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The Impact of Natural Resources on Financial Development: The Global Perspective

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ABSTRACT

Using a time series approach, this study investigates how natural resources impact financial development from a global perspective over the 1980-2019 period. Some important determinants of financial development (economic growth, trade openness, population growth, and investment) have been added to the model as control variables. Unit root tests have revealed that all the variables are integrated of order one. Johansen cointegration test has shown that the variables are in a long-run equilibrium relationship. The vector error correction model (VECM) has estimated the coefficient of the error correction term (ECT) which suggests that the short-run values of natural resources, economic growth, trade openness, population growth, and investment contribute to financial development converging to its long-run equilibrium level by a 23.63% annual speed of adjustment. The estimated coefficients suggest that global natural resource rent has a statistically-significant negative impact on global financial development in the long-run (thereby validating the financial resource curse), but not in the short-run. Causality test results imply that neither global natural resource rent nor global financial development Granger-causes each other.

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1. Introduction

Financial development involves improving the amount of services (quantity) delivered by financial intermediaries, and how well (quality) they deliver these services (Zainudin & Nordin, 2017). Benyah (2010) defined financial development as the process whereby the allocation of financial resources and the monitoring of capital projects are done efficiently by increasing competition and rendering the financial system more important. Many studies have investigated the indicators of financial development (for example: Voghouei et al., 2011; Raza et al., 2014; Ibrahim & Sare, 2018; Khalfaoui, 2015). One factor which may bring about financial development or hinder it, is the availability of natural resources. According to Garside (2021), natural resources, which can be biotic (living materials) or abiotic (non-living materials), are natural in existence, independent from human actions. Examples of natural resources are oil, natural gas, mineral, coal, and forest (Mignamissi & Kuete, 2020).

So many scholarly articles and papers have aimed to look at the significance of natural resources in an economy. Interestingly, there is no unanimous consensus as to whether or not nations benefit from having numerous valuable natural resources. The debate on this aspect continuous in the literature. For example, while Mignamissi and Kuete (2020) and Papyrakis and Gerlagh (2004) found evidence for the natural resource curse, Herb (2005) found evidence against it. In fact, Havranek et al. (2016) confirmed the absence of consensus by stating that while about 40% of empirical papers in the literature found a negative influence of natural resources on economic growth, roughly 40% discovered no impact, and approximately 20% found a positive connection.

The role of natural resources in an economy has evolved over time. It will normally be expected that countries will benefit from having an abundance of valuable natural resources. Due to this belief, prior to the second half of the 20th century, little or no efforts were made to explore the possible adverse effect of natural resources on an economy (Kaznacheev, 2017). This view, which was also asserted by Adam Smith and David Ricardo, was supported by many economists well into the 1970s (Badeeb et al., 2016). Even though debates in the 1950s and 1960s began surfacing the idea that natural resources might bring more harm than good (Aljarallah & Angus, 2020), it is only by the early 1980s that serious consideration was given to the possibility of natural resources being more of a curse than a blessing. This was as a result of the Dutch disease (Badeeb et al., 2016). In 1998, Alan Gelb established that oil economies faced more economic problems than their non-oil counterparts (Badeeb et al., 2016). However, the term “natural resource curse” was initially used in 1993 by Richard Auty in an attempt to explain how resource-rich countries suffered from poorly developed economies (Vahabi, 2017; Mittelman, 2017). Sachs and Warner (1995) confirmed the existence of the resource curse by providing empirical evidence. Thereafter, many scholars and researchers have carried out studies over the last three decades, and have contributed to the literature, with some confirming the resource curse hypothesis, while others have challenged it.

In a very great amount, oil is the main natural resource through which the curse is manifested (Ross, 2012). In fact, right from when there was an oil boom in the 1970s, the contribution of natural resources (oil in particular) in an economy has been discussed quite often (Mukoyama, 2019). During the 1973-1986 period, the oil boom was a mix of a curse and blessing to Arab oil-producing countries – significantly more revenues were generated from exporting oil to foreign countries (blessing), while the rate of inflation also increased (curse) (Aljarallah & Angus, 2020). Other than the Arab nations, there are many other countries in history – including Angola, Nigeria, Congo, Bolivia, Sierra Leone, Venezuela and Sudan – which have underperformed economically despite their riches in natural resources (Mittelman, 2017; Arezki & van der Ploeg, 2010). From 1971 to 1989, relatively slower growths were observed amongst economies with the highest exports of commodities (Mittelman, 2017), albeit Norway and Botswana are notable exceptions (Arezki & van der Ploeg, 2010). Manifestations of the natural resource curse has evolved over time, from deteriorating terms of trade in the 1950s and 1960s to the oil shocks in the 1970s to the "Dutch disease" in the 1980s to how natural resource projects affected government behavior in the 1990s (Stevens, 2005).

Theoretically, there are many advantages of having an abundance of natural resources. Firstly, countries with abundant natural resources can generate massive revenues by exporting these resources to other countries as raw materials. They can also use the resources in their domestic manufacturing industries to produce semi-finished and finished goods which can be sold both domestically and internationally. Again, Asiedu (2005) and Hayat (2014) highlight that natural resource-rich countries can attract large amounts of foreign direct investments (FDI). The revenues generated from natural resources can be used in developing the financial systems. Considering these, it could be expected, at least theoretically, that natural resources will positively impact economic growth and, hence, financial development. On the contrary, many countries have been found to underperform economically over the long run and have poorly developed financial sectors, despite being home to valuable natural resources. This is typical in Africa and in the Middle East (Badeeb et al., 2016).

As first mentioned by Richard Auty in 1993, the “natural resource curse” is a situation whereby resource-rich countries have less economic growth and development than nations with limited natural resources (Cavalcanti et al., 2009), especially if the resources are point-source resources (Arezki & van der Ploeg, 2010). This resource-trap phenomenon is also called the paradox of plenty (Mehlum et al., 2006a). This resource curse which has been well documented in the literature (Mignamissi & Kuete, 2020; Asiedu, 2013; Van der Ploeg, 2010; Robinson et al., 2006; Papyrakis & Gerlagh, 2004; Ross, 2003; Sachs & Warner, 2001; Gylfason et al., 1999), clearly highlights the adverse role natural resources play in an economy. Van der Ploeg (2010) highlighted volatility in commodity prices, real exchange rate appreciation, deindustrialization, low savings, and civil conflict as some of the explanations of the natural resource curse. Also, government corruption (Standing, 2007), high prices causing the nations to miss out on export-led growth (Sachs & Warner, 2001), a false sense of security upon the discovery of natural resources (Papyrakis & Gerlagh, 2004), and poor institutions and bad governance (Busse & Gröning, 2011) are other reasons why the resource curse is felt in resource-wealthy nations. The Dutch Disease Theory (Cavalcanti et al., 2009), the staples theory of economic growth (Auty, 2000), the institutional theory (Mignamissi & Kuete, 2020), and the theory of rent curse (Mehlum et al., 2006a; Cavalcanti et al., 2009) are some of the theories that have been put forth in an attempt to explain the natural resource curse hypothesis.

The 2007-2008 global financial crisis revealed that the importance of financial development cannot be over-emphasized. Other than preventing financial crises, financial development begets economic growth (Elhannani et al., 2016) and reduces poverty (Benyah, 2010). According to Khalfaoui (2015), financial development does not only allow for the restructuring and modernization of banks, but it also ensures resources are optimally allocated, risks are properly diversified away, and financial liberalization results. Therefore, very significant attention has to be given to the financial sector, and various ways of developing and improving the sector have to be considered. It is therefore incumbent on researchers and scholars to thoroughly look at as many possible determinants of financial development as possible. The contribution of natural resources is widely discussed in the literature. Unfortunately, in spite of the significance of the financial sector, the literature is scarce when it concerns the resource-finance nexus (Khan, M. et al., 2020; Dwumfour & Ntow-Gyamfi, 2018). Most studies have dwelled on the resource-growth nexus (Ross, 2014; Dwumfour & Ntow-Gyamfi, 2018; Badeeb et al., 2016). To the best of my knowledge, only Gylfason and Zoega (2001) made a major contribution in the resource-finance nexus research area prior to 2010. This is quite surprising considering that the financial sector can also be susceptible to the natural resource curse. Also, of all the studies that investigated the "determinants of financial development", only Badeeb and Lean (2017) used natural resources as an independent variable. This study aims to bridge this existing knowledge gap. If this critical issue is not addressed, then countries which are rich in natural resources will remain ignorant on how these resources can possibly promote or retard the development of their financial sectors. If countries are aware of the influence of natural resources on the development of their financial sectors, then they will be able to act accordingly, depending on if the impact is positive or negative.

