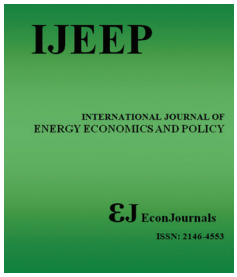


International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2021, 11(2), 281-292.

The Nexus between Economic Growth and Natural Resource Abundance in Selected ASEAN countries before Pandemic Covid-19

Abdul Rahim Ridzuan[1]*, Mohd Shahidan Shaari[2], Anita Rosli[3], Abdul Rahim Md Jamil[4], Siswantini[5], Arsiyanti Lestari[6], Shahsuzan Zakaria[7]

[1]Faculty of Business and Management, Universiti Teknologi MARA, Melaka Campus, Malaysia, [2]Faculty of Applied and Human Sciences, Universiti Malaysia Perlis, Malaysia, [3]Faculty of Humanities, Management and Sciences, Universiti Putra Malaysia, Malaysia, [4]School of Business and Economics, Universiti Putra Malaysia, Malaysia, [5]Faculty of Economic and Communication, Bina Nusantara University, Alam Sutera Campus, Indonesia, [6]Faculty of Economic and Communication, Bina Nusantara University, Kemanggisan Campus, Indonesia, [7]Faculty of Business and Management, Universiti Teknologi MARA, Shah Alam Campus, Malaysia. *Email: Rahim670@staf.uitm.edu.my

Received: 16 September 2020 **Accepted:** 24 December 2020 **DOI:** https://doi.org/10.32479/ijeep.10615

ABSTRACT

Abundant natural resources play an important role in boosting economic growth. However, as the Dutch disease emerged in the 1970s, innumerable researchers were attracted to investigate the negative impact of abundant natural resources on economic growth. The issue has been rigorously discussed in a large number of previous studies. However, they did not investigate the effect of economic growth on natural resource abundance. Therefore, this study embarks on an investigation into the effect of economic growth on natural resource abundance in selected ASEAN countries, namely Thailand, Singapore, Malaysia, Brunei, the Philippines, Vietnam, Cambodia and Indonesia. This study employs the static panel method to analyse data ranging from 2000 to 2016. The results show that foreign direct investment and direct investment can have negative impacts on natural resource abundance. An increase in economic growth, on the other hand, can have a positive impact of natural resource abundance. Other factors such as financial development, trade openness and governance do not influence natural resource abundance. Therefore, these findings can shed light for policymakers to formulate policies for future references as the outcomes based on before the spread of Covid-19 diseases. The countries can enhance economic growth to pave the way for more exploration of natural resources. Higher economic growth can lead to more advanced technologies and thus it is easy to extract more natural resources. Foreign direct investment and direct investment should be controlled to ensure that natural resources will not be exhausted.

Key words: Natural Resource Abundance, Economic Growth, Static Panel, ASEAN
JEL Classifications: O13, Q32, Q33, Q38, Q56

1. INTRODUCTION

Natural resources, especially oil, gas and coal, are of utmost importance in generating economic activities. Therefore, countries with abundant natural resources can help boost economic activities and thus there is no fear of exhaustion of natural resources, such as oil, that can disrupt economic growth (Rahman et al., 2018). Brunnschweiler (2008) and Fan et al. (2012) found that abundant resources can positively affect economic growth. Countries with abundant resources have a head start over other countries exporting their resources at low prices and thus they are more competitive in the global market. Hence, higher exports ensue, leading to higher standards of living. Natural resources should be treated to be on a par with inputs such as capital and labour. Inputs act as a catalyst for economic growth. In the absence of a higher number of inputs, economic growth can be dampened. This implies that natural

resource depletion can serve as a stumbling block to economic development. Nasiru et al. (2019), Shaari et al. (2012), Ighodaro (2010) stated that natural resources such as gas and oil can spur the economy to faster growth. Besides, managing effectively the country's resources would help the country to achieve sustainable economic development goal [Vija Kumaran et al. (2020); Ridzuan et al. (2019), Ridzuan et al. (2018), Ridzuan et al. (2017)].

Countries with abundant natural resources can be independent as there is no need for them to import. Due to natural resource dependence, they can avail themselves of the opportunity to export. Therefore, lower imports due to less independence and higher exports attributed to natural resource dependence can lead to higher economic growth. However, it is not always tenable as it is dependent on how they manage their resources. If they really utilise their resources, they can reap the benefit. Thus, job opportunities can be created, and higher standards of living ensue. However, if they do not manage their resources efficiently and effectively, a waste of resources occurs and thus its economic growth remains unchanged.

Alarm bells started to ring when the issue of the resource curse emerged. The Dutch disease occurred in the Netherlands during the 1970s and 1980s in the aftermath of a great decline in its exports (Zhang and Brouwer, 2019). Despite the country's dependence on natural resources, particularly gas, the country plunged into recession due to the fact that its exports slumped. The increase in the price of the resource due to its higher exchange rate caused the product to be less competitive in the global market. Due to the higher exchange rate, the prices of other Dutch products were higher and thus it affected the manufacturing industry. This suggests that abundant natural resources do not always suggest higher economic growth as it can also reduce economic growth. Unemployment will be on the rise stemming from abundant natural resources. The country's heavy reliance on exports has fallen prey to global crises that lead to a dramatic plunge in the global demand for natural resources. A slump in the price of natural resources will have a deleterious effect on exports. Countries without abundant resources such as Japan and Korea experience great economic growth while the economies of countries with abundant resources grow slowly. That is the reason why Saudi Arabia has also inevitably experienced the natural resource curse.

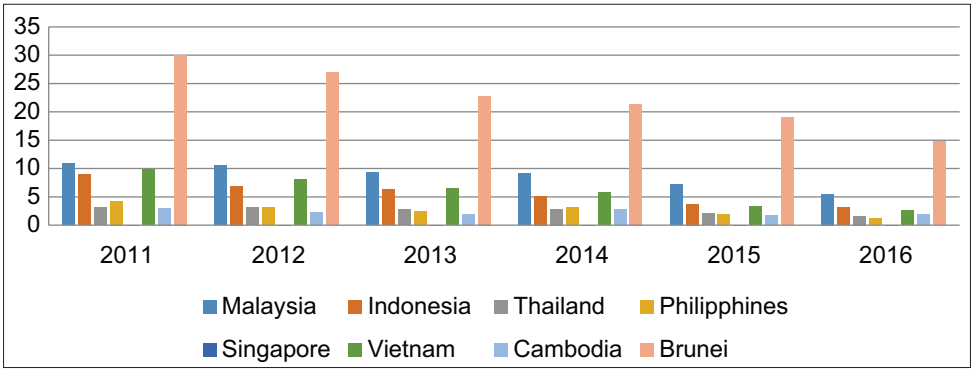
A vast array of previous literature has delved into the effects of abundant natural resources on economic growth (Daniele, 2011; Mittal and Gupta, 2017; Amini, 2018). However, no attention has been given to the other way round. Therefore, this study attempts to be the first to ascertain whether higher economic growth can help increase or decrese natural resources. Our justification for the exploration is that countries with higher economic growth have advanced technologies (Zhou and Luo, 2018) and thus they can discover more natural resources such as oil, gas and coal. Hence the reason their exports escalate. However, at a certain point where there is higher economic growth that requires more natural resources, natural resources will be exhausted. This means that higher economic growth can contribute to reducing natural resources. We extract non-renewable resources in gas, liquid or solid forms, then we convert them to final energy to be used to generate economic activities especially in the transportation and industrial sectors. It takes billions of years for natural resources, particularly fossil fuels to form and therefore, it takes billions of years to replace the resources that have been used.

