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Testing the existence of natural resource curse in Indonesia: The role of financial development

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Abstract
Natural resources are may become a blessing that can contribute to societies' welfare increases. Yet natural resource abundance could also become a curse for countries' economic development. Numerous studies have researched the relationship between natural resources and economic performance. However, the results remain ambiguous and have no consensus in the literature. Moreover, the literature focused only on the curse existence testing, a study involves the role of financial development in mediating that nexus remains scarce. To the best of our knowledge, this study is a pioneer to do so in a developing country endowed by natural resources, that is Indonesia. Using panel data of 33 provinces from 2012 to 2018, and implementing Generalized Method of Moments (GMM) technique, this study is not only to examine the existence of natural resource curse but also to scrutinise the role of financial development in mitigating and minimizing the curse. Results show that Indonesia potentially experiences natural resource curse. Nonetheless, the negative effect of natural resources on economic growth could be mitigated by enhancing the role of financial development thereby reaching the threshold. This study recommends policymakers not only to increase financial development across the provinces but also pay more serious attention to other factors causing the curse in Indonesia.

Keywords: Natural resource curse, financial development, economic growth, economic development.
JEL Classification: Q56, G21, O44, O13.

1. Introduction

Conventional views tend to assume that resource-rich countries are more likely to have better economic performance. Natural resources are a blessing since it can be an input for economic activities that help improving welfare (Andersen, 2007). Nonetheless, these views then faced a critical challenge. A significant number of natural resource-abundant countries have no as high rate of economic growth as resource-scarce countries. Auty (1994) was a pioneer formulating resource curse hypothesis, which postulates that resource-dependent nations that attempt to develop advantaged industries possibly face problems to improve their economic performance. Instead of fostering economic growth, their rate of economic growth remains low and their ecological environment gradually damages. Natural resource abundance could be either a blessing or a curse for countries' development.

Literature reveals various findings regarding the relationship between natural resources and a country's economic development. Havranek et al. (2016) find that 40% papers found a negative association, 20% papers claimed the sign of the links is positive, and only 20% found no adequate evidence to conclude the linkage. The contradictory findings are possibly due to endogeneity ignorance in the analysis (Badeeb et al., 2017), and owing to weak robustness checks Hilmawan and Clark (2019).

In the meantime, most of the previous studies focused only on the testing of the existence of a resource curse without an option of mitigating it. Erdoğan et al. (2020) argue that the development of financial systems is crucial for natural resources have a positive impact on fostering economic growth. They state that there is a certain threshold of the level of financial development, which determines the effect of natural resources on economic growth (Erdoğan et al., 2020).

The paper aims at not only scrutinizing the existence of the natural resource curse in Indonesia but also estimating the role of financial development in mitigating the curse. The study is motivated by two most-relevant analyses conducted by Hilmawan and Clark (2019), and Rongwei and Xiaoying (2020). The first considers dealing with weak robustness checks by implementing three different empirical techniques but not take into account the role of financial development on their analysis, whereas the latter considers endogeneity issues by implementing more flexible econometric model but not bear in mind the robustness checks by employing different indicators for natural resources and financial development, for example. This study utilizes two most used natural resources and financial development indicators, and it attempts to deepen the analysis by dividing a natural resource indicator, namely natural resource revenue, into mining revenue, and oil and gas revenue.

The results of the research are twofold. First, there is a potency of the existence of natural resources in Indonesia. In every one percentage point of natural dependence increases, economic growth will decline by 0.28 to 0.34 percentage point. Specifically, in contrast to the mining revenue that only revealed limited evidence of the existence of the curse, the revenue of oil and gas provide stronger evidence showing the natural resource curse in Indonesia. Second, financial development can become a channel for mitigating the curse exist in the country with the threshold of at least 28 to 34 per cent. These findings provide empirical evidence to help government formulating natural-resource-related policies in order to avoid the curse through an alternative mechanism, namely enhancing financial development. Government has to pay attention to financial sectors as a channel for mitigating and reducing the curse. Additionally, they should guarantee to reduce rent-seeking practices among elites and to strengthen institution quality.

The next section of this paper is structured as follows; Section 2 is to explore relevant literature relating to the study. Section 3 describes the data and methodology used in the analysis. Section 4 presents result and discussions and Section 5 concludes the research.

2. Literature Review

Many previous studies have examined the relationship between natural resources and economic development, attempting to scrutinize whether or not the curse significantly exist. However, the study trying to include financial development as a channel for mitigating the curse remains scarce. This section is divided into two parts separating studies focusing only on the existence of the curse and studies attempting to involve the role of financial development in natural resource and economic growth linkages.

Natural Resource Curse

There are at least two ways of calculating natural resources, namely resource abundance and resource dependence. Resource abundance refers to natural resource asset and stock such as agriculture, mineral, oil, gas, etc, minus the depreciation. Most often used indicator of resource abundance is resource rent, which the United Nation and the World Bank calculate it based on Net Present Value (NPV). Meanwhile, resource dependence refers to government revenue that comes from natural resources (Badeeb et al., 2017; Brunnschweiler & Bulte, 2008; Hilmawan & Clark, 2019).

The natural resource could be either blessing or curse for a country's economic development. traditional economist tends to have the assumption that natural resource-rich countries experience a better economic performance since natural resources is potentially catalyst for economic activities (Ben-Salha et al., 2018). Several studies have successfully found a positive impact natural resources have on economic growth (e.g. Cavalcanti et al., 2011; Hilmawan & Clark, 2019; Michaels, 2011).

