produced assets, and depletion and degradation of the environment (Hess, 2010). This study will employ the total natural resource rents as % of GDP. Research suggests that a focus upon economic success using the ANS measure has a positive and significant relationship with the aggregate welfare, although there is a weakness in magnitude. The weakness in magnitude in this case appeared because the aggregate welfare was only measured by the Infant Mortality Rate (IMR) and the Human Development Index (HDI) (Gnègnè, 2009).

2.3. Moderating Factors: Institutional Quality, Level of Investment, School Completion Level, and Industry Value Added

According to Sharma, Durand, and Gur-Arie (1981), the moderator variables are the third type of variable that affect the strength of the relationship between a dependent and independent variable.

Moderating factors that will be incorporated in this analysis are based on the work from Havranek et al. (2016) which found several factors as important influences upon the natural resource and economic growth relationship. They used a meta-analysis study and concluded that five influences emerged consistently— the investment level in the resource sector, the quality of institutions, including an interaction term between institutional quality and natural resource abundance, and the specific type of natural resource. The effects would also vary according to whether resource dependence and resource abundance was used as the dependent variable.

Institutional quality, as one moderator variable in this study, was found to be the key to whether natural resources can become a blessing or a curse (Barbier, 2003; Mehlum et al., 2006). As a measurement of institutional quality, this study employs the data of the Worldwide Governance Indicator from the World Bank, which present governance indicators collectively and separately for 215 countries and territories over the period 1996–2015. The data have been used in much previous research to measure institutional quality. These six dimensions are the voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption (Kaufmann, Kraay, & Mastruzzi, 2011).

For the measurement of level of investment, this study employs World Bank net foreign direct investment (BoP, current US$), which counts the total of capital equity, earnings reinvestment, other long-term capital, and short-term capital as shown in the balance of payments. The decision to employ foreign direct investment (FDI) rather than domestic investment was made because, compared to domestic investments, several studies have found that FDI has a stronger positive influence on the income growth in host countries, by having a greater impact on improving total factor productivity and increasing the efficiency of resource utilization in the beneficiary economy (OECD, 2002).

For the measurement of education level, this study use proxy of primary completion rate. This data has increasingly used as an indicator to measure education system's performance. This rate measures both the coverage of the education system and the educational attainment of students. Thus, the primary completion rate stated as an accurate indicator of human capital formation and the quality and efficiency of the school system (Langsten, 2017).

The industry value added measurement that this study going to employ is create by the World Bank. The data comprises value added in mining, manufacturing, construction, electricity, water, and gas industries.

III. Methodology

3.1. Data

Constructing a time series analysis with a consistent set of determinants is a big challenge due to the unavailability of data in the particular periods for each of the variables in Indonesia. Part of the data relating to institutional quality is only provided in even-numbered years in their early publication from 1996 to 2002 period. Due to this situation, this study will add the data in the missing years using the interpolation techniques. After the interpolation and filtering of the data, this study can employ 26 years of time series data from 1990 to 2015 to justify the relationship of natural resources and the economic welfare of Indonesia.

The quantitative analysis for this study will rely on secondary data provided by international agency bodies that are the World Bank, and the national agencies of the Government of Indonesia such as the Central Bureau of Statistics and the National Development Planning Agency as the supporting sources.

The details of the data sources and its measurement are summarized in Table 1. The table also contains the expected results of each moderating variable in the model.