This study focuses on selected ASEAN countries, namely Malaysia, Indonesia, Thailand, Brunei, the Philippines, Vietnam, Cambodia and Singapore. It is important to examine the effect of economic growth on natural resource dependence in the countries due to their varied patterns of natural resources. For example, Malaysia and Indonesia contibuted 85% of total world palm oil production (Fathana, 2017). The advent of new technology due to higher economic growth can help these countries boost their palm oil production.

Figure 1 shows total natural resources rents as a percentage of GDP over a 6-year period. Total natural resources rents in Brunei exhibited a slumping trend from 2011 to 2016. Malaysia and Cambodia recorded steady decreases in total natural resources rents as a share of GDP. Despite great economic development in Singapore, the country still ranked bottom in natural resources rents as a share of GDP. Notwithstanding a small country, Brunei ranked top in 2016 (14.72%), followed by Malaysia (5.51%), Indonesia (3.06%), Vietnam (2.62%), Cambodia (1.89%), Thailand (1.60%), and the Philippines (1.23%).

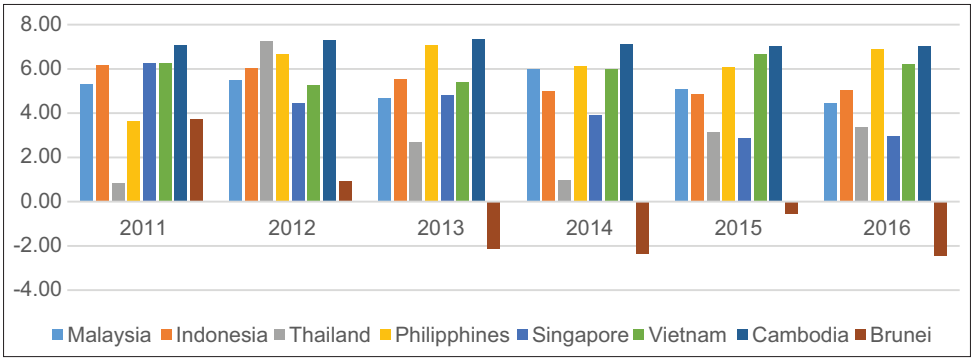
Figure 2 shows economic growth in selected ASEAN countries over a 6-year period. Based on the figure, it can be learnt that all

Figure 1: Total natural resources rents (% of GDP) in selected ASEAN countries



Source: World Bank (2019)

Figure 2: Economic growth (%) in selected ASEAN countries



Source: World Bank (2019)

of the countries except Brunei experienced positive economic growth from 2011 to 2016. Brunei lagged far behind the other countries in economic growth as its real GDP started to decline in 2013. Economic growth in all of the countries showed uncertain trends. Cambodia exhibited the strongest economic growth as its economic growth stood at higher than 7% over the period. Singapore is a developed country but could not beat Cambodia in terms of economic growth. Thailand's economy grew at a slow pace with average growth of 3.04.

2. LITERATURE REVIEW

Natural resources such as minerals, oil, forests, land, water and materials are assets for a country as they can have a significant contribution towards economic growth. Natural resources create numerous economic activities and job opportunities. Countries with an abundance of natural resource are likely to grow faster than those countries in the absence of abundant natural resources. Ramez et al. (2017). There are two keys to measuring countries' natural resource abundance: resource abundance of output (revenue from resources) and stock of resource abundance (amount of subsoil mineral, oil and gas) (Brunnschweiler and Bulte, 2008). Basically, there are some benefits of having natural resource abundance. One of the benefits is that it can generate income from the extraction of resources and this it can result in a higher standard of living. Other than that the income can be used to boost public and private consumption, to increase investment and to remove barriers of development due to lack of fiscal resources (Sachs, 2007). However, the overuse of natural resource especially non-renewable resources such as oil, gas and minerals can result in exhaustion.

Sachs and Warner (1995) found there is an inverse relationship between natural resource abundance and economic growth in cross-country studies. Modern economists found the idea that there might be a strong negative relationship between natural resources, and economic and political development that prevailed in the 1980s (Sen, 1999). There are three essential reasons that contribute to the negative relationship, such as an appreciation in the real exchange rate that can lead to the Dutch disease, volatility in natural resource export revenues and the resource curse (Morisson, 2015). Meanwhile, Deng et al. (2014) provided four reasons that abundant natural resources can hinder economic development: Dutch disease effects, crowding effects (i.e., declining savings and investment, human capital under development, innovation declines), a deterioration in the institutional quality and volatility in resource trade. Ramez et al. (2017) highlighted five causal mechanisms of the natural resource curse i.e. the Dutch disease, a fluctuation in commodity prices, economic mismanagement, rent seeking, and corruption and institutional quality.

Dutch disease effects are a common term when discussing the relationship between natural resources and economic growth. The Dutch disease arose when abundant natural resources increased domestic income and the demand for goods, resulting in inflation and an appreciation in the real exchange rate (Sachs and Warner (1995), Gylfason, (2001),, Papyrakis and Gerlagh (2004), Frankel (2010). The prices of non-resource commodities especially in the manufacturing sector become less competitive in the global market. Investment and human capital may be drawn away from the manufacturing sector to the natural resource-based sectors. However, if natural resources are not properly managed, it may affect economic performance, causing people to be worse off (Ahmad and Armida, 2006). Thus, the Dutch disease effect leads to the resource curse. According to Muhammad et al. (2019), the resource curse hypothesis refers to a situation where countries with a large amount of natural resources achieve a lower rate of economic growth, compared to those countries with a small amount of natural resources. Thus, the resource curse refers to an inverse relationship between natural resource and economic growth. However, the resource curse involves non-renewable natural resources (i.e., oil, mineral, gas).

Empirical evidence regarding to the resource curse can be categorised into three groups; resource abundance or resource dependence, various economic factors affected by natural resource wealth and the validity of the resource curse hypothesis (Ramez et al., 2017). Besides, the institutional quality and government intervention are important factors that can contribute to the resource curse. There are negative effects of natural resources on economic growth in countries with poor institutional quality (Mehlum et al., 2006). Governments misspend money from natural resource revenues to gain supporters can be detrimental to the economy. The lack of accountability can result in a shortage of public funds (Mehlum et al., 2006; Robinson et al., 2006). However, there are several ways to avoid the resource curse. Adam et al. (2018) suggested seven ways to avoid the resource

curse: institutional quality, governance quality, effectiveness of governance, membership of extractive industries transparency initiative (EITI), natural resource-sustainability and accounting, accounting and petroleum revenue management, and accountability and corruption control mechanisms.

Recently, there are numerous studies that investigated the existence of the resource curse among countries. Table 1 summarises past studies that validated the resource curse hypothesis across countries. Most researchers used GDP or real GDP per capita as an indicator of economic growth and used almost similar explanatory variables. For explanatory variables, there are a few common variables to measure the resource curse such as resource rent, investment, international trade, financial development, government expenditure, employment or unemployment rate, education, natural resource abundance, population, institution quality and government quality.

Based on our observation, this paper is expected to generate new findings and contribute to the body of literature by investigating the presence of natural curse hypothesis in the case of selected ASEAN countries. The selection of the variables has been meticulously made by referring to previous studies. Therefore, we attempt to explore the determinants of natural resource abundance in selected ASEAN countries as it has yet to be explored by previous studies. Thus, it will help readers gain new knowledge.