A significant number of researchers have then claimed that natural resources could be a curse for a nation. It was Auty (1994) who first construct a natural resource curse hypothesis, implying a negative relationship between natural resource abundance and economic performance. Sachs and Warner (1995) examine the nexus between those variables and find that resource-abundant countries tend to have a low rate of economic growth than resource-scarce countries. Gelb (1988) find that government income from natural resource tend to exacerbate economic condition when interest rate increases. Gylfason and Zoega (2006) researched 85 natural resource-rich countries and found a

negative relationship between resource abundance and economic growth through saving transmission and investment. Atkinson and Hamilton (2003) also test the linkage between natural resource rent and saving in 103 countries and found that countries blessed by rich natural resources have a low rate of saving. Marques and Pires (2019) also examine the existence of natural resource curse in gas-rich countries during 1993-2015 and conclude that gas dependence may hamper economic growth in the long run.

Natural resource studies have also been conducted in Indonesia. The findings were also mixed. Rosser (2007) conducted empirical research testing the linkage between oil and gas sector and economic growth in Indonesia between 1970 and 1980. He found that Indonesia can anticipate a natural resource curse. Hilmawan and Clark (2019) examined the linkage using municipality and regency data in Indonesia and found that mining dependence has a positive effect on real per capita GRDP. Nevertheless, other streams of literature in Indonesia find the existence of the curse. Using cross-sectional data at the municipality/regency level, Komarulzaman and Alisjahbana (2006) claimed that oil revenue has a negative association with economic growth. Edwards (2016) find that mining dependence is more likely to reduce human capital investment. Rahma (2019) stated that the curse indeed exists in Indonesia at a province level, which means that mining dependence is not a guarantee for a country have automatically sustainable development.

Natural Resource, Financial Development, and Economic Growth

Price volatility tends to influence the demand for natural resources. When the price increases, following the increase of the demand for natural resource products, economic growth will also rise. On the other hand, when the price plunge, the growth of economic output suffers. In that condition, strengthening financial development can have a critical role in curbing the curse. Beck (2011) argued that the financial system can mitigate the condition when natural resource revenues decrease due to price fluctuation; it can increase productivity and allocate natural resources optimally thus fostering growth. He also said that natural resource revenue can be a tool for establishing a financial system to be more effective, which in turn improving business circle (Beck, 2011). A high natural resource revenue can be utilized to foster other sectors through productive investment intermediated by financial institutions (Erdoğan et al., 2020). Most used financial development indicators are the ratio of deposit money bank over GRDP, the ratio of credit to the private sector over GRDP, and the ratio of liquid liabilities (M3) over GRDP, and the ratio of broad money (M2) over GRDP.

Gylfason (2005) conducted an empirical study involving 85 countries from 1965 to 1998 and found that natural resource affects growth directly and indirectly through financial development transmission. Moradbeigi and Law (2017) found that interaction between financial development and natural resource abundance (proxied by oil rent) have a positive association with economic growth, which means could curb the natural resource curse. Rongwei and Xiaoying (2020) used panel data of 30 provinces in China from 2005 to 2018 to test the role of financial development on natural resource abundance and economic growth relationship and found that financial development can mitigate the curse in China.

Such research, involving financial development in natural resources and economic performance nexus conducted in Indonesia remains scarce. The study is to fill that gap, that is not only to examine the existence of natural resource curse but also to scrutinize whether the financial development has a significant role in that relationship. The analysis takes two important factors mentioned in previous literature into consideration, namely endogeneity and robustness check issues.

3. Data and Methodology

Data

In order to examine the hypothesis of the study, we implement a regression analysis. Data used in the research is primary data collected from 33 provinces with an annual period from 2012 to 2018. We exclude North Kalimantan, a new province in Indonesia because of data scarcity issues. The study adopts the variables used in research carried out by Rongwei and Xiaoying (2020) with a little

improvement to ensure robustness checks. The dependent variable is per capita economic growth measured by the difference value of the natural logarithm of real Gross Regional Domestic Product (GRDP) at period t and t-1. BPS-Statistics Indonesia provides GRDP data with 2010 as a base year.

The research limits the coverage to include only non-renewable natural resources such as mining (coal and other mining), oil, and gas. Following previous works, the study utilizes the share of mining sector over total GRDP (mining dependent) and the share of natural resource revenue (hereinafter called DBH) over the total of government revenue as proxies of natural resource indicators. DBH consists of the mining sector, oil, and gas revenue. The analysis then divided it into two components, mining revenue and oil and gas revenue. Meanwhile, financial development indicator in this study is proxied by private credit and deposit money bank as a share of nominal GRDP. Those data are gathered from the Financial Services Authority (OJK).

As mentioned above, the study also employs control variables adopted by Rongwei and Xiaoying (2020). Those are human capital investment, economic fluctuations, regional openness, and investment efficiency. Human capital investment is proxied by the percentage of the total number of high education students over total population; economic fluctuation is the absolute value of the five-year moving standard deviation of per capita GRDP; regional openness is measured by total regional Foreign Direct Investment (FDI) over regional nominal GRDP, and investment efficiency is the share of total investment over nominal GRDP. Table 1 summarises the data used in the analysis.