The overarching aim of this study is to investigate the impact of natural resources on financial development from a global perspective. Firstly, as already mentioned, this is an area which is currently under-researched – the literature is very scarce when it concerns the resource-finance nexus. So, this research is necessary because it will bridge the knowledge gap by contributing to the literature and adding new knowledge to the field. This study adds to the literature on both the contribution of natural resources and the determinants of financial development. Secondly, the contribution of natural resources may vary from nation to nation. Majority of the few studies which examined how natural resources influence financial development limited their scopes to just some particular countries or continents. By including all world countries in the study, this research will provide empirical evidence from a universal perspective. Again, the findings of this study directly benefits resource-wealthy countries, as they will be able to better plan for the allocation of the resources, depending on what impact it has on the development of their respective financial sectors. For example, it may encourage countries to concentrate more capital and labor in exploiting those particular natural resources (if any) which positively impact financial development. Moreover, financial institutions will benefit from the results of this research. For instance, banks may be encouraged to give out loans to aid in the exploitation of those particular natural resources which will be found to positively impact financial sector development, while limiting loans to projects concerned with resources which adversely impact financial development. Furthermore, this study will aid future studies in the field. By adding to the literature, researchers, academicians and scholars will be able to draw on it when they carry out future related researches.

The rest of this research is structured as follows: the relevant literatures related to the topic are reviewed in section 2; the data, empirical modelling and methodology used in the study are described in section 3; the empirical findings are presented, discussed, critically analyzed and evaluated, and the research hypotheses are tested in section 4; while conclusions, suggestions and recommendations are provided in section 5.

2. Literature Review

In this section, the existing literature is reviewed with respect to the determinants of financial development, the role of natural resources, criticisms of the resource curse hypothesis, and the impact of natural resources on financial development.

2.1 The Determinants of Financial Development

Prior to the 2007-2008 global financial crisis, the literature on the determinants of financial development was virtually non-existent. After the global crisis, researchers began taking the development of the financial sector more seriously, and many studies in the literature have explored the potential determinants of financial development. Economic growth and development (Raza et al., 2014; Khalfaoui, 2015; Elsherif, 2015; Badeeb & Lean, 2017; Ibrahim & Sare, 2018), trade openness (Law & Habibullah, 2009; Benyah, 2010; Voghouei et al., 2011; Takyi & Obeng, 2013; Raza et al., 2014; Khalfaoui, 2015; Elsherif, 2015; Badeeb & Lean, 2017; Ibrahim & Sare, 2018; Aluko & Ibrahim, 2019), income (Law & Habibullah, 2009; Takyi & Obeng, 2013; Aluko & Ibrahim, 2019), human resources (Khalfaoui, 2015; Elsherif, 2015; Ibrahim & Sare, 2018), population growth (Raza et al., 2014), investment (Elsherif, 2015), financial openness (Benyah, 2010), financial liberalization (Law & Habibullah, 2009; Ayadi et al., 2014), market capitalization (Khalfaoui, 2015), inflation (Takyi & Obeng, 2013; Ayadi et al., 2014; Elsherif, 2015; Badeeb & Lean, 2017; Aluko & Ibrahim, 2019), political economy (Voghouei et al., 2011), government debt (Ayadi et al., 2014), government expenditure (Ibrahim & Sare, 2018; Aluko & Ibrahim, 2019), interest rate (Takyi & Obeng, 2013), education (Elsherif, 2015), liquidity rate in the economy (Khalfaoui, 2015), legal tradition (Voghouei et al., 2011; Ayadi et al., 2014; Khalfaoui, 2015; Emenalo et al., 2017), reserve requirement (Takyi & Obeng, 2013), democracy (Ayadi et al., 2014; Raza et al., 2014), non-performing loans (Khalfaoui, 2015), size of agricultural sector (Raza et al., 2014), disease endowment (Emenalo et al., 2017), and institutional quality (Law & Habibullah, 2009; Voghouei et al., 2011; Khalfaoui, 2015; Cherif & Dreger, 2016) have been identified in the existing literature as some of the main determinants of financial development. On the evidence of the existing literature, almost no researcher has thought of natural resources as a potential determinant of financial development. To the best of the author's knowledge, of all the studies that explored the "determinants of financial development", only Badeeb and Lean (2017) used natural resources (natural resource dependence) as an independent variable. This study aims to bridge this knowledge gap.

2.2 The Role of Natural Resources

From a general perspective, natural resources contribute to an economy in various ways. The role of natural resources in an economy has been overly debated in the literature. That said, no consensus has been arrived at with respect to whether nations benefit or suffer from having abundant valuable natural resources. For instance, Sachs and Warner (1995), Gylfason et al. (1999), Gylfason (2000), Auty (2000), Gylfason and Zoega (2001), Gylfason (2001), Kronenberg (2002), Bravo-Ortega and De Gregorio (2005), Alden and Alves (2009), Kim and Lin (2015), Venables (2016), and Zallé (2018) found natural resources to have a negative impact on economic growth and development; Mideksa (2012), Ji et al. (2013), Gunton (2015), Nawaz et al. (2019), and Haseeb et al. (2020) revealed the positive effect of natural resources on economic growth and development; while Gerelmaa and Kotani (2016), and Havranek et al. (2016) showed that natural resources have no statistically-significant impact on economic growth and development. Other than the resource-growth nexus, the curse of natural resources has also been revealed by the negative impacts on income (Torvik, 2001; Arezki & van der Ploeg, 2010), welfare and happiness (Mignamissi & Kuete, 2020), foreign direct investment (Asiedu, 2013), peace (Herbst, 2000; Le Billon, 2001; Ross, 2003; Ross, 2004a; Ross, 2004b; Humphreys, 2005; Mildner et al., 2011; Rustad & Binningsbø, 2012; Basedau & Wegenast, 2013; Koubi et al., 2013), the environment (Gutti et al., 2012; Hassan et al., 2018; Ahmad et al., 2020; Ahmed et al., 2020), governance and institutional quality (Mehlum et al., 2006a; Bhattacharyya & Hodler, 2009; Busse & Gröning, 2011), and government expenditure (Cockx & Francken, 2014; 2016). To further show the lack of consensus with respect to the role of natural resources, many studies in the literature also reported positive impacts on income (Cavalcanti et al., 2009), welfare and happiness (Bravo-Ortega & De Gregorio, 2005), foreign direct investment (Asiedu, 2005), peace (Brunnschweiler & Bulte, 2009), the environment (Zafar et al., 2019; Khan, I. et al., 2020), and governance and institutional quality

(Brunnschweiler & Bulte, 2008a; Tsani, 2012). This lack of consensus invites further research on the role of natural resources, and this study aims to achieve exactly that.

2.3 Criticisms of the Resource Curse Hypothesis

The natural resource curse theory has been a very popular topic in the literature since many more studies revealed the negative effects, rather than the positive effects, of natural resources in an economy. However, this hypothesis has faced widespread criticisms. Daniele (2011) suggested that the resource curse concept is misleading, since it hides the reality that most resource-rich economies suffer from the curse of natural resources, not because of the natural resources themselves, but because of the poor governance in these countries. Similarly, contrary to the claims of Sachs and Warner (1995; 2001) that institutions are irrelevant when it concerns the role of natural resources on economic growth, Mehlum et al. (2006a; 2006b) and Arezki and van der Ploeg (2010) posited that the natural resource curse is not universal, since the impact of natural resources on economic growth depends on the quality of institutions. Also, the concept of the resource curse is a red herring since most of the studies that support the theory used resource dependence (instead of resource abundance) as a measure of natural resources, and according to Brunnschweiler and Bulte (2008b), resource dependence is not an appropriate exogenous variable. Again, in most of the empirical studies which provide evidence in support of the resource curse, the results are biased since the effects of key parameters such as institutional quality are ignored (Brunnschweiler & Bulte, 2008b; Arezki & van der Ploeg, 2010; Mignamissi & Kuete, 2020). Moreover, using Chad and Mauritania as case studies, Auty (2006) illustrated that, natural resources could be a blessing after all if there are good policies in place for the sound management of the resources, and there are many empirical studies in the literature which found natural resources to be a “blessing” rather than a “curse”. By exploring the role of natural resources from a global perspective, rather than limiting the scope only to poorly-governed or well-governed countries, this study addresses the concern of Daniele (2011).