3. METHODOLOGY

3.1. Model Specification

In this study, a static panel analysis is used to deal with a small sample size for selected ASEAN countries over a period of 17 years ranging from 2000 to 2016. Our models are specified in linear and nonlinear forms. To estimate the non-linear relationship between independent and dependent variables, our model specification is extended by using the non-dynamic panel threshold model. The formulation of the models are briefly explained in this section.

Model 1: The impact of natural resource abundance on economic growth.

To investigate the effect of natural resource abundance on economic growth and to validate the natural resource curse hypothesis, a linear model in Model 1 is formulated as follows:

$$GDP=f(NA) \quad (1)$$

where *GDP* represents GDP per capita or economic growth and *NA* represents total natural resource rents. It is the sum of rents from oil, natural gas, coal (hard and soft), minerals, and forests. Eq. (1) is transformed into an econometric model to estimate the relationship between natural resource abundance and economic growth. In order to achieve the consistency and reliability of the estimation by standardising the data scale, these variables are transformed into the logarithms (indicated by *ln* in Eq. [2]) to explain the results of long- run elasticity (Shahbaz, 2010). Eq., (1) is re-written as follows:

$$\ln GDP_{it}=\delta_0+\beta_1 \ln NA_{it}+\mu_{it} \quad (2)$$

Where δ_0 denotes the intercept term; β_1 is the undetermined coefficient; μ_{it} is the error term; *i* represents countries (i = 1, 2,…, N) and *t* represents time (t = 1, 2,…, T). The model is extended by including a set of parameters for control variables such as domestic investment (DI), foreign direct investment (FDI), financial development (FD), openness to trade (TO), and governance (GOV). Some of these variables were introduced by previous studies such as Apergis and Payne (2014), Tiba and Frikha (2019), and Tiba and Frikha (2019). A new form of the equation is expressed as follows:

$$\ln GDP_{it}=\delta_0+\beta_{11} \ln NA_{it}+\beta_{12} \ln DI_{it}+\beta_{13} \ln FDI_{it}+\beta_{14}\ln FD_{it} +\beta_{15} \ln TO_{it}+\beta_{16} GOV_{it}+\mu_{it} \quad (3)$$

The coefficient of natural resource abundance, $(\widehat{\beta_{11}})$ may be positive or negative depending on the existence of resources. The expected sign of the coefficient $(\widehat{\beta_{12}})$ for domestic investment should yield a positive sign as founded by Barro (1991), and Levine and Renelt (1992). Meanwhile, the coefficient $(\widehat{\beta_{13}})$ of FDI as estimated by Mankiw et al. (1992) and Obstfeld (1994) is positive. Both FDI as shares of GDP and domestic investment capture the capital accumulation requisite for economic growth. The coefficient $(\widehat{\beta_{14}})$ of financial development is also positive as found by Beck and Levine (2004), and Bertocco (2008), etc. The coefficient $(\widehat{\beta_{15}})$ of openness to trade, (TO) reflects the impact of globalisation and it is expected to have a positive sign as addressed by Lee et al. (2004), Freund and Bolaky (2008) and Chang et al (2009). The expected sign related to governance (β_{16}) is positive as addressed by Costantini and Monni (2008), and Abou-Ali and Abdelfattah (2013).

Investment is structured under Keynesian economics as a determinant of economic growth. Looking at the domestic economy, domestic investment may depend on natural resources in a country to be utilised in order to generate economic growth. Suppose that the level of natural abundance may influence the performance of domestic investment on economic growth, the baseline model in Eq. (3) is further extended by including the interaction term between natural abundance (NA) and domestic investment (DI) as follows:

$$lnGDP_{it} = \delta_1 + \beta_{21}lnNA_{it} + \beta_{22}lnDI_{it} + \beta^*_{22}(lnDI_{it} \times lnNA_{it}) +\beta_{23}lnFDI_{it} + \beta_{24}lnFD_{it} + \beta_{25}lnTO_{it} + \beta_{26}GOV_{it} + \mu_{1it} \quad (4)$$

Where β^*_{22} denotes the interaction term between domestic investment and natural abundance. If the interaction term coefficient is significant, it means that natural abundance is a catalyst to influence the effect of domestic investment on economic growth. Therefore, a non-linear relationship exists in the model as specified in Eq. (4).

Model 2: The impact of economic growth on natural abundance.

In comparison with Model 1, Model 2 is introduced by specifying natural resource abundance as a dependent variable. Meanwhile economic growth is being treated as an independent variable and the others are control variables as incorporated in Model 1. The baseline model in a linear form is shown as follows:

Table 1: Summary of literature of natural resource curse and different economic variables

Author/Year	Sample (countries)	Dependent variable	Independent variables	Data and methodology	Main findings
Boschini et al. (2008)	54 democracy countries (parliamentary and electoral system)	-Growth rate of GDP	-Natural resource -Initial GDP per capita -Investment -Openness -Institution (parliamentary system or electoral rule)	-Annual data; 1970-2003 -Regression	-Less (or no) resource cause-effect exists in parliamentary regimes and majoritarian electoral systems compared to presidential and proportional electoral systems -The resource curse-effects are dominant in countries that having much ores, metals and fuels
Cale et al. (2017)	ASEAN 5; Philippines, Indonesia, Malaysia, Thailand and Singapore	-Income per effective worker	-Total factor productivity -Capital per effective worker -Human capital invested -External factors that affect the human capital invested -External factors affecting capital per effective worker	-Annual data (using 5-year intervals); 1970-2010 -Solow's neoclassical model and the Cobb Douglas production function	-Lucas Paradox and human capital resource curse exist and connected among these countries
Kurecic and Kokotovic (2017)	Small economy countries	-GDP	-Tourism -Natural resource rent -Human capital stock -Gross domestic product per capita	-Annual data; 1995-2014 -Vector auto regression	-Natural resource curse presents in the economies that depend strongly on resource that substitutable and whose prices constantly fluctuate
Tamat et al. (2012)	90 countries	-Real GDP per capita	-Natural resource abundance -Institutional quality -Vector of controls (initial income per capita, latitude)	-Annual data; 1984-2005 -Threshold regression technique	-To generate growth, countries with poor institutional quality depend heavily with natural resource compared to counties with high quality institution
Papyrakis and Gerlagh (2004)	47 countries	-GDP per capita	-Initial per-capita income -Resource abundance -Share of mineral production -Corruption perception index -Investment -Openness -trade - schooling	-Regression	-The effect of natural resource on economic growth is negative when transmission channels included in the model -Investment channel is important channel
Kakanov et al. (2018).	24 oil exporters	-Real GDP per capita adjusted for PPP	-Investment -Education -Population -Conflict -Oil share -Export -Trade -Capital	-Panel data; 1982 and 2012 -Cointegration analysis	-Oil dependence has negative impact on economic growth
Sofien and Mohamed (2019)	26 African countries	-GDP per capita	-Human development -Natural resource endowment -Trade openness -Foreign direct investment -Gross fixed capital formation	-Annual data; 1990-2016 -Panel FMOLS and DOLS	-A long run equilibrium exists between all variables in the resource curse hypothesis and the EKC model
Muhammad et al. (2019)	35 natural resource abundant countries	GDP per capita	-Natural resource rents (sum of oil rents, natural gas rents, coal rents, mineral rents and forest rents) -Capitalization -Financial development (domestic credit to private sector) - trade openness (real total trade per capita)	-Panel data -ECM-based Westerlund's cointegration test	-Natural resource abundance encourages economic growth but natural resource dependence deters economic activities