Table 1. Data and definition used in the analysis

No	Variable	Definition	Abbrev.	Unit of Measurement	Source
1	Per capita economic growth	The logarithmic difference in per capita GRDP	y	Natural log	BPS-Statistics Indonesia
Natural Resource Indicators					
2	Mining Dependence	Percentage of total mining output over real GRDP	MINDEP	Per cent	BPS-Statistics Indonesia
3	Natural Resource Revenue	The percentage of total natural resource revenue (total of mining, oil, and gas revenue) over total government revenue	NRREV	Per cent	DJPK
4	Mining Revenue	The percentage of mining revenue (DBH mining) over total government revenue	MINREV	Per cent	DJPK
5	Oil+gas Revenue	The percentage of oil and gas revenue (DBH oil and gas) over total revenue	OILGASREV	Per cent	DJPK
Financial Development					
6	Credit	The percentage of credit to the private sector over total nominal GRDP	Kredit	Per cent	OJK
7	Deposit Money Bank	The percentage of deposit money bank over total nominal GRDP	DPK	Per cent	OJK
Control Variables					
8	Human Capital Investment	The percentage of high education students over the total population	HCI	Per cent	BPS-Statistics Indonesia
9	Economic Fluctuations	The absolute value of the five-year moving standard deviation of per capita GRDP	EF	Billion Rupiah	BPS-Statistics Indonesia
10	Regional Openness	total regional Foreign Direct Investment (FDI) over regional nominal GRDP	Open	Per cent	BKPM
11	Investment Efficiency	The share of total investment over nominal GRDP	EI	Per cent	BKPM

DJPK (Directorate General of Fiscal Balance, Ministry of Finance), OJK (Financial Services Authority), BKPM (Capital Investment Coordinating Board)

Empirical Strategy

We define per capita output growth as the logarithmic difference in per capita GRDP, which is determined by the initial level of per capita income ($y_{i,t-1}$) as suggested by Barro (1996) and other explanatory variables following Rongwei and Xiaoying (2020) as have mentioned above. Our model is then

$$y_{it} - y_{i(t-1)} = \beta y_{i,t-1} + \beta_1 NR_{i,t} + FD'_{i,t}\beta_2 + \beta_3 (NR_{i,t} . FD'_{i,t}) + x'_{it}\delta + \varepsilon_{it} \quad (1a)$$

$$y_{it} = (\beta + 1)\, y_{i(t-1)} + \beta_1 NR_{i,t} + FD'_{i,t}\beta_2 + \beta_3 (NR_{i,t} . FD'_{i,t}) + x'_{it}\delta + \varepsilon_{it} \quad (1b)$$

$$y_{it} = \beta^* y_{i(t-1)} + \beta_1 NR_{i,t} + FD'_{i,t}\beta_2 + \beta_3 (NR_{i,t} . FD'_{i,t}) + x'_{it}\delta + \varepsilon_{it} \quad (1c)$$

$$\varepsilon_{it} = \alpha_i + v_{it} \quad (2)$$

$$E(\alpha_i) = E(v_{i,t}) = E(\alpha_i v_{i,t}) = 0 \quad (3)$$

Where $\beta^* = \beta + 1$, y_{it} and $y_{i,t-1}$are per capita GRDP of province *i* at period *t* and *t-1*, respectively. $NR_{i,t}$ represents the natural resource dependence of provinces at a certain period. $FD'_{i,t}$ indicates vector of financial development indicators consisting of private credit and deposit money bank. x'_{it} describes the vector of control variables. α_i and v_{it} are individual-specific effect and error term, respectively.

The study implements a dynamic generalized method of moments (dynamic GMM) estimation first developed by Arellano and Bond (1991). According to Das and Chowdhury (2016), GMM approach has several advantages compared to OLS estimation. First, it allows estimating panel data with many individuals and large time span. Second, it permits us to control the individual-specific effect with appropriate GMM variant. Third, GMM estimation is able to anticipate endogeneity problems in the model.

In order to purge the individual-specific effect in equation (1), it needs to take the first difference so that it yields

$$\Delta y_{it} = \beta^* \Delta y_{i,t-1} + \beta_1 \Delta NR_{i,t} + \Delta FD'_{i,t}\beta_2 + \beta_3 \Delta(NR_{i,t} . FD'_{i,t}) + \Delta x'_{it}\delta + \Delta\varepsilon_{it} \quad (4)$$

With following moment condition

$$E(\omega_{i,s}\Delta\varepsilon_{i,t}) = 0 \text{ for } s < t \quad (5)$$

Where $\omega_{i,s}$ is all independent variables that are treated as predetermined variables in equation (1). Estimation method using moment condition as in equation (5) is then called difference GMM (diff-GMM).

Several researchers then suggest utilizing additional moment condition to yield better finite sample properties. Arellano and Bover (1995) and Blundell and Bond (1998) recommend using the following additional moment condition

$$E(\Delta\omega_{i,t}\varepsilon_{i,t}) = 0 \quad (6)$$

Estimation method using additional moment condition as in equation (6) is then called system GMM (sys-GMM). The paper implements sys-GMM using two-step standard error procedure to examine the existence of resource curse and testing the role of financial development in natural abundance and economic growth linkages. To avoid instrument proliferation, we follow Roodman (2009) recommendation to limit the number of lags only using the first available lag of instrumenting variables of equation (1) and to collapse them.