2.4 The Impact of Natural Resources on Financial Development

With respect to how natural resources impact financial development, the literature has been very scarce. To the best of the author's knowledge, only Gylfason and Zoega (2001) made a significant contribution in the resource-finance research area prior to 2010. It was only by 2019 (after the outbreak of the COVID-19 global pandemic) that many researchers began flooding the literature with the potential impact of natural resources on financial development. One possible explanation is that the adverse effects of the COVID-19 pandemic on the economies and financial sectors of most countries, prompted researchers to consider wider factors which could possibly contribute to the development of the financial sector, including an abundance of, and / or a dependence on, natural resources. To date, no consensus has been reached in the literature with respect to whether natural resources are a blessing or a curse to the development of the financial sectors of resource-wealthy nations. Gylfason and Zoega (2001), Beck (2010), Yuxiang and Chen (2010), Hattendorff (2013), Hassan (2013), Hattendorff (2014), Bhattacharyya and Hodler (2014), Kurronen (2015), Badeeb and Lean (2017), Dwumfour and Ntow-Gyamfi (2018), Asif et al. (2019), Adetutu et al. (2019), Mlachila and Ouedraogo (2019), Dogan, Madaleno et al. (2020), Guan et al. (2020), Sun et al. (2020), Khan, Z. et al. (2020), Umar et al. (2021), Jiang et al. (2021), Shobande and Enemona (2021), and Gaies (2021) validated the financial resource curse by showing a negative correlation between natural resources and financial development, while Shahbaz et al. (2017), Zaidi et al. (2019), Gokmenoglu and Rustamov (2019), Yıldırım et al. (2020), and Dogan, Altinoz et al. (2020) revealed that the resource-finance relationship is a positive one. The results were not so clear-cut in all cases as, for example, Li et al. (2021) and Ali et al. (2021) revealed that natural resources are a blessing to financial market development (the stock market sector), but a curse to financial institutions (the banking sector). Also, Kassouri et al. (2020) argued that the impact of natural resources on financial development depends on the quality of institutions, but this point was contradicted by Dellepiane-Avellaneda et al. (2021) who empirically showed that the financial resource curse can still be manifested even in the presence of good governance and sound institutions. In all of the aforementioned studies, the scopes were limited to some particular countries. So, by looking at the resource-finance nexus from a global perspective, this study provides empirical evidence from a universal viewpoint.

3. Data and Methodology

In this section, the data used in the study are defined, the main characteristics of the data are described, the empirical model is specified, and the econometric methodology applied in the research is discussed.

3.1 Definition of Data

Table 1: Definition of Data

Variable	Measure	Database	Definition	Source
Financial Development	Financial Development Index	IMF Financial Development Index Database	This is an overall index which is gotten by combining nine different indices which summarize the development of the financial sector in terms of the depth, access, and efficiency of the financial markets and institutions.	IMF (2022)
Natural Resources	Total Natural Resources Rents (% of GDP)	World Development Indicators	This is the total of all rents from oil, natural gas, coal, minerals, and forest products.	The World Bank (2022)
Economic Growth	GDP per capita (constant 2015 US$)	World Development Indicators	This is the total value of all the finished goods and services, as a share of midyear population.	The World Bank (2022)
Trade Openness	Trade (% of GDP)	World Development Indicators	This is the total of all goods and services which are imported and exported, divided by the gross domestic product.	The World Bank (2022)
Population Growth	Population Growth (annual %)	World Development Indicators	This is the rate at which the midyear population grows exponentially year-on-year, expressed as a percentage.	The World Bank (2022)
Investment	Gross Fixed Capital Formation (% of GDP)	World Development Indicators	This relates to investments in the form of purchases of property, plant, and equipment; land improvements; roads and railways constructions; and constructions of buildings (schools, hospitals, offices, private residences, commercial and industrial buildings).	The World Bank (2022)

This study relies on annual data for all countries in the world over the period 1980-2019. Table 1 shows the proxies and definitions of the variables, as well as the data sources. Financial Development is the dependent variable (regressand), Natural Resources is the independent variable (regressor) of interest, while Economic Growth, Trade Openness, Population Growth, and Investment are potential determinants of financial development which are used as control variables.

The control variables have been selected based on the evidence from the existing literature. Trade openness clearly impacts financial development positively (Law & Habibullah, 2009; Benyah, 2010; Voghouei et al., 2011; Takyi & Obeng, 2013; Raza et al., 2014; Khalfaoui, 2015; Elsherif, 2015; Badeeb & Lean, 2017; Ibrahim & Sare, 2018; Aluko & Ibrahim, 2019); while population growth (Raza et al., 2014), economic growth (Raza et al., 2014; Khalfaoui, 2015; Elsherif, 2015; Badeeb & Lean, 2017; Ibrahim & Sare, 2018), and investment (Huang, 2011; Elsherif, 2015) are also indicators of financial development. Jiang et al. (2021) also used gross domestic product (GDP), gross fixed capital formation (GFCF), and trade openness as control independent variables in their study of the influence of natural resources on financial development in China. These control variables help limit the omitted variable bias.

There are many other measures of financial development such as domestic credit to the private sector (% of GDP) (Raza et al., 2014; Badeeb & Lean, 2017; Asif et al., 2019), M2 as the share of GDP (Badeeb & Lean, 2017; Asif et al., 2019), the size of deposits relative to GDP (Badeeb & Lean, 2017), market capitalization (Asif et al., 2019), financial system depth (Emenalo et al., 2017), and financial system access (Emenalo et al., 2017). However, an index sourced from the IMF database has been used as a measure for financial development in this study.

As a measure for natural resources, some studies used natural resource abundance (Yuxiang & Chen, 2010; Hassan, 2013; Hattendorff, 2014; Shahbaz et al., 2017; Gokmenoglu & Rustamov, 2019; Li et al., 2021), while others used natural resource dependence (Gylfason & Zoega, 2001; Hassan, 2013; Kurronen, 2015; Badeeb & Lean, 2017). Consistent, however, with the works of Asif et al. (2019); Yıldırım et al. (2020); Dogan, Altinoz et al. (2020); Sun et al. (2020); Mignamissi and Kuete (2020); and Jiang et al. (2021), resource rents have been used in this study as a measure for natural resources.

3.2 Descriptive Statistics

Table 2: Descriptive Statistics

Variable	Number of observations	Mean	S.D	Min	Max	JB
lnFD	40	-1.424654	0.266668	-1.965113	-1.137093	4.067793
lnNR	40	0.856153	0.459664	-0.072383	1.816429	1.628248
lnGDP	40	8.968727	0.197142	8.674179	9.307410	2.819982
lnTR	40	3.838336	0.198701	3.534866	4.106579	4.286072
lnPOP	40	0.342855	0.168787	0.064472	0.588059	3.940216
lnGFCF	40	3.190834	0.036810	3.119751	3.284855	0.935943

NOTE: Author's construction. FD represents financial development index; NR represents total natural resources rents (% of GDP); GDP represents gross domestic product per capita (constant 2015 US$); TR represents trade (% of GDP); POP represents population growth (annual %); and GFCF represents gross fixed capital formation (% of GDP). The variables are all log-transformed.

The main characteristics of the data are shown in Table 2. In logarithmic form, the mean values of the global financial development index, total natural resources rents (% of GDP), gross domestic product per capita (constant 2015 US$), trade (% of GDP), population growth (annual %), and gross fixed capital formation (% of GDP) are -1.42, 0.86%, $8.97, 3.84%, 0.34%, and 3.19%, respectively. The respective standard deviations are 0.27, 0.46%, $0.20, 0.20%, 0.17% and 0.04%, implying that the GFCF data have the least variation (they are closest to their mean value on average), while the NR data are furthest from their mean value on average. This is reflected by the fact that the GFCF dataset has the smallest range (maximum value – minimum value) of 0.17, while the NR has the widest range (span) of 1.89.

With respect to the distribution of the data, the probability values of the Jarque-Bera (JB) test statistic of all the variables are greater than 10%. Hence, for all the variables, even at 10% level of significance, we are not able to reject the null hypothesis that the data are normally distributed. Hence, normality is plausible in the data of all the variables. The time span is not small, as 40 years of observation is sufficient for the establishment of long-run relationships among the variables. The time series data covers the 1980-2019 period for all global countries.