(*Contd...*)

Table 1: (*Continued*)

Author/Year	Sample (countries)	Dependent variable	Independent variables	Data and methodology	Main findings
Vespignani et al. (2019)	95 countries	-Real GDP per capita	-Change in log of real GDP per capita -Oil rent -Unemployment rate -Foreign direct investment -Current account balance -Military expense -Infant mortality rate -Trade openness	-Panel data; 1980-2017 -Ordinary least square regression	-Trade openness could reduce the resource curse
Ousamu et al. (2018)	Australia, Brazil, Canada China, Iran, Saudi Arabia, USA and Venezuela	-GDP per capita	-Natural resource rents	-Annual Data; 1970-2013 -Pooled mean group estimator -Panel ARDL	-A bidirectional long run causality exists between economic growth and resource rents
Apergis and Katsaiti (2018)	28 oil exporting countries, 36 major natural gas Exporters, and 15 major coal exporters	-Poverty	-GDP per capita -Education level -Energy (oil, gas and coal -Economic freedom -Democratic level -Corruption	-Annual data; 1992-2014 -Cointegration test	-Fossil energy resources worsen poverty -Democracy and economic freedom could reduce the poverty while the corruption will increase the poverty

$$\ln NA_{it}=\alpha_0+\gamma_{11}\ln GDP_{it}+\gamma_{12}\ln DI_{it}+\gamma_{13}\ln FDI_{it}+\gamma_{14}\ln FD_{it}+\gamma_{15}\ln TO_{it}+\gamma_{16}GOV_{it}+\varepsilon_{it} \quad (5)$$

The purpose of introducing the baseline model in Model 2 is to examine the nexus between natural resource abundance and economic growth in two directions. Besides, the consistency of the sign in the coefficients of all control variables (DI, FDI, FD, TO and GOV) in both Models 1 and 2 are used for a robustness check.

Assuming that the relationship between economic growth and natural resource abundance is related to the environmental Kuznets curve hypothesis, thus the relationship between these variables is expected not to be linear. The linear model as specified in Eq. (5) is therefore extended by incorporating the square term of GDP. The quadratic model is expressed as below:

$$\ln NA_{it}=\alpha_1+\gamma_{21}\ln GDP_{it}+\gamma_{21}^{*}\ln GDP_{it}^{2}+\gamma_{22}\ln DI_{it}+\gamma_{23}\ln FDI_{it}+\gamma_{24}\ln FD_{it}+\gamma_{25}\ln TO_{it}+\gamma_{26}GOV_{it}+\varepsilon_{1it} \quad (6)$$

where γ_{21}^{*} denotes the square term of GDP. If the interaction term coefficient is significant, it means that natural resource abundance acts as a catalyst to influence the effect of domestic investment on economic growth. Therefore, a non-linear relationship exists in the model as specified in Eq. (4).

3.1.1. The estimations

All models as specified in Eq. (3)-(6) are referring to the pooled model. The static panel data are used for a small sample size as discussed earlier. Holding the classical linear regression model assumptions, the pooled model is estimated by using pooled ordinary least square (POLS). Since the heterogeneity of the countries occurs, the homogeneity of the variance assumption cannot be held. The fixed effect (FE) model is therefore employed by incorporating the countries' specific effect (such as η_i) to indicate the different intercept among countries to allow the heterogeneity in the model. The coefficients of all variables in the FE model are estimated by using within regression. On the other hand, the variance may be heterogeneous among countries. Hence, the random effect (RE) model uses two components of variance by allowing the country specific effect variance θ_i and the residual (ω_{it}) in the error term (ϵ_{it}).

To investigate either the pooled model or FE model is preferred, the F-test is used to test the null hypothesis of the intercept of countries' specific effects is homogenous. If the P-value of the F-test is rejected, it means that the heterogeneity of the countries is allowed and the FE model is preferred. Meanwhile, the Breusch Pagan (BP) LM test is used to test either the pooled model or RE model is preferred. If the p-value of the BPLM statistic is <0.05, it means that the null hypothesis of the pooled model is rejected at the 5% significance level, indicating that the variance of the countries are various and the RE model is preferred. If both p-value of the F-test and BPLM test are <0.05, a Hausman test is conducted to test whether the FE model or RE model is preferred. If the Hausman statistic is significant, it means that the FE model is preferred over the RE model.

3.2. Non-dynamic Panel Threshold Regression

To examine whether there is a structural change in the relationship between the dependent and independent variables, the static panel threshold regression model as proposed by Hansen (1999) is employed. If the interaction term coefficient in Eq. (4) for Model 1 is significant, it means that the effect of domestic investment on GDP is contingent with the level of natural resource abundance. On the other hand, if the p-value of the square term in Eq. (5) is significant, the effect of GDP on natural resource abundance is dependent on the level of GDP. Thus, Models 1 and 2 need a further investigation by using the non-dynamic panel threshold regression model and it can be written in Eq. (7) and Eq. (8), respectively.

$$lnGDP_{it}=\delta_2+\beta_{31}lnDI_{it}I\left(lnNA_{it}\le\lambda\right)+\beta_{31}^{*}lnDI_{it}I\left(lnNA_{it}\ge\lambda\right)+\beta' X_{it}+\eta_i+\varepsilon_{2it} \quad (7)$$

Where $\ln NA_{it}$ is the threshold variable for Model 1 representing natural resource abundance in selected ASEAN countries. $I(.)$ denotes a Heaviside function indicating $I(\ln NA_{it} \leq \lambda)=1$ when $I(\ln NA_{it} \leq \lambda)=1$ or otherwise, $I(\ln NA_{it} \geq \lambda)=0$, for β_{31}, and vice-versa for β_{31}^{*}. If the sign of the coefficient of $\widehat{\beta_{22}^{*}}$ in Eq. (4) is positive and statistically significant, then the coefficient of β_{31}^{*}, in Eq. (7) should be positive or higher than $\widehat{\beta_{31}}$ in the same equation. Lastly, η_i denotes the country specific effect to address the heterogeneity.

Meanwhile, the extended model from Eq. (6) can be expressed into the static panel threshold regression model in Eq. (8) as follows:

$$lnNA_{it} = \delta_2 + \gamma_{31} lnGDP_{it} I\left(lnGDP_{it} \leq \lambda\right) + \gamma_{31}^{*} lnGDP_{it} I \left(lnGDP_{it} \geq \lambda\right) + \gamma' X_{it} + \theta_i + \epsilon_{2it} \quad (8)$$

Where $\ln GDP_{it}$ is the threshold variable for Model 2 indicating the effect of GDP per capita on natural resource abundance depending on GDP per capita. $I(.)$ denotes a Heaviside function indicating $I(\ln GDP_{it} \leq \lambda)=1$ when $\ln GDP_{it} \leq \lambda$ or otherwise, $I(\ln GDP_{it} \geq \lambda)=0$, for γ_{31}, and vice-versa for . If the sign of the coefficient of $\widehat{\gamma_{21}^{*}}$ in Eq. (6) is positive and statistically significant, then the coefficient of γ_{31}^{*} in Eq. (8) should be positive or higher than $\widehat{\gamma_{31}}$ in the same equation. Lastly, θ_i denotes the countries' specific effect to address the heterogeneity.