4. Results and Discussion

Descriptive Statistics

Before going further examining the existence of natural resource curse and the role of financial development in mitigating it, it will be better to descriptively analyse variables used in this study. As mentioned, the data consists of 33 provinces in Indonesia between 2012 and 2018. Table 2 presents the summary statistics of the variables.

Based on data, the average and the standard deviation of economic growth in Indonesia during the sample period is around 3.73 per cent and 2.22 per cent, respectively. Economic growth inequality among provinces in Indonesia remains high as its maximum and minimum values has a high range, accounted for negative 5.72 per cent and 18.40 per cent. Moreover, natural resource dependences,

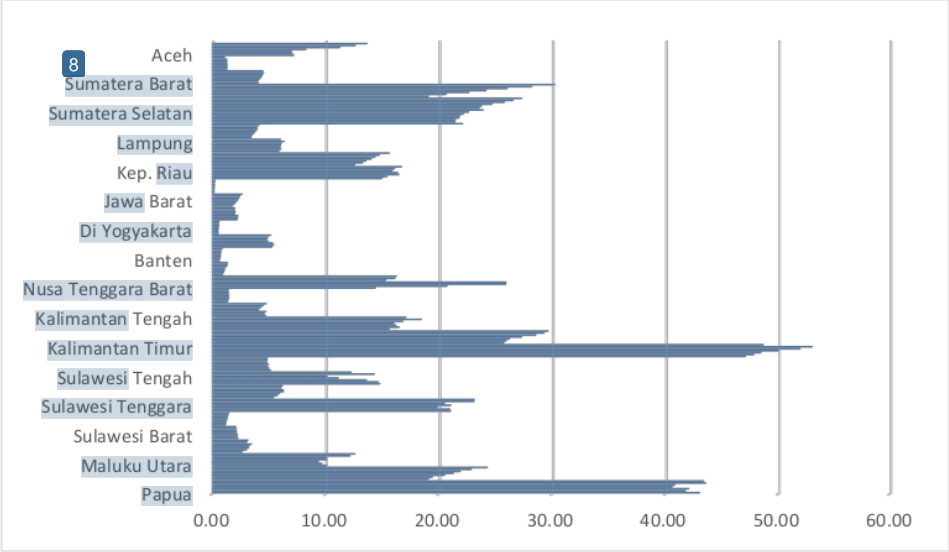
which are proxied by mining dependences GRDP and natural resource revenue, also show high inequality in the country. As economic growth data has, those variables have a high range with 0.17 per cent and 53.05 per cent for mining dependence GRDP's minimum and maximum value, and 0.00 per cent and 61.50 per cent for natural resource revenues' minimum and maximum value.

Table 2. Summary statistics

Variables		Unit of Measurement	Obs.	Mean	St.Dev	Min	Max
Per capita real GRDP (Y)		Million Rupiahs	231	37,19	29,12	10,03	165,87
Logarithmic differences of per capita GRDP		Percentage	231	3.73	2.22	-5.72	18.40
Natural Resource Dependence	***Mining dependence* (Mindep)**	Percentage	231	11,63	12,22	0,17	53,05
	***Natural resource revenue* (Nrrev)**	Percentage	231	5,81	10,88	0,00	61,50
	***Mining Revenue* (Miningrev)**	Percentage	231	2,15	4,76	0,00	27,04
	***Oil+gas Revenue* (Oilgasrev)**	Percentage	231	3,65	8,53	0,00	61,37
Financial Development	**Credit**	Percentage	231	24,92	14,75	7,79	103,82
	Deposit Money Bank	Percentage	231	25,92	18,06	9,25	120,34
***Investasi Human Capital* (hci)**		Percentage	231	3,62	1,77	0,95	9,19
Economic Fluctuation (ef)		Million Rupiahs	231	5,78	4,86	0,59	28,93
Regional Openness (open)		Percentage	231	3,65	3,89	0,01	20,04
Investment efficiency (ie)		Percentage	231	5,37	4,26	0.17	20,55