3.3 Model Specification

In order to empirically investigate the impact of natural resources on financial development, a model is specified where financial development is a linear function of natural resources and some other determinants of financial development which are introduced into the model as control variables (economic growth, trade openness, population growth, and investment). The linear function is:

$$lnFD_t = f\,(lnNR_t, lnGDP_t, lnTR_t, lnPOP_t, lnGFCF_t) \quad (1)$$

From equation (1), the following empirical model is specified:

$$lnFD_t = ß_0 + ß_1(lnNR_t) + ß_2(lnGDP_t) + ß_3(lnTR_t) + ß_4(lnPOP_t) + ß_5(lnGFCF_t) + u_t \quad (2);$$

where FD represents financial development index; NR represents total natural resources rents (% of GDP); GDP represents gross domestic product per capita (constant 2015 US$); TR represents trade (% of GDP); POP represents population growth (annual %); and GFCF represents gross fixed capital formation (% of GDP). FD is the dependent variable (regressand); NR is the independent variable (regressor) of interest; and GDP, TR, POP and GFCF are control independent variables. The variables are all log-transformed. $ß_0$ is the intercept (constant term); $ß_1$, $ß_2$ … $ß_5$ are the partial coefficients of the independent variables; t is the time period; and u_t is the stochastic error term. The model is linear both in the variables and in the parameters.

3.4 Methodology

In the literature, many different methodologies have been used to examine the effect of natural resources on financial development. For example, Yuxiang and Chen (2010); Bhattacharyya and Hodler (2014); Kurronen (2015); Dwumfour and Ntow-Gyamfi (2018); Kassouri et al. (2020); Sun et al. (2020); Umar et al. (2021); and Gaies (2021) all applied panel data techniques in their study, while Hattendorff (2013) and Hattendorff (2014) used cross-sectional analysis. Consistent with the time-series methodologies applied in the works of Badeeb and Lean (2017), Shahbaz et al. (2017), Asif et al. (2019), Guan et al. (2020), Khan, Z. et al. (2020), and Ali et al. (2021), a time series approach has also been applied in this study. Time series data which spans from 1980 to 2019 for all countries in the world (global perspective) has been used to empirically study the impact of natural resources on financial development. The analyses have been done in the following order: unit root and stationarity tests, vector autoregressive (VAR) model (Hacker & Hatemi-J, 2008), Johansen test for cointegration (Johansen, 1991a), vector error correction model (VECM) (Engle & Granger, 1987), Granger causality test (Granger, 1969), and diagnostic checks.

3.4.1 Unit Root and Stationarity Tests

In time series analysis, the initial step is always to check whether or not the variables are stationary. This is because the non-stationarity of the variables may result to spurious regressions, unreliable hypothesis test results (since t ratios will not follow t distributions and F statistics will not follow F distributions), and shocks to the system will remain persistent. There are many unit root tests, but the most common conventional ones – the Augmented

Dickey-Fuller (ADF) unit root test (Dickey & Fuller, 1979) and the Phillips-Perron (PP) unit root test (Phillips & Perron, 1988) – as well as the Kwiatkowski et al. (KPSS) stationarity test (Kwiatkowski et al., 1992) have been applied in checking whether or not the variables are stationary, and in determining the order of integration of the variables. All three models (trend and intercept, intercept, and none) have been included in both the ADF and PP non-stationarity tests; while in the KPSS stationarity test, both the trend and intercept model and the intercept-only model have been included. Generally, all the variables have been found to be integrated of order one (I (1)), since majority of the tests confirmed them to be stationary at their first differences, rather than at their level forms.

3.4.2 Vector Autoregressive (VAR) Model (Hacker & Hatemi-J, 2008)

Since all the variables are I (1), the Johansen's procedure (Johansen, 1991b; 1995) has been followed. In the first step of the Johansen's procedure, an unrestricted standard Vector Autoregressive (VAR) model has been estimated to determine the optimal lag length (Hacker & Hatemi-J, 2008) to use in the Johansen cointegration test and in estimating the vector error correction model (VECM). Based on the Akaike information criterion (AIC), the Schwarz information criterion (SC), and the Hannan-Quinn information criterion (HQ), the optimal lag length has been established to be three. Thereafter, in order to trust the standard VAR model's suggestion of the optimal lag length, the stability of the VAR model has been checked by looking at both the autoregressive roots (AR) table and autoregressive roots (AR) graph to be sure that none of the roots lie outside the unit circle. The VAR model has been found to satisfy the stability condition.

3.4.3 Johansen Cointegration Test (Johansen, 1991a)

Since the variables are generally I (1), it means that stationarity is induced by taking the first differences. By differencing, the long-run properties of the variables are being compromised. Hence, it is necessary to run cointegration tests to check if the variables are in a long-run relationship. Cointegrating relationship (s) exist if there is a stationary linear combination of non-stationary variables (Engle & Granger, 1987); and in order to run cointegration tests, all the variables have to be integrated of the same order. In the second step of the Johansen's procedure, the Johansen cointegration test has been used to check if the variables are in a long-run relationship, and to find out how many cointegrating equations are present. In order to determine the exact number of cointegrating equations present, the null hypotheses of no cointegrating equation, not more than one cointegrating equation, not more than two cointegrating equation, and so on, have been tested sequentially until a point has been reached where the null hypothesis can no longer be rejected. Two test statistics – the trace statistic and the maximum eigen value – have been used in testing these hypotheses.

3.4.4 Vector Error Correction Model (VECM) (Engle & Granger, 1987)

Since pure first difference models do not have a long-run solution, it is essential to estimate a VECM which uses combinations of first differenced and lagged levels of the variables as follows:

$$\Delta lnFD_t = \beta_1 \Delta lnNR_t + \beta_2 \Delta lnGDP_t + \beta_3 \Delta lnTR_t + \beta_4 \Delta lnPOP_t + \beta_5 \Delta lnGFCF_t + \beta_6 (lnFD_{t-1} - \gamma_1 lnNR_{t-1} - \gamma_2 lnGDP_{t-1} - \gamma_3 lnTR_{t-1} - \gamma_4 lnPOP_{t-1} - \gamma_5 lnGFCF_{t-1}) + u_t \quad (3)$$

where $lnFD_{t-1} - \gamma_1 lnNR_{t-1} - \gamma_2 lnGDP_{t-1} - \gamma_3 lnTR_{t-1} - \gamma_4 lnPOP_{t-1} - \gamma_5 lnGFCF_{t-1}$ is the error correction term (ECT); β_6 is the coefficient of the ECT; $\gamma_1, \gamma_2, \ldots, \gamma_5$ are the cointegrating (long-run) coefficients of the independent variables; and $ß_1$, $ß_2$, …, $ß_5$ are the short-run coefficients of the independent variables.

In the third step of the Johansen's procedure, using a lag interval corresponding to the optimal lag length minus one (as a rule of thumb), the aforementioned VECM has been estimated with the deterministic trend assumption where cointegration has been found. The coefficient of the ECT shows the speed of adjustment of the global financial development towards its long-run equilibrium value, following a short-run shock. The VECM has corrected for any previous-year deviation from the long-run equilibrium value of the global financial development, and it is appropriate for examining long-run relationships since the coefficient of the ECT has been found to be negative and statistically significant.

3.4.5 Granger Causality Test (Granger, 1969)

Granger causality tests under the block exogeneity Wald tests of the VECM have been applied to estimate the directions of the long-run and short-run relationships between the variables. That is, to determine if there are any unidirectional, bi-directional, or multidirectional causalities running from any of the variables to others.