Both Eq. (7) and (8) are estimated according to Hansen (1999). When λ is known, the ordinary fixed effect regression model is employed to estimate the values of lnDI in Model 1 and lnGDP in Model 2, and the corresponding sum of squared errors is $S_i(\lambda)$. However, if λ is unknown, Hansen (1999) introduced an estimate of λ by using the least-squares based on the non-linear specification in Eq. (7) and (8). This is the easiest way to achieve by minimising the concentrated sum of squared errors. Hence, the least squares estimator of λ is shown as follows:

$$\hat{\lambda} = \arg\min_{\lambda} S_1(\lambda) \quad (9)$$

$$\hat{\gamma} = \arg\min_{\gamma} S_1(\gamma) ...(7.0)$$

The minimum sum of squared errors from Eq. (9) is $S_i(\lambda)$ with a variance estimate as follows:

$$\widehat{\sigma^2} = S_1(\lambda)/[n(T-1)] \quad (10)$$

$$\hat{\sigma}^2 = S_1(\hat{\gamma})/\left[n(T-1)\right] ...(8.0)$$

Next we test whether there is a threshold effect as proposed by Hansen (1996, 1999) included a hypothesis test for both models,

Model 1: $H_0 : \beta_{31} = \beta_{31}^{*}$ versus $H_0 : \beta_{31} \neq \beta_{31}^{*}$ for *DI* variable in Eq. (7); and

and

Model 2: $H_0 : \gamma_{31} = \gamma_{31}^{*}$ versus $H_0 : \gamma_{31} \neq \gamma_{31}^{*}$ for *GDP* variable in Eq. (8)

H_0:$LNGDP_1 = LNGDP_2$,
H_i:$LNGDP_1 \neq LNGDP_2$ for Model 2.

Thus, the approximate likelihood ratio test of zero versus single threshold can be based on the following statistic formulae:

$$F_1=[S_0-S_1(\lambda)]/\sigma^2 \quad (11)$$

$$F_1 = \left[S_o - S_1(\hat{\lambda}) \right] / \hat{\sigma}^2 ..(9.0)$$

Where S_0 represents the sum of squared errors when the null hypothesis is accepted. However, if the null hypothesis of no threshold is rejected, the single threshold is chosen and if F_1 is large. As addressed by Hansen (1999), since the null asymptotic distribution of the likelihood ratio test is not pivotal, the bootstrap procedure is used to estimate the sampling distribution. If the bootstrap is asymptotic, the efficient of the p-value is derived in accordance with the F-value under H_0. The null hypothesis of no threshold effect is rejected under this condition, where the probability value (P-value) is smaller than the critical value. Furthermore, Hansen (1996) showed that for a large sample size, the statistic of the P-value is based on the uniform distribution, and thus the Bootstrap method can be used to get the value. Finally, we consider the construction of confidence intervals for the threshold parameters to test whether the value of the estimated threshold is reliable. Due to the nuisance parameters, the traditional statistics will be non-standard estimation. In order to overcome this problem, Hansen (1999) built a no-rejection region of asymptotic and efficient confidence interval using the maximum likelihood ratio LR statistics. Thus, the confidence interval is constructed as follows:

$$LR_1^{\lambda}(\lambda) = \left[S_i(\lambda) - S_1\left(\widehat{\lambda_1}\right) \right] / \widehat{\sigma^2} \quad (11)$$

$$LR_1^{\gamma}(\gamma) = \left[S_i(\gamma) - S_1(\hat{\gamma}_1) \right] / \hat{\sigma}^2 ..(10.0)$$

Our asymptotic of (1-α)% confidence interval for λ_1 is a set of values of λ and thus $LR(\lambda) \leq -2\ln\left(1-\sqrt{1-\infty}\right)$. One of the strong features of this confidence region is that it is a natural model estimation. The likelihood ratio sequence LR is a simple renormalisation of numbers and it requires no further computation. The model above only considers a single threshold. In some cases, it can be a multiple threshold. However, in our case, we can identify two or more threshold values, as pointed out and discussed by Hansen (1999).

3.2.1. Data description and source of data

A series of data for all variables used in this analysis are shown in Table 2. All variables are transformed into the natural logarithms except for GOV due to its small data scale ranging from 1 to 4.5. The data are described as a preliminary analysis to be used as a reference in the main analysis. The highest value of the variable is GDP per capita (GDP) and the smallest number is natural resource abundance (NA). NA has the biggest gap in the data, followed by GDP as indicated by the standard deviation. It suggests that NA and GDP among selected ASEAN countries are relatively different. Thus, the heterogeneity of NA and GDP motivates us to further

investigate the nexus between GDP and NA. Meanwhile, the portion of domestic investment (DI) is higher than foreign direct investment (FDI), indicating that DI is more important than FDI as investment is one of the core determinants of economic growth in Keynes's theory. However, the high kurtosis of DI suggests that any changes in DI are uncertain. Hence, these variables are considered as focal variables in our investigation. The units of measurement and sources of data for all variables are shown in Table 3. Real GDP per capita is used as a proxy for economic growth. NA that refers to total natural resource rents is the sum of rents from oil, natural gas, coal (hard and soft), minerals, and forests.

4. EMPIRICAL FINDING

Our empirical findings are discussed based on the estimation results for the baseline, non-linear and non-dynamic panel threshold models.

Model 1: The impact of natural abundance on economic growth.

The relationship between natural resource abundance and economic growth as specified in Eq. (3) is shown in Table 4. The P-value of the Hausman test in both of the baseline and interaction models are higher than 0.05, hence, the alternative hypothesis is rejected indicating that the interpretation of the results for both of the baseline and interaction models must be based on the RE model. In the baseline model, the impact of natural resource abundance (NA) on economic growth is positive (0.141) and statistically significant at the 1% level. Similarly, the coefficient of domestic investment (DI) is also positive (0.359) and statistically significant at the 1% level. Our assumption that NA may influence DI and thus affects GDP is proven when the coefficient $\widehat{(\beta_{22}^{*})}$ of the interaction term is statistically significant at the 1% level. The sign of the coefficient for the interaction term, $\widehat{(\beta_{22}^{*})}$, is however negative (−0.024), indicating that natural resource abundance can dampen the positive effect of DI on GDP. Thus, natural resource abundance plays a moderating role in influencing the impact of DI on GDP. All coefficients of the control variables are statistically significant at various significance levels (1%, 5% and 10%) and have positive signs in line with the theory, except for TO that has a negative sign.

Table 2: Descriptive statistics in natural logarithm form

Variable	Min	Mean	Max	St. Dev	Skewness	Kurtosis
FD	1.138	3.768	5.004	0.979	−0.865	3.058
FDI	−1.680	1.896	3.971	0.988	−0.360	4.351
TO	−1.787	4.323	6.090	1.710	−2.571	9.021
GOV	1	2.46	4.5	0.926	0.698	3.199
DI	1.000	3.098	3.675	0.371	−2.323	11.680
NA	−12.819	−6.041	10.314	6.622	1.479	3.963
GDP	5.849	10.419	27.668	6.146	2.214	6.386

All variables are in natural logarithm form except GOV because of small scale in data series

Table 3: Units of measurement and sources of data

Variables	Units of measurement	Sources
Economic growth	Real GDP per capita (constant, 2010)	WDI 2019
Natural resource abundance	Total natural resource rents are the sum of rents from oil, natural gas, coal (hard and soft), minerals, and forests	WDI 2019
Foreign direct investment inflows	Foreign direct investment, net inflows % of GDP	WDI 2019
Domestic investment	Gross fixed capital formation % of GDP	WDI 2019
Financial development	Broad money % of GDP	WDI 2019
Trade openness	Sum of export and import % of GDP	WDI 2019
Governance	Corruption perception index	ICRG 2017