Source: Author's calculation

Figure 1. Mining Dependence GRDP in Indonesia 2012-2018

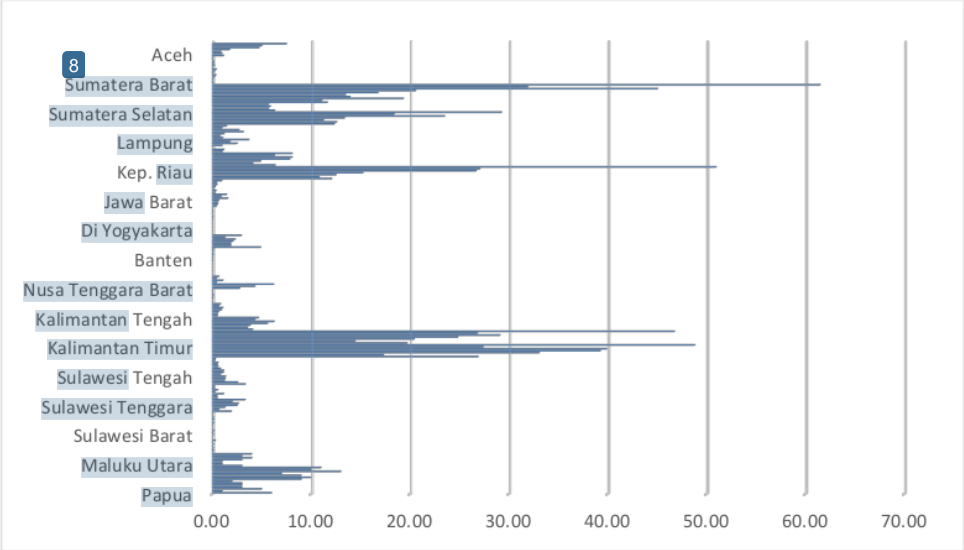


Source: Author's calculation

According to 2018 data, East Kalimantan is the province that has the highest dependences in the mining sector, accounted for around 53.05 per cent. Conversely, DKI Jakarta is the province that has the smallest portion of dependences with only 0.17 per cent. Overall, natural resource output across

provinces tend to decrease all the time. In the meantime, for the second proxy, natural resource revenue that is measured by the share of mining, oil and gas sector revenue over the total of government revenue, Riau Province had the highest revenue compared to others, accounted for 61.50 per cent in 2018. On the other hand, there is a province that has no revenue from natural resources, namely Bali Province. Generally speaking, natural resource revenue across provinces in Indonesia tends to decline over time.

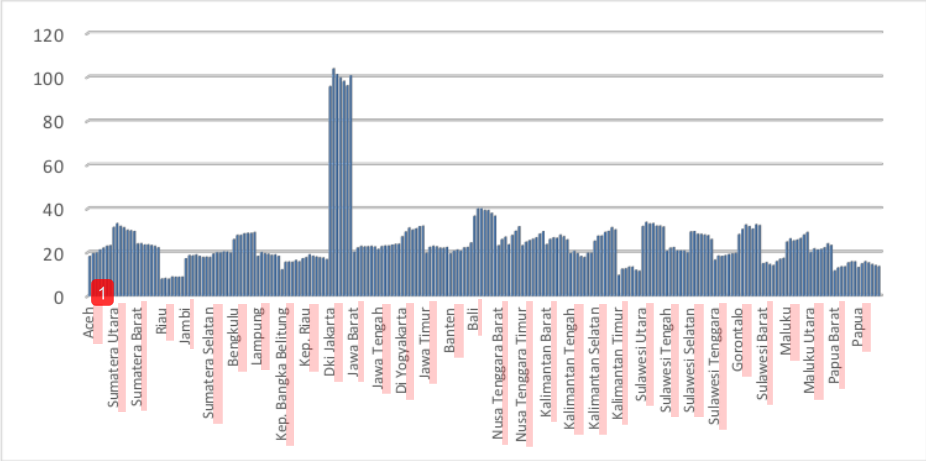
Figure 2. Natural Resouces Revenue in Indonesia 2012-2018



Source: Author's calculation

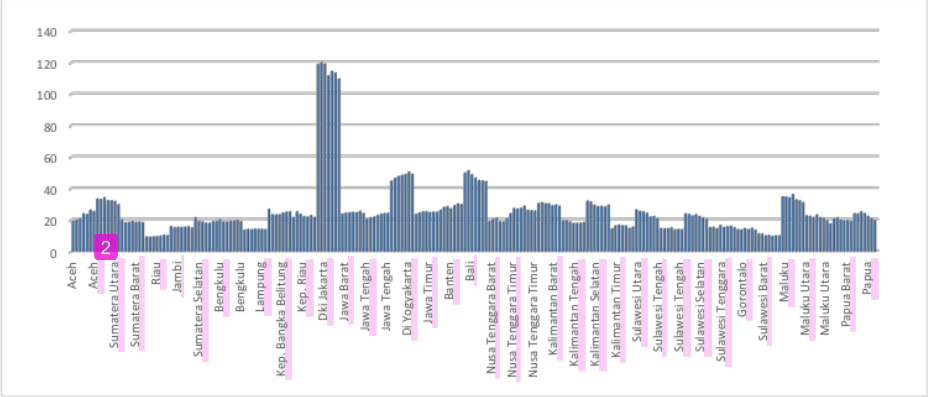
Table 2 also indicates that there is a high inequality among financial development sector in Indonesia. The development is centred only in developed provinces such as DKI Jakarta Province whose the percentage (both credit and deposit money bank) is the highest among others. Those two indicators fluctuated during the sample period.

Figure 3. The Percentage of Private Credit over GRDP in Indonesia 2012-2018



Source: Author's calculation

Figure 3. The Percentage of Deposit Money Bank over GRDP in Indonesia 2012-2018



Source: Author's calculation

Control variables used in the study have relatively low means and high ranges. Human capital investment, which is proxied by the percentage of people who are studying in the college level, has a mean of 3.62 per cent, minimum value of 0.95 per cent and maximum value of 9.19 per cent. Economic fluctuation indicator has 5.78 billion Rupiahs with a minimum value of 0.59 billion Rupiahs and maximum value of 28.93 billion Rupiahs. Regional openness, which is measured by a total foreign investment over GRDP, has a mean of 3.65 per cent with a minimum and maximum value of 0.01 per cent and 20.04 per cent, respectively. Investment efficiency, calculated by the total of foreign and domestic investment over GRDP, has a mean of 5.37 per cent, minimum value of 0.17 per cent and a maximum value of 20.55 per cent.