3.4.6 Diagnostic Checks

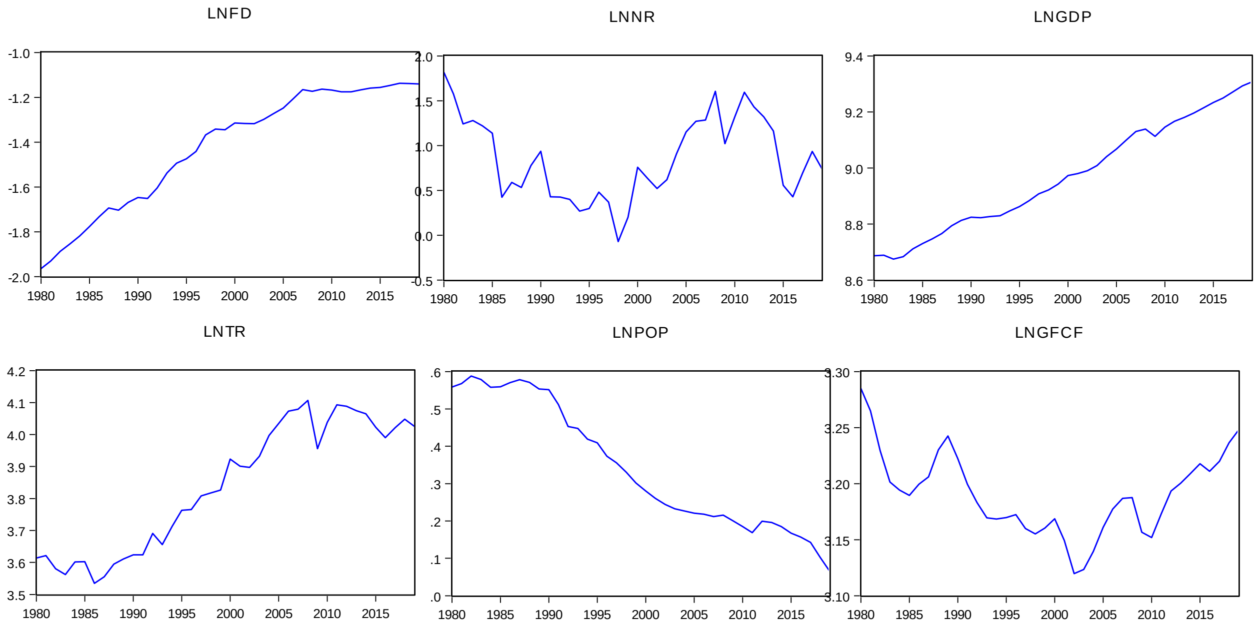
Diagnostic checks have also been done to ensure that the residuals are free from serial correlation, heteroscedasticity and non-normality. In particular, the Portmanteau autocorrelation test, the autocorrelation LM test, the normality tests, and the residual heteroscedasticity test (Levels and Squares) have been performed.

4. Results and Analyses

In this section, the findings are presented and analyzed. Firstly, a priori expectations (research hypotheses) are set based on the graphs of the variables and the information gathered from the existing literature. Thereafter, the empirical results are discussed and compared to the a priori expectations (research hypotheses).

4.1 Preliminary Evidence and Research Hypotheses

Figure 1: Line Graphs of lnFD, lnNR, lnGDP, lnTR, lnPOP, and lnGFCF



Source: Author's construction using the data collected from the IMF and World Bank

Looking at the graphs in Figure 1, we see that there are fluctuations in the lnNR graph, while the lnFD graph has a steady upward trend. From 1980 till about 1998, there was a negative relationship between lnNR and lnFD – a decrease in lnNR caused an increase in lnFD, on average. From 1998 till about 2007-2008 when there was a global financial crisis, natural resources were seen to be positively connected to financial development, as an increase in natural resources led to an increase in global financial development, on average. After 2010, the negative correlation has again been apparent. Based on this, and coupled with the evidences from the literature (Gylfason & Zoega, 2001; Beck, 2010; Yuxiang & Chen, 2010; Hattendorff, 2013; Hassan, 2013; Hattendorff, 2014; Bhattacharyya & Hodler, 2014; Kurronen, 2015; Badeeb & Lean, 2017; Dwumfour & Ntow-Gyamfi, 2018; Adetutu et al., 2019; Dogan, Madaleno et al., 2020; Guan et al., 2020; Sun et al., 2020; Khan, Z. et al., 2020**;** Umar et al., 2021; Jiang et al., 2021; Shobande & Enemona, 2021), the sign of the coefficient of lnNR is expected to be negative. That is, the natural resource curse is expected to be validated and to also apply to the development of the financial sector.

From the graphs, a positive long-run relationship is observed between lnGDP and lnFD and between lnTR and lnFD. On average, from 1980 to 2019, an increase in lnGDP led to an increase in lnFD, and an increase in lnTR also led to an increase in lnFD. These are consistent with many studies in the literature which revealed that trade openness is positively connected to financial development (Law & Habibullah, 2009; Benyah, 2010; Voghouei et al., 2011; Takyi & Obeng, 2013; Raza et al., 2014; Khalfaoui, 2015; Elsherif, 2015; Badeeb & Lean, 2017; Ibrahim & Sare, 2018; Aluko & Ibrahim, 2019) and economic growth is positively connected to financial development (Raza et al., 2014; Elsherif, 2015; Badeeb & Lean, 2017; Ibrahim & Sare, 2018). A negative long-run relationship is observed between lnPOP and lnFD. On average, from 1980 to 2019, a decrease in lnPOP led to an increase in lnFD. Similar to the lnNR graph, there are lots of fluctuations in the lnGFCF graph. From 1980 till about 2002, a negative relationship (on average) was observed between lnGFCF and lnFD, while a positive relationship (on average) was observed thereafter. Based on these, the signs of the coefficients of lnGDP, lnTR, lnPOP and lnGFCF are expected to be positive, positive, negative and positive, respectively. Huang (2011) and Elsherif (2015) also found investment to positively impact financial development. The a priori expectations (research hypotheses) are summarized in table 3.

As seen in Figure 1, the graphs of lnFD, lnGDP, and lnPOP clearly look like a trend-stationary process (deterministic non-stationarity), while the graph of lnTR slightly looks like a random walk process (stochastic non-stationarity).

Table 3: A Priori Expectations

Variable	**Expected Impact on lnFD**
lnNR	Negative (-)
lnGDP	Positive (+)
lnTR	Positive (+)
lnPOP	Negative (-)
lnGFCF	Positive (+)

NOTE: Author's construction. FD represents financial development index; NR represents total natural resources rents (% of GDP); GDP represents gross domestic product per capita (constant 2015 US$); TR represents trade (% of GDP); POP represents population growth (annual %); and GFCF represents gross fixed capital formation (% of GDP). The variables are all log-transformed.

These a priori expectations (research hypotheses) will be tested by comparing them with the actual empirical findings.

4.2 Empirical Findings

4.2.1 Unit Root and Stationarity Tests

Table 4 shows the results of the unit root and stationarity tests which have been performed to check the stationarity of the variables and their respective order of integration. For the non-stationarity (unit root) tests (ADF and PP), the null hypothesis is that the variable has a unit root (variable is non-stationary). For the stationarity test (KPSS confirmatory test), the null hypothesis is that the variable is stationary.

Table 4: Non-stationarity (Unit Root) and Stationarity Test Results

Statistics (level)	**lnFD**	**lag**	**lnNR**	**lag**	**lnGDP**	**lag**	**lnTR**	**lag**	**LnPOP**	**lag**	**lnGFCF**	**lag**
τT (ADF)	-0.18	(0)	-2.69	(0)	-2.99	(0)	-1.83	(0)	-1.72	(0)	-1.01	(2)
τμ (ADF)	-2.57	(6)	-1.89	(2)	1.06	(0)	-0.84	(0)	0.58	(0)	-1.43	(2)
τ (ADF)	-0.47	(9)	-1.23	(2)	8.25	(0)	1.42	(0)	-3.65*	(0)	0.17	(2)
τT (PP)	-0.30	(1)	-2.65	(3)	-3.08	(1)	-1.73	(2)	-2.02	(3)	-1.84	(3)
τμ (PP)	-1.79	(3)	-2.56	(2)	1.21	(5)	-0.76	(2)	0.28	(3)	-2.29	(0)
τ (PP)	-5.85*	(3)	-1.76***	(4)	8.19	(4)	1.70	(2)	-2.77*	(3)	-0.32	(1)
τT (KPSS)	0.20**	(5)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
τμ (KPSS)	0.74*	(5)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Statistics (first difference)	**Δ** lnFD	lag	**Δ** lnNR	lag	**Δ** lnGDP	lag	**Δ** lnTR	lag	**Δ** lnPOP	lag	**Δ** lnGFCF	lag
τT (ADF)	-4.00**	(5)	-5.49*	(1)	-4.82*	(0)	-6.82*	(0)	-4.09**	(0)	-5.32*	(1)
τμ (ADF)	-3.80*	(0)	-5.53*	(1)	-4.81*	(0)	-6.91*	(0)	-4.10*	(0)	-4.88*	(1)
τ (ADF)	-1.50	(2)	-5.57*	(1)	-2.34**	(0)	-6.58*	(0)	-2.81*	(0)	-4.98*	(1)
τT (PP)	-4.99*	(0)	-6.19*	(7)	-4.86*	(8)	-6.83*	(1)	-4.09**	(0)	-3.34***	(16)
τμ (PP)	-3.77*	(3)	-6.24*	(6)	-4.80*	(7)	-6.92*	(1)	-4.10*	(0)	-2.83***	(13)
τ (PP)	-2.47**	(3)	-6.31*	(5)	-2.34**	(0)	-6.59*	(2)	-2.65*	(1)	-2.93*	(13)
τT (KPSS)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.08	(6)
τμ (KPSS)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.47**	(1)

Note: Author's construction. ADF is the Augmented Dickey-Fuller unit root test (Dickey & Fuller, 1979); PP is the Phillips-Perron unit root test (Phillips & Perron, 1988); KPSS is the Kwiatkowski et al. stationarity test (Kwiatkowski et al., 1992); τT stands for the intercept and trend model; τμ stands for the intercept-only model; and τ stands for the none model. NA means it was not necessary to perform the confirmatory test. Numbers in brackets show the optimum lag length. *, **, *** show that the null hypothesis is being rejected at the 1%, 5%, and 10% significance levels, respectively.