Table 1. *Data Definitions and the Expected Results*

Variable	Definition	Source	Measurement	Expected Results
Adjusted Net Savings (per capita)	National net saving adjusted for the value of resource depletion and environmental degradation and credited for education expenditures, per total population.	World Bank	USD/people	positive
Natural Resource Abundance (per capita)	The sum of natural resource rents (oil rents, natural gas rents, coal rents, mineral rents, and forest rents), per total population.	World Bank	USD/people	positive
Foreign Direct Investment (per capita)	Foreign direct investment (the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments), per total population	World Bank	USD/people	positive
Institutions: Voice and accountability	capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media	World Bank	Index	positive

Institutions: Political stability	capturing perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism	World Bank	Index	positive
Institutions: Government effectiveness	capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies	World Bank	Index	positive
Institutions: Regulatory quality	capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development	World Bank	Index	positive
Institutions: Rule of law	capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence	World Bank	Index	positive
Institutions: Control of Corruption	capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests	World Bank	Index	positive
Primary completion rate, total	Primary completion rate, or gross intake ratio to the last grade of primary education, is the number of new entrants (enrolments minus repeaters) in the last grade of primary education, regardless of age, divided by the population at the entrance age for the last grade of primary education.	World Bank	% of relevant age group	positive

Industry, value added (per capita)	Comprises value added in mining, manufacturing, construction, electricity, water, and gas. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs.	World Bank	USD/people	positive

Source: World Bank (modified)

3.2 Empirical Models

The aim of this quantitative analysis is to examine the effect of four moderating variables of institutional quality, level of investment, education level, and industry value added during the period from 1990 to 2015. The analysis will be performed by running STATA package software, using a time series regression method.

A set of multiple regression models was explored in order to identify the optimum functional form to fit the data and meet the objective of the study, and resulted in a set of models. The models are made based on a consideration to interpret the relationship between each of the moderating variables upon dependent variable separately.

To test whether the moderating factors of institutional quality, investment level, education level, and industry value added have a significant supporting or inhibiting effect, a Moderated Regression Analysis (MRA) will be employed. MRA is a regression-based technique that is used to identify the moderator variable, by using an interaction term between the moderating variable and independent variable. If the regression results are found to be significant, then there is an amplifying or weakening effect between the independent variable and dependent variable.

The pre-test stage of the experimental design was performed by plotting all the data into a line chart to discover the trend, and into a histogram chart to see the distributions of the data. The test showed that normality distribution occurs on the data.

Equation 1 describes the basic relationship between economic welfare (represent by Adjusted Net Savings per capita "ADJNETSAVING) and the rent generated from natural resources per capita "ABUNDNR"

$$ADJNETSAVING_t = \alpha_n + \beta_n \, ABUNDNR_t + \mu_t \quad (1)$$

Equation 2 describes the relationship between economic welfare as the dependent variable and the rent generated from natural resources. The equation also examines the institutional quality "INSTIT" as a moderating variable. An interaction term has been placed between the moderating variable "INSTIT" and "ABUNDNR" in the models to test the effect of the moderating variables on the main relationships.

$$ADJNETSAVING_t = \alpha_n + \beta_n \, ABUNDNR_t + \beta_n \, INSTIT_t + \beta_n \, ABUNDNR_t{}^* INSTIT_t + \mu \quad (2)$$

Since the institutional quality variable consists of six dimensions that are all equally important in establishing the institutional quality, this study will run each of the dimensions separately. Thus, the models that consist of INSTIT will be run six times, each with different dimensions of institutional quality.

Equation 3 explores the relationship between economic welfare and the rent generated from natural resources, while also examining the effect of the level of foreign direct investment "INVEST". An interaction term again has been put between

the "INVEST" and "ABUNDNR" to know whether 'INVEST" can give supporting or negating effect on the resource-welfare relationship.

$$\text{ADJNETSAVING}_t = \alpha n + \beta n\ \text{ABUNDNR}_t + \beta n\ \text{INVEST}_t + \beta n\ \text{ABUNDNR}_t{*}\ \text{INVEST}_t + \mu_t \quad (3)$$

Equation 4 investigates the relationship between economic welfare and the rent generated from natural resources, while also studying the effect of education level (using proxy of primary completion rate) "COMPLETE". An interaction term has been put between the "COMPLETE" and "ABUNDNR" to test the effect of education level on the main relationship.