WDI: World Development Indicators (2019) and ICRG: International Country Risk Guide (2017)

Next, the non-dynamic panel threshold method is employed to confirm the effect of NA as a catalyst to dampen the effect of DI on GDP. The role of NA as a moderating variable in influencing the relationship between DI and GDP can be tested by using a threshold test as shown in Table 5. The statistics of F_1 and F_2 as shown in Table 5 are to test the number of thresholds, either single or double. Both statistics are based on Model 1 in Eq. (7) that is estimated by using the least squares. Table 5 shows that the test of the single threshold F_1 is significant with a bootstrap P = 0.033, however, the bootstrap P-value for F_2 is 0.379 and it is >0.05, suggesting that the model has no double threshold. We conclude that there is evidence of one threshold in the regression relationship. The estimated value of the single threshold within the range of 95% confidence intervals is shown in Table 5.1. The estimated value is 0.004 and it is very small in the empirical distribution of the threshold variable of NA. Hence, the countries are categorized into two groups. One is those with low natural resource abundance and the other is those with high natural resource abundance.

Table 5.2 shows the core analysis of this research paper. The relationship between DI and GDP is dependent on the level of countries' natural resource abundance. A 1% increase in DI will cause GDP to increase by 0.368% at a level of NA below 0.004. Other than that, GDP increases by 0.296% for every 1% increase in DI when the level of NA is >0.004. It means that the effect of DI on GDP becomes smaller after NA is larger than the threshold value. The results of the threshold test confirm that NA will diminish the effect on GDP through DI, suggesting the presence of the natural curse hypothesis in the selected ASEAN countries. A huge amount of natural resources might be exploited and wasted by domestic investors and thus boosts GDP through DI. Besides, there are positive effects of FD, FDI, GOV on GDP in the countries. Statistically, a 1% increase in FD, FDI and GOV can increase GDP by 0.28%, 0.04% and 0.12%, respectively. With better financial markets and institutions, loans can be easily accessible, especially for small and medium enterprises (SMEs) and thus it generates more economic activities and output. Besides, higher inflows of FDI especially from developed countries will help enhance productivity and output as more advanced technologies are brought in the countries. These findings are consistent with the results of Omri et al. (2015), and Tiba and Frikha (2019). Governance can also contribute to higher economic growth as most resources are more efficiently and effectively used as the governments are

Table 4: Regression results on static panel analysis (Dependent variable: GDP)

Regressor	Baseline model			Interaction model		
	POLS	FE	RE	POLS	FE	RE
FD	0.319	0.297***	0.298***	0.345	0.287***	0.291***
FDI	−0.149	0.027	0.025	−0.243	0.051**	0.044*
TO	−0.467**	−0.034*	−0.034*	−0.291	−0.047***	−0.046**
GOV	1.577***	0.099***	0.096***	1.501***	0.136***	0.126***
DI	2.104***	0.357***	0.359***	4.022***	0.174***	0.204***
NA	0.811***	0.121***	0.141***	−0.240	0.166***	0.194***
DI*NA	-	-	-	0.327***	−0.028***	−0.024***
Constant	6.010***	8.776***	8.900***	-0.704	9.062***	9.231***
R-squared	0.819	0.694	0.758	0.828	0.720	0.720
F-Stats (P-value)		0.000			0.000	
BPLM test (P-value)			0.000			0.000
Hausman test (P-value)			0.316			0.177

***, ** and * indicates 1%, 5% and 10% significance level, respectively

Table 5: Tests for threshold effects

Test for single threshold	
F_1	31.19
P-value	0.033
(10%, 5%, 1% critical values)	(26.162, 28.981, 37.623)
Test for double threshold	
F_2	14.93
P-value	0.390
(10%, 5%, 1% critical values)	(44.345, 66.255, 88.097)

Table 5.1: Threshold estimates

Threshold	Estimate	95% confidence interval
$\hat{\gamma}$	0.004	(0.000, 0.652)

Table 5.2: Regression estimates: Single threshold model (Dependent variable: GDP)

Regressor	Coefficient estimate	OLS SE
FD	0.286***	0.036
FDI	0.040*	0.022
TO	−0.035*	0.019
GOV	0.120***	0.030
DI I(NA ≤0.004)	0.368***	0.045
DI I(NA ≥0.004)	0.296***	0.055
Constant	8.030***	0.155

***, ** and * indicates 1%, 5% and 10% significance level, respectively

monitoring corruption and controlling the rent-seeking behavior that can cost a fortune to these countries. These findings support the findings of Siddiqui and Ahmed (2013). TO, on the other hand, has a negative and significant relationship with GDP which is in line with the preliminary results in Table 4. A 1 % increase in TO can reduce GDP of ASEAN countries by 0.03%. The sign of coefficient for all control variables have a similar direction as shown in the previous results in Table 4.

Model 2: The impact of economic growth on natural abundance.

The relationship between economic growth and natural abundance for the baseline and interaction models as specified in Eq. (5) and Eq. (6), respectively, are shown in Table 6. Similarly, the Hausman test for both models suggested that the RE model produce better results as the P-values are higher than 0.05 (0.974 and 0.914, respectively) and we fail to reject the null hypotheses.

As for the baseline model, the impact of GDP on NA is positive (0.910) and statistically significant at the 1% level. The relationship between GDP and NA is not linear and it exhibits an inverted U-shaped curve. The coefficient of GDP ($\widehat{\gamma_{21}}$) is positive and then the coefficient of GDP square (γ_{21}^{*}) is negative and both are statistically significant at the 1% level. This suggests that in the early stage of higher economic growth, NA will simultaneously increases. However, in the final stage of higher economic growth, NA starts to decrease. Even though the results in the quadratic model show an inverted U-shaped curve, but we still do not rely on these results since the turning point from this estimation results is out of the range of the maximum GDP. Therefore, these findings need a further analysis by using the threshold method for non-dynamic panel.

Table 7 shows that there is only a single threshold as the bootstrap P-value of F1 is 0.030 and statistically significant at the 5% level. However, the value of F_2 is not significant. The point estimate of the single threshold reported in Table 7.1 is USD1, 818.378 and it is within the range of the 95% confidence intervals.

Table 7.2 shows the threshold regression results that reveal the effect of GDP on NA. The coefficients of GDP before and after the threshold levels are positive and statistically significant at the 5% and 1% levels, respectively. The results show that a 1% increase in GDP will cause NA to increase by 0.469% at a level of GDP below $1,818.378. Interestingly, NA will increase by 0.612 % when there is a 1% rise in GDP and its level is higher than $1,818.378. It means that the effect of GDP on NA becomes greater after GDP is larger than the threshold value. Thus it can have a potential to boost their industries due to advanced technologies to utilise natural resources. Higher GDP can lead to better financial institutions, high-skilled labour and advanced technologies that can improve natural resources.