For the lnFD variable, with the exception of the most restricted model (the none model) under the PP test, both the ADF and PP unit root tests shows that for all the other models, the variable is non-stationary at its level form, since we are not able to reject the null hypothesis of non-stationarity at 5% level of significance. The KPSS stationarity test also confirmed the non-stationarity of the lnFD variable at its level form. Both models of the KPSS test indicate that the null hypothesis that the variable is stationary at its level form is rejected at the 5% significance level. With the exception of the none model (the model without intercept and trend) under the ADF test, for all the other models under both ADF and PP unit root tests, we are able to reject the null hypothesis that the lnFD variable is non-stationary at its first difference, at 5% level of significance. The none model is the most restricted model, so its result on its own is not too important. Hence, it was not necessary to perform the KPSS confirmatory test in this case. We therefore conclude that the lnFD variable has a unit root at level form, and it is stationary at its first difference. Thus, lnFD is integrated of order 1.

For the lnNR variable, both the ADF and PP unit root tests show that based on all three models (intercept and trend model, intercept model, none model), the null hypothesis that the variable has a unit root at its level form cannot be rejected at the 5% significance level. Hence, the lnNR variable is clearly non-stationary at its level form, and performing the KPSS confirmatory test was not necessary. Both the ADF and PP unit root tests also show that based on all three models, the null hypothesis that the lnNR variable has a unit root at its first difference is rejected at the 5% significance level. Again, the KPSS stationarity test was not necessary here, since the ADF and PP unit root tests did not give conflicting results. Hence, lnNR is non-stationary at level form, and it is stationary at its first difference. We therefore conclude that lnNR is integrated of order 1.

For the lnGDP variable, both the ADF and PP unit root tests show that based on all three models (intercept and trend model, intercept model, none model), the null hypothesis that the variable has a unit root at its level form cannot be rejected at the 5% significance level. Hence, the lnGDP variable is clearly non-stationary at its level form, and performing the KPSS confirmatory test was not necessary. Both the ADF and PP unit root tests also show that based on all three models, the null hypothesis that the lnGDP variable has a unit root at its first difference is rejected at the 5% significance level. Again, the KPSS stationarity test was not necessary here, since the ADF and PP unit root tests did not give conflicting results. Hence, lnGDP is non-stationary at level form, and it is stationary at its first difference. We therefore conclude that lnGDP is integrated of order 1.

For the lnTR variable, both the ADF and PP unit root tests indicate that based on all three models (intercept and trend model, intercept model, none model), at the 5% level of significance, we cannot reject the null hypothesis that the variable has a unit root at its level form. Hence, the lnTR variable is clearly non-stationary at its level form, and performing the KPSS confirmatory test was not necessary. Both the ADF and PP unit root tests also show that based on all three models, at the 5% level of significance, we reject the null hypothesis that the lnTR variable has a unit root at its first difference. Again, the KPSS stationarity test was not necessary here, since the ADF and PP unit root tests did not give conflicting results. Hence, lnTR is non-stationary at level form, and it is stationary at its first difference. We therefore conclude that lnTR is integrated of order 1.

For the lnPOP variable, with the exception of the none model in both the ADF and PP unit root tests, all the other models indicate that the null hypothesis that the variable has a unit root at its level form cannot be rejected at the 5% significance level. The none model is the most restricted model, so its result on its own is not too important. Hence, it was not necessary to perform the KPSS confirmatory test in this case, and we conclude that the lnPOP variable has a unit root at its level form. Both the ADF and PP unit root tests also show that based on all three models (intercept and trend model, intercept model, none model), the null hypothesis that the lnPOP variable has a unit root at its first difference is rejected at the 5% significance level. Again, the KPSS stationarity test was not necessary here, since the ADF and PP unit root tests did not give conflicting results. Hence, lnPOP is non-stationary at level form, and it is stationary at its first difference. We therefore conclude that lnPOP is integrated of order 1.

For the lnGFCF variable, both the ADF and PP unit root tests indicate that based on all three models (intercept and trend model, intercept model, none model), the null hypothesis that the variable has a unit root at its level form cannot be rejected at the 5% significance level. Hence, the lnGFCF variable is clearly non-stationary at its level form, and performing the KPSS confirmatory test was not necessary. Four out of the six models of the ADF and PP unit root tests show that the null hypothesis that the lnGFCF variable has a unit root at its first difference is rejected at the 5% significance level. In order to be sure of the result, the KPSS confirmatory test has been performed, and the least restricted model of the test (the intercept and trend model) indicated that the null hypothesis that the lnGFCF variable is stationary at its first difference cannot be rejected at the 5% significance level. Hence, lnGFCF is non-stationary at level form, and it is stationary at its first difference. We therefore conclude that lnGFCF is integrated of order 1.

Generally, all the variables are integrated of order one (I (1)). We therefore proceed by following the three-step Johansen's procedure (Johansen, 1991b; 1995). The three-step Johansen's technique involves estimating an unrestricted standard vector autoregressive (VAR) model, performing the Johansen cointegration test, and then estimating a vector error correction model (VECM) to determine the cointegrating (long-run) and short-run coefficients, as well as the coefficient of the error correction term (ECT).

4.2.2 Vector Autoregressive (VAR) Model (Hacker & Hatemi-J, 2008)

In the first step of the Johansen's procedure, a Vector Autoregressive (VAR) model is estimated to establish the optimal lag length (Hacker & Hatemi-J, 2008) to be used in the Johansen cointegration test and in estimating the vector error correction model (VECM). The standard VAR model is estimated using a lag interval of one-to-one for endogenous variables (lnFD, lnNR, lnGDP, lnTR, lnPOP, lnGFCF). An exogenous variable (a constant) is also included. In establishing the optimal lag length, 3 lags have been included in the lag specification. The selection of the optimal lag length based on various information criteria is provided in Table 5.

Table 5: Optimal Lag Length

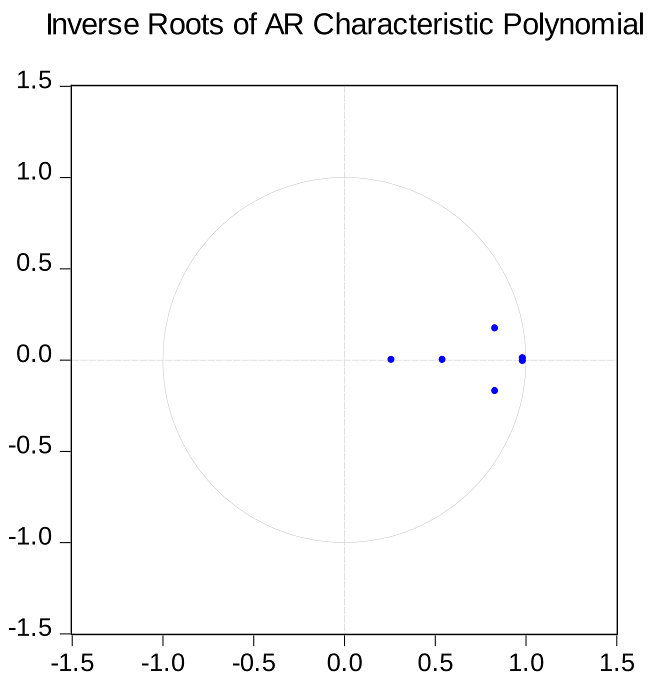
Lag	LogL	LR	FPE	AIC	SC	HQ
0	310.1566	NA	2.92e-15	-16.44090	-16.17967	-16.34880
1	552.4316	392.8784	4.31e-20	-27.59090	-25.76229*	-26.94623
2	597.8781	58.95756*	3.04e-20	-28.10152	-24.70553	-26.90427
3	646.9868	47.78145	2.37e-20*	-28.81010*	-23.84673	-27.06028*

NOTE: Author's construction. LR is sequential modified LR test statistic (each test at 5% level); FPE is Final prediction error; AIC is Akaike information criterion; SC is Schwarz information criterion; and HQ is Hannan-Quinn information criterion. * shows the lag order selected by the criterion.