$$\text{ADJNETSAVING}_t = \alpha n + \beta n\ \text{ABUNDNR}_t + \beta n\ \text{COMPLETE}_t + \beta n\ \text{ABUNDNR}_t{*}\ \text{COMPLETE}_t + \mu_t \quad (4)$$

Equation 5 explores the relationship between economic welfare and the rent generated from natural resources, with a focus on investigating the effect of value added in industry "VAINDUSTRY". An interaction term has been put between the "VAINDUSTRY" and "ABUNDNR" to test the effect of industry value added on the main relationship.

$$\text{ADJNETSAVING}_t = \alpha n + \beta n\ \text{ABUNDNR}_t + \beta n\ \text{VAINDUSTRY}_t + \beta n\ \text{ABUNDNR}_t{*}\ \text{VAINDUSTRY}_t + \mu_t \quad (5)$$

Equation 6 describes the whole variables relationship. In this equation, there is no interaction term, and all the variables "ABUNDNR", "INSTIT", "INVEST", "COMPLETE", and "VAINDUSTRY" have been used as independent variables to test the relationship with economic welfare "ADJNETSAVING" directly.

$$\text{ADJNETSAVING}_t = \alpha n + \beta n\ \text{ABUNDNR}_t + \beta n\ \text{INSTIT}_t + \beta n\ \text{INVEST}_t + \beta n\ \text{COMPLETE}_t + \beta n\ \text{VAINDUSTRY}_t + \mu \quad (6)$$

The results from these equations are shown in Table 2 and Table 3. Each of the equation is shown as a column. For equation with "INSTIT", each of the dimensions is presented as A (political stability "politicstab"), B (accountability "accountblty"), C (government effectiveness "govteffectiv"), D (regulatory quality "regulatory"), E (rule of law "ruleoflaw"), and F (control of corruption "ctrlcorrupt").

Table 2. *Regression Results (Equation 1, 2, and 3)*

	1	2A	2B	2C	2D	2E	2F	3
abundnr	2.892434	3.553604	2.092468	3.702928	6.403543	12.26579	-.6544109	.6143828
	(0.000)*	(0.002)*	(0.003)*	(0.049)*	(0.001)*	(0.000)*	(0.851)	(0.359)
politicstab			177.2446					
			(0.122)					
c.abundnr#c.politicstab			2.508274					
			(0.016)*					
accountblty			-287.1028					
			(0.219)					
c.abundnr#c.accountblty			10.95781					
			(0.007)*					

	1	2A	2B	2C	2D	2E	2F	3
govteffectiv				356.0947 (0.568)				
c.abundnr#c.govteffectiv				7.619764 (0.210)				
regulatory					-650.863 (0.118)			
c.abundnr#c.regulatory					11.76349 (0.036)*			
ruleoflaw						-575.2321 (0.157)		
c.abundnr#c.ruleoflaw						15.45585 (0.002)*		
ctrlcorrupt							857.5994 (0.059)**	
c.abundnr#c.ctrlcorrupt							-4.239178 (0.404)	
invest								-6.224382 (0.026)*
c.abundnr#c.invest								-.0237137 (0.209)

Notes: Standard error in parentheses. * shows statistically significant in 5% level, ** shows statistically significant in 10% level.

Table 3. Regression Results (Equation 4, 5, and 6)

	4	5	6A	6B	6C	6D	6E	6F
abundnr	-20.24173 (0.098)**	-2.560497 (0.000)*	-1.292867 (0.002)*	-1.199889 (0.001)*	-1.217307 (0.002)*	-1.186561 (0.003)*	-1.225823 (0.004)*	-1.240619 (0.001)*
politicstab			-71.64557 (0.245)					
c.abundnr#c.politicstab								
accountblty				-128.0939 (0.034)*				
c.abundnr#c.accountblty								
govteffectiv					-188.7706 (0.236)			