Regression Results

In addition to scrutinise the existence of the curse, this part is also to test the role of financial development in mitigating it. These two topics of discussion will answer the hypotheses of the study.

The existence of the natural resource curse in Indonesia

Table 3 presents the regression results of economic growth on several natural resources and financial development indicators. Overall, it reveals the potency of the existence of natural resources in Indonesia even though the effect is unclear when using mining dependence GRDP (Model 1 and Model 2). Model 3 and Model 4, which pair *nrrev* with credit and deposit variable, show a negative relationship between natural resources and economic growth. In every one percentage point of *nrrev* increase, economic growth will decline by 0.28 percentage point (Model 3) to 0.34 percentage point (Model 4) with the average of the growth is 3.73 per cent as presented at table 2.

Moreover, the study breaks down the *nrrev* into mining revenue (*miningrev*) and oil and gas revenue (*oilgasrev*) in order to further examine the variables that potentially lead to the curse. When the model employs *oilgasrev*, there is strong evidence that the curse may exist in Indonesia. As shown by Model 7 and Model 8 in Table 3, both paired with credit and deposit indicators, *oilgasrev* is associated negatively with economic growth. One percentage point of *oilgasrev* increase will drive to 0.33 percentage point (Model 7) to 0.34 percentage point (Model 8) of economic growth decreases. Those are in line with within-country natural resource curse studies. Douglas and Walker (2017) and Papyrakis and Gerlagh (2007) found the negative relationship between natural resources and economic growth in the USA. Rongwei and Xiaoying (2020) have also detected the negative association between resource endowment and economic growth in China. In Indonesia, Komarulzaman and Alisjahbana (2006) also claimed that the nexus between those two variables is negative.

Table 3. Relationships between natural resource dependence, financial development and economic growth

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Initial income	**-0.0827*** (0.05)**	**-0.0875*** (0.10)**	**-0.0365*** (0.03)**	**-0.0302*** (0.01)**	**-0.0228*** (0.04)**	**-0.0367*** (0.01)**	**-0.0447*** (0.02)**	**-0.0338*** (0.01)**
Mining dependence GRDP *(mindep)*	0.0043 (0.01)	0.0026 (0.01)						
Natural resource revenue (*nrrev*)			**-0.0028** (0.00)**	**-0.0034** (0.00)**				
Mining revenue (*minrev*)					-0.0063 (0.00)	**-0.0033* (0.00)**		
Oilgas revenue (*oilgasrev*)							**-0.0033** (0.00)**	**-0.0034* (0.00)**
Credit	0.0018 (0.00)		-0.0010 (0.00)		0.0007 (0.00)		-0.0007 (0.00)	
Deposit money bank		0.0018 (0.00)		-0.0001 (0.00)		0.0006 (0.00)		-0.0000 (0.00)
*Mindep**credit	-0.0002 (0.00)				0.0002 (0.00)			
*Mindep**deposit		-0.0001 (0.00)				0.0001 (0.00)		
*Nrrev**credit			**0.0001* (0.00)**				0.0001 (0.00)	
*Nrrev**deposit				**0.0001*** (0.00)**				
*Minrev**credit					0.0002 (0.00)			
*Minrev**deposit						0.0001 (0.00)		
*Oilgasrev**credit							0.0001 (0.00)	
*Oilgasrev**deposit								**0.0001*** (0.00)**
Control variables	YES	YES	YES	YES	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES	YES	YES	YES	YES
AR(1) p	0.1147	0.1199	**0.0786***	**0,0731***	**0.0461***	**0.0815***	**0.0831***	**0.0860***
AR(2) p	0.1280	0.5116	0.4275	0.4246	**0.0542***	**0.0332****	0.2552	0.2867
Hansen/Difference-in-Hansen *Test* p	0.8886	0.7234	0.5660	0.5411	0.6745	0.8558	0.6482	0.5992
Instrument	22	22	22	22	22	22	22	22
Province	33	33	33	33	33	33	33	33

Standard errors in parameter *p<0.1 **p<0.05 ***p<0.01
Source: Author's calculation

Badeeb et al., (2017) state that there are reasons behind the negative association between natural resources and economic growth. They classified into economic and political channels. From an economic perspective, the curse may relate to 'Dutch disease', commodity price volatility, economic policy failures, and the neglect of education. On the other hand, from the political point of view, the channels are traced to rent-seeking and weak institutions and corruption.

The reasons the curse may exist in Indonesia are potentially consistent with statements of Badeeb et al., (2017). Like other countries in the world, Indonesia has also encountered boom and recession in its economy. Indonesia has often been classified as a developing country that is successfully out from the resource curse trap during the 1970s to 1980s, the conditions in which natural-resource-based economic growth could foster industrialization processes leading to economic welfares and poverty alleviation. However, after the 2000s, the condition in which labour-intensive agricultural products play a critical role in economic activities, the economy of Indonesia experienced all the symptoms of the modern Dutch-disease (Edwards, 2016). In addition to Dutch-disease, Indonesia probably has high price volatility and policy mismanagement. Badeeb et al., (2017) argue that price

volatility could reduce economic growth since market instability may increase uncertainty, leading to the difficulties to measure natural resource revenues so that government face challenges to formulate economic development planning. Furthermore, natural resource revenues often make policymakers become overconfidence. For instance, natural-resource-based fiscal often drives the government to be ignorance to set policies relating to urbanization, human capital development, and infrastructure that is prominent for long term economic growth (Badeeb et al., 2017).