As can be seen from Table 5; based on LR, the lag order is 2; based on FPE, the lag order is 3; based on AIC, the lag order is 3; based on SC, the lag order is 1; and based on HQ, the lag order is 3. Lag order 3 is not only selected by the AIC, but it is also selected the highest number of times amongst AIC, SC, and HQ; and amongst all 5 criteria. Hence, the optimal lag length is 3.

Now, in order to trust the VAR model's suggestion of the optimal lag length, the stability of the VAR model is checked by looking at both the autoregressive (AR) roots graph and the autoregressive roots (AR) table, and the results are presented in Figure 2 and Table 6, respectively.

Figure 2: AR Roots Graph



Source: Author's construction using the data collected from the IMF and World Bank

Table 6: Moduli of AR Roots

Root	Modulus
0.984670 - 0.007726i	0.984700
0.984670 + 0.007726i	0.984700
0.832839 - 0.172309i	0.850477
0.832839 + 0.172309i	0.850477
0.542673	0.542673
0.260418	0.260418

NOTE: Author's construction. The endogenous variables are lnFD, lnNR, lnGDP, lnTR, lnPOP, and lnGFCF. The constant term is the exogenous variable. The lag specification is one-to-one.

Looking at the AR roots graph in Figure 2, all the roots lie within the unit circle. Also, as seen from the AR roots table (Table 6), the moduli of all the roots are less than one. Thus, the VAR model satisfies the stability condition. Since the VAR model is stable and the optimal lag length is established, we then proceed to step 2 of the Johansen's technique, which is to perform the Johansen cointegration test to check whether or not there is a long-run relationship between the variables, and to find out how many cointegrating equations are present (if any).

4.2.3 Johansen Cointegration Test (Johansen, 1991a)

With the Johansen test for cointegration, two test statistics – the Trace statistic and the maximum Eigenvalue – are used in making the decision. The hypotheses for the tests are as follows:

H_0: Zero cointegrating equation present (r = 0)
H_1: At least one cointegrating equation present

H_0: Not more than one cointegrating equation present ($r < 1$)
H_1: At least two cointegrating equations present

H_0: Not more than two cointegrating equations present ($r < 2$)
H_1: At least three cointegrating equations present

H_0: Not more than three cointegrating equations present ($r < 3$)
H_1: At least four cointegrating equations present

H_0: Not more than four cointegrating equations present ($r < 4$)
H_1: At least five cointegrating equations present

H_0: Not more than five cointegrating equations present ($r < 5$)
H_1: At least six cointegrating equations present

The null hypotheses are tested sequentially until a point is reached where the null hypothesis can no longer be rejected. At this point, the exact number of cointegrating equations is determined.

With the deterministic trend assumption of *intercept and trend in CE – no intercept in VAR*, with a lag length of 1 (lag interval of 1 to 1) for differenced endogenous variables, with MHM critical values, with a 1% test size, and with no exogenous variables included, cointegration has been found. The results of the tests are shown in Table 7.

Table 7: Johansen Cointegration Test Statistics

Trace						**Maximum Eigenvalue**					
r = 0	r < 1	r < 2	r < 3	r < 4	r < 5	r = 0	r < 1	r < 2	r < 3	r < 4	r < 5
140.28*	89.29	52.06	31.42	17.55	5.76	50.99*	37.23	20.64	13.87	11.80	5.76

NOTE: Author's construction. r = 0, r < 1, r < 2, r < 3, r < 4, and r < 5 are null hypotheses indicating no cointegrating equation, not more than one cointegrating equation, not more than two cointegrating equations, not more than three cointegrating equations, not more than four cointegrating equations and not more than five cointegrating equations, respectively. * shows that the null hypothesis is being rejected at the 1% level of significance.

At the 1% level of significance, we reject the null hypothesis that there is no cointegrating vector present (r = 0), since both the trace statistic and the max-eigen statistic are greater than the respective critical values, and the respective p-values are less than 1%. We therefore accept the alternative hypothesis that there is at least one cointegrating vector present. Since the r = 0 null hypothesis is rejected, the r < 1 null hypothesis is then tested.

At the 1% level of significance, we are not able to reject the null hypothesis that there is at most one cointegrating vector present (r < 1), since both the trace statistic and the max-eigen statistic are less than the respective critical values, and the respective p-values are greater than 1%. Hence, just one cointegrating vector is present. Since we have found a cointegrating vector, we thus conclude that our variables are cointegrated (they are in a long-run relationship).

Since cointegration has been found, we therefore move to the third step of the Johansen's procedure, which is to estimate a vector error correction model (VECM) in order to determine the long-run (cointegrating) and short-run coefficients of the variables, as well as the speed of adjustment of financial development towards its long-run equilibrium – depicted by the coefficient of the error correction term (ECT).

4.2.4 Vector Error Correction Model (VECM) (Engle & Granger, 1987)

The VECM is estimated using a lag interval of 1 to 2 for differenced endogenous variables, which is equivalent to the optimal lag length (lag 3) minus 1 (as a rule of thumb). No exogenous variables are included. With a deterministic trend specification of *intercept and trend in CE – no trend in VAR* and with a rank of one cointegrating equation (as determined by the Johansen cointegration test), the results of the VECM are obtained, as shown in Tables 8, 9 and 10.

The short-run and cointegrating (long-run) coefficients of the variables as estimated by the VECM are shown in Tables 8 and 9, respectively.

Table 8: Short-run Coefficients of Variables

	Regressors					
Dependent variable	D(lnFD(-1))	D(lnNR(-1))	D(lnGDP(-1))	D(lnTR(-1))	D(lnPOP(-1))	D(lnGFCF(-1))
D(lnFD)	0.183340 [1.14266]	0.017567 [0.97221]	0.383843 [0.78208]	-0.394586 [2.06558]	-0.590938 [-2.56948]	0.489392 [1.27263]

NOTE: Author's construction. FD represents financial development index; NR represents total natural resources rents (% of GDP); GDP represents gross domestic product per capita (constant 2015 US$); TR represents trade (% of GDP); POP represents population growth (annual %); and GFCF represents gross fixed capital formation (% of GDP). The variables are all log-transformed. Numbers in square brackets are t-statistics of each coefficient.

Table 9: Long-run Coefficients of Variables

	Regressors				
Dependent variable	lnNR	lnGDP	lnTR	LnPOP	lnGFCF
lnFD	0.121858 [4.04841]	3.557347 [5.74053]	-2.269914 [-8.50019]	-1.229030 [-3.40638]	-0.900810 [-2.58183]

NOTE: Author's construction. FD represents financial development index; NR represents total natural resources rents (% of GDP); GDP represents gross domestic product per capita (constant 2015 US$); TR represents trade (% of GDP); POP represents population growth (annual %); and GFCF represents gross fixed capital formation (% of GDP). The variables are all log-transformed. Numbers in square brackets are t-statistics of each coefficient.

Table 8 shows the short-run coefficients of the variables. With the exception of D(lnTR(-1)) and D(lnPOP(-1)) whose respective t-statistics are greater than 2 in absolute value, the short-run coefficients of all the other variables are statistically insignificant since, following the rule of thumb, their respective t-statistics are less than 2 in absolute value, meaning that the null hypothesis of no-significance cannot be rejected. Thus, over the short-run, global natural resources, global economic growth and global investments have no statistically significant impact on the global financial development. In interpreting the short-run impacts of global trade openness and population growth on financial development, the signs of the coefficients are reversed. A 1% rise in the global trade openness causes a 0.39% increase in the global financial development on average over the short-run, provided the effects of the global natural resources, global economic growth, global population growth and global investments are held constant. Also, a 1% rise in the global population growth causes a 0.59% increase in the global financial development on average over the short-run, provided the effects of the global natural resources, global economic growth, global trade openness and global investments are held constant.