However, there are no significant effects of FDI, TO and GOV on NA in the countries. Meanwhile, the coefficient signs of DI and FD indicate there are negative effects of DI and FD on NA. Statistically, a 1 % increase in DI can reduce NA by 0.22%. This implies that with higher DI, new areas will be developed to build roads, houses, factories and other infrastructures. These new areas can potentially lead to discovery of more natural resources such

Table 6: Regression estimates: Single threshold model (Dependent variable: Natural abundant)

Regressor	Baseline model			Quadratic model		
	POLS	FE	RE	POLS	FE	RE
FD	−0.545	−0.315***	−0.323***	−1.226***	−0.345***	−0.387***
FDI	−1.096***	0.040	0.037	−0.762**	0.090	0.070
TO	0.384*	0.046	0.046	0.455**	0.027	0.036
GOV	−0.845**	0.053	0.047	−1.546***	0.172*	0.121
DI	−1.039	−0.365***	−0.375***	−0.785	−0.382***	−0.436***
GDP	0.900***	0.881***	0.910***	2.517***	1.443***	1.478***
GDP^2	-	-	-	−0.046***	−0.033***	-0.025***
Constant	−7.647***	−13.302***	−13.535***	−15.161***	−14.437***	−15.535***
R-squared	0.827	0.764	0.765	0.844	0.615	0.743
F-Stats (P-value)		0.000			0.000	
BPLM test (P-value)			0.000			0.000
Hausman test (P-value)			0.974			0.914

***, ** and * indicates 1%, 5% and 10% significance level, respectively

Table 7: Tests for threshold effects

Test for single threshold	
F_1	36.73
P-value	0.030
(10%, 5%, 1% critical values)	(29.047, 33.054, 40.229)
Test for double threshold	
F_2	30.53
P-value	0.247
(10%, 5%, 1% critical values)	(41.844, 48.959, 55.010)

Table 7.1: Threshold estimates

Threshold	Estimate	95% confidence interval
$\hat{\gamma}$	1,818.378	(1,728.657, 1,880.137)

Table 7.2: Threshold regression estimates: single threshold model (Dependent variable: Natural resource abundance)

Regressor	Coefficient estimate	OLS SE
FDI	0.042	0.051
DI	−0.226*	0.123
FD	−0.204**	0.101
TO	0.058	0.044
GOV	0.058	0.073
GDP I (GDP $\leq \hat{\gamma}$	0.469**	0.205
GDP I (GDP $\geq \hat{\gamma}$)	0.612***	0.198
Constant	−11.059***	1.633

***, ** and * indicates 1%, 5% and 10% significance level, respectively

as earth minerals. Similar to DI, FDI can also have a negative and significant relationship with NA. Statistically, a 1% increase in FDI can result in a decrease of 0.20% in NA. This will lead to better financial institutions and thus more loans can be provided for the service industry compared to the heavy industry that deals with natural resource extraction as it becomes a growing industry in most emerging economies in ASEAN.

5. CONCLUSION AND POLICY RECOMMENDATION

The findings contribute to the existing literature that investigated the relationship between abundant natural resources and economic growth to validate the natural resources curse hypothesis in ASEAN countries. We introduce two different models in our study. First, we find that there is a relationship between domestic investment and economic growth depending on the level of natural resources abundance. When the threshold level of natural abundance is below 0.004, GDP will increase 0.368%. GDP will increase 0.296 % for an additional percentage of domestic investment if the level of natural resource abundance beyond 0.004. The empirical results suggest that the impact of domestic investment on GDP become slower after the natural abundance in the countries reaches beyond its threshold value. Thus, these findings support the natural resources curse hypothesis as a whole. Second, the estimated results in Model 2 show the relationship between GDP and natural resource abundance depends on the level of GDP. We find that when the GDP level reaches $1,818,378, there is a significant abundance of natural resources, indicating that after GDP reaches the threshold value, the effect of GDP on natural resources surplus is increasing.

Therefore, the findings are important for policymakers to formulate policies. The selected ASEAN countries can diversify and generate economic growth in various sectors such as manufacturing, agriculture and services. Economic diversification may spur higher productivity and can lead to more job opportunities. It can also stimulate the economy and thus sustainability can be achieved especially during a plunge in global demand for natural resources. Besides, the governments in the selected ASEAN countries need to attract more domestic investment which may lead to adopt the latest technologies and gain expertise. This will help enhance the exploration and extraction of new resources especially in the mining and quarrying sector. In addition, improving the upstream activities of natural resources, such as crude oil, gas and coal, is of utmost importance in boosting economic growth. Therefore, measures such as comprehensive trade policies and governance which involve natural resource management can be appropriately addressed to increase economic activities not only within the regions but also other trading partners such as the US, Japan and European countries. This is crucial to ensure the credibility of the governments in managing their resources and thus contributes to economic sustainability.

6. ACKNOWLEDGMENT

This research is funded by the international matching grant, TEJA (GSAT2020-12), from two universities, namely Universiti Teknologi MARA, Melaka Campus, Malaysia and Universitas

Binus, Indonesia. This research team would like to express gratitude to Dr Elya Nabila Abdul Bahri from Universiti Malaya for sharing her expertise in panel data analyses.

REFERENCES

Abou-Ali, H., Abdelfattah, Y.M. (2013), Integrated paradigm for sustainable development: A panel data study. Economic Modelling, 30, 334-342.

Adam, D., Ullah, S., Akhtar, P., Adams, K., Saidi, S. (2018), The role of country-level institutional factors in escaping the Natural Resource Curse: Insights from Ghana. Resources Policy, 61, 433-440.

Ahmad, K., Armida, S.A. (2006), Testing the Natural Resource Curse Hypothesis in Indonesia: Evidence at the Regional Level. Working Paper in Economics and Development Studies. Center for Economics and Development Studies. Bandung, Indonesia: Department of Economics, Padjadjaran University.

Amini, A. (2018), Studying the effect of abundance of natural resources on economic growth. European Journal of Sustainable Development, 7(1), 201-208.

Apergis, N., Katsaiti, M.S. (2018), Poverty and the resource curse: Evidence from a global panel of countries. Research in Economics, 72, 211-223.

Apergis, N., Payne, J.E. (2014), The oil curse, institutional quality, and growth in MENA countries: Evidence from time-varying cointegration. Energy Economics, 46, 1-9.

Barro, R. (1991), Economic growth in a cross-section of countries. Quarterly Journal of Economics, 106, 407-443.

Beck, T., Levine, R. (2004), Stock markets, banks, and growth: Panel evidence. Journal of Banking and Finance, 28(3), 423-442.

Bertocco, G. (2008), Finance and development: Is Schumpeter's analysis still relevant? Journal of Banking and Finance, 32(6), 1161-1175.

Boschini, A., Pettersson, J., Roine, J. (2008), The consitutional channels of the resource curse. Thematic, 8, 449-456.

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.

Brunnschweiler, N. (2008), Cursing the blessings? Natural resource abundance, institutions, and economic growth. World Development, 36(3), 399-419.

Cale, I.J.V., Camaro, P.J.C., Melendres, K.P., Rosete, M.A.L. (2017), The Lucas paradox and the human capital resource curse in Philippines, Indonesia, Malaysia, Thailand and Singapore. Review of Integrative Business and Economics Research, 6(1), 276-295.

Chang, T.H., Huang, C.M., Lee, M.C. (2009), Threshold effect of the economic growth rate on the renewable energy development from a change in energy price: evidence from OECD countries. Energy Policy, 37, 5796-5802.

Costantini, V., Monni, S. (2008), Environment, human development, and economic development. Ecological Economics, 64, 867-880.

Daniele, V. (2011), Natural resources and economic growth: A curse or a blessing? Rivista Italiana Degli Economisti, 16(3), 507-528.

Deng, T., Ma, M., Cao, J. (2014), Tourism resource development and longterm economic growth: A resource curse hypothesis approach. Tourism Economics, 20(5), 923-938.