In the meantime, politically, rent-seeking, corruption and weak institution quality remain challenges for Indonesia societies. According to Badeeb et al., (2017), economists argued that in many countries, natural resource abundance enhances the power of elites since they are able to take a large portion of natural resource revenues and to share the revenues with particular groups in their circle rather than to boost infrastructure or sustainable economic development. Numerous economists argue that institution quality plays a crucial role in determining whether natural resources could become a blessing or a curse. Natural resources could not only become a main driver of conflicts but also corruption and pressure to institution quality (Badeeb et al., 2017). In Indonesia, corruption has become a serious issue. According to the corruption perception index of Transparency International, Indonesia ranked 85th of 180 countries. This becomes a potential reason the curse exists or persist in Indonesia.

The role of financial development in mitigating the curse

In addition to examine the relationship between natural resource dependence and economic growth, Table 3 is also to scrutinise the role of financial development in mediating the linkages between natural resources and economic output. Individually, the effect of financial development on per capita output is insignificant in all model specifications. Meanwhile, the interaction terms between financial development and natural resource dependence are positive and significant, both using credit and deposit money bank as a proxy for financial development. This indicates that financial development may become a channel for mitigating the natural resource curse in Indonesia. According to Model 3 and Model 4 in Table 3, interaction terms between *nrrev* and private credit and deposit money bank are significant and positive. Specifically, it is the interaction between *oilgasrev* and deposit money bank that is significant and positive (Model 8), but not between *oilgasrev* and private credit where the correlation is not statistically significant (Model 7).

In order to calculate the threshold in which financial development mitigates the curse, it needs to take a partial derivative of the standard model used in this study, as written by equation (1c). The formula is as follows;

$$\frac{\partial y}{\partial NR} \geq \boldsymbol{\beta_1} + \boldsymbol{\beta_3}\, \boldsymbol{FD} \qquad (7)$$

So that it yields;

Table 4. Relationships between natural resource dependence, financial development and economic growth

	Coefficient $\boldsymbol{\beta_1}$	Coefficient $\boldsymbol{\beta_3}$	The Threshold of Financial Development
*Nrrev**credit	-0,0028	0,0001	28
*Nrrev**deposit	-0,0034	0,0001	34
*Oilgasrev**deposit	-0,0034	0,0001	34

Source: Author's calculation

Table 3 shows that only Model 3 and Model 4 that confirm the existence of the natural resource curse in Indonesia. In Model 3 and Model 4, the interaction terms between natural resource and financial development are significant and positive. Table 4 presents the thresholds in which financial development could mitigate and minimize the curse. Interaction coefficient between *nrrev* and private

credit is 0.0001, indicating private credit could reduce the curse if its level is accounted for at least 28 per cent. Moreover, the interaction coefficient between *nrrev* and deposit money bank is also 0.0001, indicating that deposit money bank could mitigate the natural resource curse when its level is approximately at least 34 per cent. Finally, the interaction coefficient between *oilgasrev* and deposit money bank is accounted for 0.001, reflecting deposit money bank could mitigate the curse after reaching the threshold at 34 per cent. Those results indicate that financial development has a potency to be one of the mechanisms of minimizing the curse exists in a country. The study finds that private credit and deposit money bank should be at least 28 per cent and 34 per cent, respectively. According to descriptive statistics in Table 2, the average of private credit and deposit money bank is 24 per cent and 26 per cent, respectively. It is a signal for policymakers when formulating economic development planning with still considering natural resource quality. Enhancing financial development could be a crucial way to avoid and anticipate the existence of the curse. These results are consistent with researches conducted by Moradbeigi and Law (2017) dan Rongwei and Xiaoying (2020).

Moradbeigi and Law (2017) conducted research using 63 oil-producing countries and found that financial development could reduce the negative effect of natural resource endowment especially oil on economic growth when the level of financial development of a country at 19 per cent to 34 per cent. The threshold in developing countries tends to be higher than developed countries to minimize the effect of natural resources on output growth since the level of financial development remains low in developing countries. Additionally, Rongwei and Xiaoying (2020) argued that the level of financial development should be at least at 17 per cent to mitigate the curse in China.

Rongwei and Xiaoying (2020) stated that when a country has a low level of financial development, the investment tends to flow to a virtual economy so that the real economy cannot develop. However, when the level of financial development has reached a certain threshold, the investment will also flow to other labour-intensive real sectors and lead to higher economic growth. Financial development could reduce the curse in two ways. First, when natural resource revenue is reduced due to price volatility, the financial system could help by finance so that it can increase productivity and allocate resources optimally. Second, when natural resource revenue increases, the revenue could help the financial system to be more effective and strong so that it could boost other sectors which in turn fostering growth.

5. Conclusion and recommendations

The positive impact of natural resource abundance on economic development has become debatable since Auty (1994) first constructed a hypothesis relating to the natural resource curse, which reveals the possibility the relationship between natural resource and economic growth is negative. The study is to examine the existence of a natural resource curse in Indonesia and scrutinize the role of financial development in mitigating it.