	4	5	6A	6B	6C	6D	6E	6F
c.abundnr#c.ctrlcorrupt								
invest			-2.458501	-.1139652	-1.100437	-1.885895	-2.001494	-2.238822
			(0.038)*	(0.919)	(0.307)	(0.094)**	(0.088)**	(0.021)*
c.abundnr#c.invest								
complete	27.70214		-8.474478	-5.083623	-5.658289	-7.322243	-7.454634	-8.509933
	(0.094)**		(0.258)	(0.451)	(0.439)	(0.347)	(0.333)	(0.219)
c.abundnr#c.complete	.2229883							
	(0.078)**							
vaindustry		.6254943	.7971793	.8775688	(.8014034)	.7306665	.7384208	.7732809
		(0.000)*	(0.000)*	(0.000)*	(0.000)*	(0.000)*	(0.000)*	(0.000)*
c.abundnr#c.vaindustry.		.0012411						
		(0.001)*						

*Notes: Standard error in parentheses. * shows statistically significant in 5% level, ** shows statistically significant in 10% level.*

IV. Results And Discussion

From the results in Tables 1, 2, 3, and 4, the coefficients of ABUNDNR cannot be said were consistently positive, or consistently negative. For example, we can see the results of equations 1 to 3 where the coefficients are all significant and positive, except on equation 2E which has positive coefficient but not significant. However, on equations 4 to 6F, the coefficients are all negative and significant. This shows that the results not robust and cannot be used to conclude that the rent generated from natural resources in Indonesia has been contributed on the economic welfare.

In terms of the moderating variables between natural resource rents and economic welfare, this study found that there are six significant moderating variables. The six variables that can significantly give supporting effect on the natural resources-economic welfare relationship are the (1) POLITICSTAB (political stability), (2) ACCOUNTBLTY (accountability), (3) REGULATORY (regulatory), and (4) RULEOFLAW (rule of law), which all are the dimensions of institutional quality. The other significant moderating variables are the (5) COMPLETE (primary completion level), and (6) VAINDUSTRY (industry value added). The signs on the results are positives which mean the implementation of these variables will enhance the relationship between natural resources and economic welfare. In terms of the coefficient signs for each of the moderating variables, the STATA results show that all the coefficient signs match with the expected signs in Table 1.

For the institutional quality variable, from the six dimensions of institutions measured in this study, only four dimensions that significantly can support the natural resources-economic welfare relationship ("relationship"): (1) The more stable the government from unconstitutional, politically motivated violence and terrorism, the tighter is the relationship; (2) The more freedom for: participating in government selection, expression, association, and a free media, the more it supports the

relationship; (3) The higher the ability to formulate and implement sound policies and regulations that permit and promote private sector development, the closer is the relationship; (4) The better the quality of contract enforcement, property rights, the police, and the courts, the firmer is the relationship.

In terms of the two-remaining significant moderating variables, the positive coefficient signs of the variable means: (5) the higher the rate of completion in primary school, the more it supports the relationship; (6) the greater the value added in mining, manufacturing, construction, electricity, water, and gas sectors, the tighter is the relationship.

V. Conclusion

Eventhough the role of natural resource rents on economic welfare in Indonesia is hard to conclude due to the inconsistency of the coefficient signs on each of the equations results, this study manage to find six moderating variable that can give a supporting effect on the natural resource-economic welfare relationship. From the four factors put into the models, the investment is the only moderating variable that does not have significant results on the relationship. This study found that institution and education are two area that need to have more focus if the government wants to make sure the rent generated from the natural resource sector contributes to the economic welfare. The government's policy in regard to adding value for industry's products also will give positive impact on the contribution of natural resource rents to economic welfare.

In regard of these conclusion, this study aware of the quality of data employed. With the limited amount of time series data available, it is hard to give a strong recommendation for the Government of Indonesia. A set of panel data with each provinces in Indonesia as the observations has been considered, however this cannot be executed due to the availabilty of the data in the provincial level on the variables desired. For the next research, a longer set of data with other new moderating variables, might give a better understanding to study how natural resourc rents contribute to economic welfare in Indonesia.