Fan, R., Fang, Y., Park, S.Y. (2012), Resource abundance and economic growth in China. China Economic Review, 23, 704-719.

Fathana, H. (2018), Palm oil politics in Malaysia and Indonesia: Competition or collaboration? Journal of Southeast Asian Studies, 23(2), 47-64.

Frankel, J.A. (2010), The natural resource curse: A survey. National Bureau of Economic Research, No. w15836.

Freund, C., Bolaky, B. (2008), Trade, regulations, and income. Journal of Development Economics, 87, 309-332.

Gylfason, T. (2001), Natural resources, education, and economic development. European Economic Review, 45(4-6), 847-859.

Hansen, B.E. (1996), Inference when a nuisance parameter is not identified under the null hypothesis. Econometrica, 64, 413-430.

Hansen, B.E. (1999), Threshold effects in non-dynamic panels: Estimation, testing and inference. Journal of Econometrics, 93, 345-368.

ICRG. (2017), The International Country Risk Guide. Available from: https://www.prsgroup.com/explore-our-products/internationalcountry-risk-guide.

Ighodaro, C.A. (2010), Co-integration and causality relationship between energy consumption and economic growth: Further empirical evidence for Nigeria. Journal of Business Economics and Management, 11(1), 97-111.

Kakanov, E., Blöchliger, H., Demmou, L. (2018), Resource Curse in Oil Exporting Countries. Economics Department Working Papers No. 1511. Organisation for Economic Co-operation and Development.

Kurecic, P., Kokotovic, F. (2017), Examining the "natural resource curse" and the impact of various forms of capital in small tourism and natural resource dependent. Economies, Economies, 5(1), 1-24,

Lee, H.Y., Ricci, L.A., Rigobon, R. (2004), Once again, is Openness Good for Growth? NBER Working Papers. Cambridge: National Bureau of Economic Research.

Levine, R., Renelt, D. (1992), A sensitivity analysis of cross-country growth regressions. The American Economic Review, 82, 942-963.

Mankiw, N.G., Romer, D., Weil, D. (1992), A contribution to the empirics of economic growth. Quarterly Journal of Economics, 107, 407-437.

Mehlum, H., Moene, K., Torvik, R. (2006), Institutions and the resource curse. EconJournal, 116(508), 1-20.

Mittal, I., Gupta, R.K. (2017), Natural resources depletion and economic growth in present era. Mastnath Journal of Science and Technology, 10(3), 24-28.

Morisson, K.M. (2015), Natural resources and development. In: Kosslyn SM, editors. Emerging Trends in the Social and Behavioral Sciences. Hoboken, New Jersey: John Wiley and Sons, Inc.

Muhammad, S., Mehmet, A.D., Ilyas, O., Avik, S. (2019), An empirical note on comparison between resource abundance and resource dependence in resource abundant countries. Resources Policy, 60, 47-55.

Nasiru, I., Usman, H.M., Saidu, A.M. (2019), Oil consumption and economic growth: Evidence from Nigeria. Bulletin of Energy Economics, 2(4), 106-112.

Obstfeld, M. (1994), Evaluating risky consumption paths: The role of inter-temporal substitutability. European Economic Review, 38, 1471-1486.

Omri, A., Mabrouk, N.B., Sassi-Tmar, A. (2015), Modeling the causal linkages between nuclear energy, renewable energy and economic growth in developed and developing countries. Renewable and Sustainable Energy Reviews, 42, 1012-1022.

Papyrakis, E., Gerlagh, R. (2004), The resource curse hypothesis and its transmission channels. Journal of Comparative Economics, 32,181-193.

Rahman, S., Amin, S., Khan, F. (2018), The relationship between oil consumption and economic growth in Bangladesh: An empirical analysis. World Review of Business Research, 8(3), 24-36.

Ramez, A.B., Leana, H.H., Clark, J. (2017), The evolution of the natural resource curse thesis: A critical literature survey. Resource Policy, 51, 123-134.

Ridzuan, A.R., Ismail, N.A., Che Hamat, A.F. (2017), Does foreign direct investment successfully lead to sustainable development in Singapore? Economies, 5(3), 1-20.

Ridzuan, A.R., Ismail, N.A., Che Hamat, A.F. (2018), Foreign direct

investment and trade openness: Do they lead to sustainable development in Malaysia? Journal of Sustainability Science and Management, 4, 79-97.

Ridzuan, A.R., Sapuan, N.M., Abdul Rahman, N.H, Borhan, H., Othman, A. (2019), The impact of corruption on environmental quality in the developing countries of ASEAN-3 countries. International Journal of Energy Economics and Policy, 9(6), 469-478.

Robinson, J.A., Torvik, R., Verdier, T. (2006), Political foundations of the resource curse. Journal of Development Economics, 79, 447-468.

Sachs, J.D. (2007), How to handle the macroeconomics of oil wealth. In: Humphreys, M., Sachs, J., Stiglitz, J., editors. Escaping the Resource Curse. Ch. 7. New York: Columbia University Press. p173-193.

Sachs, J.D., Warner, A.M. (1995), Natural Resource Abundance and Economic Growth. NBER Working Paper Series No 5398. Cambridge, MA: National Bureau of Economic Research.

Sen, A. (1999), Development as Freedom. New York: Alfred A. Knopf.

Shaari, M.S., Hussain, N.E., Ismail, M.S. (2012), Relationship between energy consumption and economic growth: Empirical evidence for Malaysia. Business Systems Review, 2(1), 17-28.

Shahbaz, M. (2010), Income inequality-economic growth and nonlinearity: A case of Pakistan. International Journal of Social Economics, 37(8), 613-636.

Siddiqui, D.A., Ahmed, Q.M. (2013), The effect of institutions on economic growth: A global analysis based on GMM dynamic panel estimation. Structural Change and Economic Dynamics, 24, 18-33.

Sofien, T., Mohamed, F. (2019), The controversy of the resource curse and the environment in the SDGs background: The African context. Resources Policy, 62, 437-452.

Tamat, S., Law, S.H., Jafari, Y. (2012), Resource curse: new evidence on the role of institutions. Munich Personal RePEc Archive. Available from: https://www.mpra.ub.uni-muenchen.de/37206.

Tiba, S., Frikha, M. (2019), EKC and macroeconomics aspects of well-being: A critical vision for a sustainable future. Journal of the Knowledge Economy, 11, 1171-1197.

Tiba, S., Frikha, M. (2019), The controversy of the resource curse and the environment in the SDGs background: The African context. Resources Policy, 62, 437-452.

Vija Kumaran, V., Ridzuan, A.R., Khan, F.U., Abdullah, H., Mohamad, Z.Z. (2020). An empirical analysis of factors affecting on renewable energy consumption in selected ASEAN countries: Does quality of governance matters? International Journal of Energy Economics and Policy, 10(2),1-9.

Vespignani, J., Raghavan, M., Majumder, M.K. (2019), Oil Curse, Economic Growth and Trade Openness. Globalization Institute Working Paper, No. 370.

World Development Indicators. (2019), World Development Indicators. Washington, DC: The World Bank. Available form: http://www.databank.worldbank.org/data/reports.aspx?source=worlddevelopment-indicators. [Last accessed on 2019 Mar 20].

Zhang, Q., Brouwer, R. (2019), Is China affected by the resource curse? A critical review of the chinese literature. Journal of Policy Modeling, 42(1), 133-152.

Zhou, G., Luo, S. (2018), Higher education input, technological innovation, and economic growth in China. Sustainability, 10, 2615.