The results provide evidence of the possibility of the curse in Indonesia. The study finds a negative association between natural resource dependence and economic output growth. One percentage point of natural resource revenue increase will drive to 0.28 to 0.34 percentage point of the growth rate decreases. It is both mining revenue and oil and gas revenue that reveals evidence of the existence of the curse in Indonesia. However, the latter gives stronger empirical evidence than the first one. The study also finds another crucial finding showing an alternative channel for mitigating the curse exists in the country through financial development. Results show that enhancing financial development could potentially mitigate and reduce the negative effect of natural resource dependence on economic growth. The level of financial development has to be at least 28 to 34 per cent so that it gives the desired impact in reducing the curse.

The findings recommend the government to pay more serious attention to fight the curse occurred in the country through effective mechanisms, one of which is through financial development. Enhancing financial development so that it reaches a certain threshold could mitigate or reduce the natural resource curse in the country. In the meantime, policymakers should also guarantee that other reasons causing the curse can be solved efficiently and effectively, such as anticipating modern “Dutch

disease", reduce price volatility, eradicate rent-seeking benefiting particular elites and their circles and strengthen the quality of the institution. Finally, the revenues of natural resources combined with capable financial sectors could boost economic output growth, which in turn increase the living standard of societies.

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References

Andersen, M. S. (2007). An introductory note on the environmental economics of the circular economy. *Sustainability Science*, *2*(1), 133–140.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, *58*(2), 277.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, *68*(1), 29–51.

Atkinson, G., & Hamilton, K. (2003). Savings, growth and the resource curse hypothesis. *World Development*, *31*(11), 1793–1807.

Auty, R. M. (1994). Industrial Policy Reform in Six Large Newly Industrializing Countries : The Resource Curse Thesis. *World Development*, *22*(1), 11–26.

Badeeb, R. A., Lean, H. H., & Clark, J. (2017). The evolution of the natural resource curse thesis: A critical literature survey. *Resources Policy*, *51*(June 2016), 123–134.

Barro, R. J. (1996). *Determinants of economic growth: A cross-country empirical study*.

Beck. (2011). *Finance and Oil . Is there a Resource Curse in Financial Development ? Finance and Oil Is there a resource curse in financial development ?*

Ben-Salha, O., Dachraoui, H., & Sebri, M. (2018). Natural resource rents and economic growth in the top resource-abundant countries: A PMG estimation. *Resources Policy*.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, *87*(1), 115–143.

Brunnschweiler, C. N., & Bulte, E. H. (2008). The resource curse revisited and revised: A tale of paradoxes and red herrings. *Journal of Environmental Economics and Management*, *55*(3), 248–264.

Cavalcanti, T. V. d. V., Mohaddes, K., & Raissi, M. (2011). Growth, development and natural resources: New evidence using a heterogeneous panel analysis. *Quarterly Review of Economics and Finance*, *51*(4), 305–318.

Das dan Chowdhury. (2016). ICT Diffusion, Financial Development and Economic Growth: New Evidence from Low and Lower Middle-Income Countries. *Journal of the Knowledge Economy*, *9*(3), 928–947.

Douglas, S., & Walker, A. (2017). Coal Mining and the Resource Curse in the Eastern United States. *Journal of Regional Science*, *57*(4), 568–590.

Edwards, R. B. (2016). *Natural Resource Sectors and Human Development: International and Indonesian Evidence*. 400.

Erdoğan, S., Yıldırım, D. Ç., & Gedikli, A. (2020). Natural resource abundance, financial development and economic growth: An investigation on Next-11 countries. *Resources Policy*, *65*(August 2019).

Gelb, A. (1988). *Blessing or Curse?*

Gylfason, T. (2005). Natural resource and economic growth: From Dependence to Diversification. In *Economic Liberalization and Integration Policy: Options for Eastern Europe and Russia* (Issue May).

Gylfason, T., & Zoega, G. (2006). Natural resources and economic growth: The role of investment. *World Economy*, *29*(8), 1091–1115.

Havranek, T., Horvath, R., & Zeynalov, A. (2016). Natural Resources and Economic Growth: A Meta-Analysis. *World Development*, *88*(609642), 134–151.

Hilmawan, R., & Clark, J. (2019). An investigation of the resource curse in Indonesia. *Resources Policy*, *64*.

Komarulzaman, A., & Alisjahbana, A. S. (2006). *Testing the natural resource curse hypothesis in Indonesia: Evidence at the regional level*. *6*.

Marques, A. C., & Pires, P. S. (2019). Is there a resource curse phenomenon for natural gas? Evidence from countries with abundant natural gas. *Resources Policy*, *63*.

Michaels, G. (2011). The Long Term Consequences of Resource-Based Specialisation. *Economic Journal*, *121*(551), 31–57.

Moradbeigi, M., & Law, S. H. (2017). The role of financial development in the oil-growth nexus. *Resources Policy*, *53*(June), 164–172.

Papyrakis, E., & Gerlagh, R. (2007). *Resource abundance and economic growth in the United States*. *51*, 1011–1039.

Rahma, H. (2019). *Fenomena Natural Resource Curse Dalam Pembangunan Wilayah di Indonesia*.

Rongwei, X., & Xiaoying, Z. (2020). Is financial development hampering or improving the resource curse? New evidence from China. *Resources Policy*, *67*.

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal*, *9*(1), 86–136.

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

Sachs, J., & Warner, A. (1995). Natural Resource Abundance and Economic Growth. *National Bureau of Economic Research*, *3*.

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