References

ADB. (2015). *Indonesia: Interim Country Partnership Strategy (2015)*. Retrieved from http://www.adb.org/documents/indonesia-interim-country partnership-strategy-2015

AgMRC. (2017). *What is Value-added Agriculture?* Retrieved from https://www agmrc.org/business-development/getting-prepared/valueadded agriculture/what-is-value-added-agriculture/

Aji, P. (2015). *Summary of Indonesia's Poverty Analysis.*

Alisjahbana, A. S., & Yusuf, A. A. (2004). *Assessing Indonesia's Sustainable Development:Long-Run Trend, Impact of the Crisis, and Adjustment during the Recovery Period.* ASEAN Economic Bulletin, 21(3), 290-307.

Ambrey, C. L., Fleming, C. M., & Manning, M. (2016). *The role of natural capital in supporting national income and social welfare*. Applied Economics Letters, 23(10), 723-727. doi:10.1080/13504851.2015.1102839

Arezki, R., & van der Ploeg, F. (2010). *Trade policies, institutions and the natural resourcecurse.* Applied Economics Letters, 17(15), 1443-1451. doi:10.1080/13504850903035881

Atkinson, G., & Hamilton, K. (2003). *Savings, Growth and the Resource Curse Hypothesis.* WORLD DEVELOPMENT, 31(11), 1793-1807. doi:http://dx.doi org/10.1016/j.worlddev.2003.05.001

Auty, R. M. (2007). *Natural resources, capital accumulation and the resource curse.* Ecological Economics, 61(4), 627-634. doi:http://dx.doi.org/10.1016/j ecolecon.2006.09.006

Barbier, E. B. (2003). *The Role of Natural Resources in Economic Development.* Australian Economic Papers, 42(2), 253-272. doi:10.1111/1467-8454.00198

Behbudi, D., Mamipour, S., & Karami, A. (2010). *NATURAL RESOURCE ABUNDANCE, HUMAN CAPITAL AND ECONOMIC GROWTH IN THE PETROLEUM EXPORTING COUNTRIES.* Journal of Economic Development, 35(3), 81.

Brunnschweiler, C. N. (2008). *Cursing the Blessings? Natural Resource Abundance, Institutions, and Economic Growth.* WORLD DEVELOPMENT, 36(3), 399-419. doi:http://dx.doi.org/10.1016/j.worlddev.2007.03.004

Bulte, E. H., Damania, R., & Deacon, R. (2003). *Resource Abundance, Poverty and Development.*

Collier, P., & Goderis, B. (2012). *Commodity prices and growth: An empirical investigation.* European Economic Review, 56(6), 1241-1260. doi:http://dx.doi org/10.1016/j.euroecorev.2012.04.002

Dietz, S., Neumayer, E., & De Soysa, I. (2007). *Corruption, the resource curse and genuine saving.* Environment and Development Economics, 12(1), 33-53. doi:10.1017/S1355770X06003378

Gaitan, B., & Roe, T. L. (2012). *International trade, exhaustible-resource abundance and economic growth.* Review of Economic Dynamics, 15(1), 72-93. doi:http:/dx.doi.org/10.1016/j.red.2011.08.002

Gnègnè, Y. (2009). *Adjusted net saving and welfare change*. Ecological Economics, 68(4), 1127-1139. doi:http://dx.doi.org/10.1016/j.ecolecon.2008.08.002

Golban, A. (2014). *THE INCREASING OF COMPETITIVENESS OF HIGH VALUE ADDED HORTICULTURAL PRODUCTION IN THE CONTEXT OF THE ECONOMIC GROWTH OF THE REPUBLIC OF MOLDOVA.* Scientific Papers Series: Management, 14(2), 133-140.

Gylfason, T. (2001). *Natural resources, education, and economic development.* European Economic Review, 45(4–6), 847-859. doi:http://dx.doi.org/10.1016 S0014-2921(01)00127-1

Hanif, H., & Bria, E. (2016). *Can We Reverse the Resource Curse at the Local Level in Indonesia?* Retrieved from http://www.resourcegovernance.org/blog

can-we-reverse-resource-curse-local-level-indonesia

Havranek, T., Horvath, R., & Zeynalov, A. (2016). *Natural Resources and Economic Growth: A Meta-Analysis.* WORLD DEVELOPMENT, 88, 134-151. doi:http://dx.doi.org/10.1016/j.worlddev.2016.07.016

Hess, P. (2010). *Determinants of the adjusted net saving rate in developing economies.* International Review of Applied Economics, 24(5), 591-608. doi:10.1080/02692170903426070

Jacobs, G., & Slaus, I. (2010). I*ndicators of Economics Progress: The Power of Measurement and Human Welfare.* Cadmus, 1(1), 53-113.

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2011). *The worldwide governance indicators: methodology and analytical issues.* Hague Journal on the Rule of Law, 3(2), 220-246.

Langsten, R. (2017). *School fee abolition and changes in education indicators.* International Journal of Educational Development, 53(Supplement C), 163 175. doi:https://doi.org/10.1016/j.ijedudev.2016.12.004

Mehlum, H., Moene, K., & Torvik, R. (2006). *Cursed by Resources or Institutions?* World Economy, 29(8), 1117-1131. doi:10.1111/j.1467-9701.2006.00808.x

Mikesell, R. F. (1997). *Explaining the resource curse, with special reference to mineral exporting countries.* Resources Policy, 23(4), 191-199. doi:http://dx.doi org/10.1016/S0301-4207(97)00036-6

Mollin, J. (2014). *REDD+ can "green" Indonesia's resource-dependent economy*, U.N. expert says. Retrieved from Thomson Reuters Foundation News website: http://news.trust.org//item/20140703054800-mtxl7/

Norrbin, S. C., Pipatchaipoom, O., & Bors, L. (2008). *How robust is the natural resource curse?* International Economic Journal, 22(2), 187-200. doi:10.1080/10168730802079722

NRGI. (2015). *Subnational Revenue Distribution: Natural resource revenues in a decentralized context.* March 2015.

OECD. (2002). *Foreign Direct Investment for Development.* Retrieved from Paris:

Rosser, A. (2004). *Why did Indonesia overcome the resource curse?*

Rosser, A. (2007). *Escaping the resource curse: The case of Indonesia.* Journal of Contemporary Asia, 37(1), 38-58.

Sachs, J. D., & Warner, A. M. (1995). *Natural resource abundance and economic growth.* National Bureau of Economic Research Working Paper 5398. Cambridge, MA.

Shao, S., & Yang, L. L. (2014). *Natural resource dependence, human capital accumulation, and economic growth: A combined explanation for the resource curse and the resource blessing.* Energy Policy, 74(C), 632-642. doi:10.1016/j.enpol.2014.07.007

Sharma, S., Durand, R. M., & Gur-Arie, O. (1981). *Identification and Analysis of Moderator Variables.* Journal of Marketing Research, 18(3), 291 300. doi:10.2307/3150970

Statistics Indonesia. (2017). *Number Of Poor People, Percentage of Poor People and The Poverty Line*, 1970-2017. from Statistics Indonesia https://www.bps go.id/linkTabelStatis/view/id/1494

Toman, M. A. (2003). *The roles of the environment and natural resources in economic growth analysis: Resources for the Future.*

World Bank (Producer). (2016). *Indonesia's Rising Divide.* World Bank, Jakarta. Retrieved from https://openknowledge.worldbank.org/handle/10986/24765

Xavier, S.-i.-M., Doppelhofer, G., & Miller, R. I. (2004). *Determinants of Long-Term Growth: A Bayesian Averaging of Classical Estimates (BACE) Approach.* The American Economic Review, 94(4), 813-835.