As can be seen from Table 9, the long-run (cointegrating) coefficients of the variables are all statistically significant since, following the rule of thumb, the t-statistics of all the long-run coefficients are greater than 2 in absolute value, implying that we can reject the null hypothesis of no-significance. In writing the long-run equation and / or interpreting the coefficients, the signs of the coefficients are reversed. The estimated long-run equation is shown below:

$$lnFD_t = 17.4 - 0.1(lnNR_t) - 3.6(lnGDP_t) + 2.3(lnTR_t) + 1.2(lnPOP_t) + 0.9(lnGFCF_t) \qquad (4)$$

As shown in equation 4, a 1% rise in the global natural resource rents causes a 0.1% decrease in the global financial development on average over the long-run, provided the effects of the global economic growth, global trade openness, global population growth and global investments are held constant. This finding of a negative connection is consistent with most of the studies in the literature (Gylfason & Zoega, 2001; Beck, 2010; Yuxiang & Chen, 2010; Hattendorff, 2013; Hassan, 2013; Hattendorff, 2014; Bhattacharyya & Hodler, 2014; Kurronen, 2015; Badeeb & Lean, 2017; Dwumfour & Ntow-Gyamfi, 2018; Adetutu et al., 2019; Dogan, Madaleno et al., 2020; Guan et al., 2020; Sun et al., 2020; Khan, Z. et al., 2020**;** Umar et al., 2021; Jiang et al., 2021; Shobande & Enemona, 2021) and with the a priori expectations set earlier in this section. Hence, the financial resource curse is validated in the long-run.

The signs of the coefficients of the trade openness and investments variables are logical and consistent with the literature. A 1% rise in the global trade openness causes a 2.3% increase in the global financial development on average over the long-run, provided the effects of the global natural resources, global economic growth, global population growth and global investments are held constant. Law and Habibullah (2009), Benyah (2010), Voghouei et al. (2011), Takyi and Obeng (2013), Raza et al. (2014), Khalfaoui (2015), Elsherif (2015), Badeeb and Lean (2017), Ibrahim and Sare (2018), and Aluko and Ibrahim (2019) also found trade openness to have a statistically significant positive impact on financial development in the long-run.

A 1% rise in the global investment causes a 0.9% increase in the global financial development on average over the long-run, provided the effects of the global natural resources, global economic growth, global trade openness and global population growth are held constant.

Huang (2011) and Elsherif (2015) also found investments to have a statistically significant positive impact on financial development in the long-run.

The sign of the coefficient of the economic growth variable is inconsistent with most of the studies in the literature, as Raza et al. (2014), Elsherif (2015), Badeeb and Lean (2017), and Ibrahim and Sare (2018) rather found that economic growth is positively connected to financial development. Equation 4 above shows that a 1% rise in the global economic growth causes a 3.6% decrease in the global financial development over the long-run on average, provided the effects of the global natural resources, global trade openness, global population growth and global investments are held constant.

The sign of the coefficient of the population growth variable is not compatible with the a priori expectation set earlier in this section. Equation 4 above shows that a 1% rise in the global population growth causes a 1.2% increase in the global financial development over the long-run on average, provided the effects of the global natural resources, global economic growth, global trade openness and global investments are held constant.

The compatibility between the a priori expectations (the research hypotheses) and the empirical findings is shown in Table 10.

Table 10: Compatibility of A Priori Expectations of Long-run Relationships with Empirical Findings

	IMPACT ON FINANCIAL DEVELOPMENT (lnFD)		
	A PRIORI EXPECTATIONS (A)	**EMPIRICAL FINDINGS (B)**	**COMPATIBILITY BETWEEN A AND B?**
Natural Resources (lnNR)	Negative (-)	Negative (-)	Yes
Economic Growth (lnGDP)	Positive (+)	Negative (-)	No
Trade Openness (lnTR)	Positive (+)	Positive (+)	Yes
Population Growth (lnPOP)	Negative (-)	Positive (+)	No
Investments (lnGFCF)	Positive (+)	Positive (+)	Yes

NOTE: Author's construction. FD represents financial development index; NR represents total natural resources rents (% of GDP); GDP represents gross domestic product per capita (constant 2015 US$); TR represents trade (% of GDP); POP represents population growth (annual %); and GFCF represents gross fixed capital formation (% of GDP). The variables are all log-transformed.

Table 10 shows us that the signs of the coefficients of lnNR, lnTR and lnGFCF are logical and consistent with many of the studies in the existing literature. On the other hand, the sign of the coefficient of lnGDP is inconsistent with the literature, and the empirical finding of the impact of population growth on financial development is not compatible with the a priori expectation set based on the preliminary evidence from the graphs.

All the aforementioned results and interpretations of the cointegrating (long-run) coefficients of the variables are valid, since the vector error correction model (VECM) has worked well and is therefore appropriate for examining long-run relationships. This is because the coefficient of the error correction term (ECT) has been found to be both negative and statistically significant, as shown in Table 11.

Table 11: Vector Error Correction

Coefficient of ECT	**t-statistic**
-0.236312	-3.18006*

NOTE: Author's construction. ECT represents Error Correction Term. * denotes the statistical significance of the t-statistic

As seen in Table 11, the coefficient of the error correction term (ECT) is negative and statistically significant (since, following the rule of thumb, the t-statistic of the coefficient is greater than 2 in absolute value, meaning that the null hypothesis of no-significance can be rejected). Hence, the vector error correction model (VECM) has worked well, and it is therefore appropriate for examining long-run relationships. One possible reason why the VECM worked well is because potential financial development indicators were added to the model as control variables, thereby limiting the omitted variable bias. This coefficient (-0.236312) of the ECT shows the speed of adjustment of the global financial development towards long-run equilibrium following a short-run shock, and it indicates that the short-run values of lnNR, lnGDP, lnTR, lnPOP and lnGFCF contributed to the long-run equilibrium level of lnFD at a speed of about 23.63% every year. The estimated vector error correction model (VECM) is shown in equation 5 below:

$$\Delta lnFD_t = -0.02\Delta lnNR_t - 0.38\Delta lnGDP_t + 0.39\Delta lnTR_t + 0.59\Delta lnPOP_t - 0.49\Delta lnGFCF_t - 0.24(lnFD_{t-1} + 0.12lnNR_{t-1} + 3.56lnGDP_{t-1} - 2.27lnTR_{t-1} - 1.23lnPOP_{t-1} - 0.90lnGFCF_{t-1}) \quad (5)$$

4.2.5 Granger Causality Test (Granger, 1969)

Next, causality analysis has been performed. In particular, Granger causality tests under the block exogeneity Wald tests of the VECM has been applied to estimate the directions of the long-run and short-run relationships between the variables. The results are shown in Table 12.

Table 12: Granger Causality test results under the VECM

	Dependent variable					
Regressors	D(lnFD)	D(lnNR)	D(lnGDP)	D(lnTR)	D(lnPOP)	D(lnGFCF)
D(lnFD)	-	0.0005	1.3625	1.4098	7.1085**	0.8268
D(lnNR)	1.0314	-	2.3462	1.6698	0.8646	10.862*
D(lnGDP)	0.6485	4.9112***	-	9.0437**	2.4285	4.8039***
D(lnTR)	6.5520**	7.5212**	11.174*	-	0.8886	8.9267**
D(lnPOP)	6.6884**	3.8084	3.0141	3.1795	-	11.947*
D(lnGFCF)	2.1267	0.5113	1.0246	0.9825	4.2017	-
All	15.213	11.428	18.397**	17.568***	15.061	18.994**

NOTE: Author's construction. "All" shows long-run causality, while "D(variable)" shows short-run causality. *, **, *** show that the null hypothesis is being rejected at the 1%, 5%, and 10% significance levels, respectively.

For the Granger causality tests, the null hypothesis is that "a variable doesn't Granger-cause", while the alternative hypothesis is that "a variable Granger-causes". As shown in Table 12, global trade openness Granger-causes global financial development in the short-run, and global population growth also Granger-causes global financial development over the short-run. This is because for both the global trade openness and global population growth variables, we are able to reject the null hypothesis that the variable does not Granger-cause the global financial development at the 5% level of significance. Therefore, over the short-run, a change in the global trade openness will cause a change in the global financial development, and the short-run values of the global population growth series provide statistically significant information that can be used in forecasting the future values of the global financial development over the short-run. There are no other short-run causalities running from any of the other variables to global financial development. Again, all the variables do not Granger-cause global financial development in the long-run, since the null hypothesis of no-Granger-causality cannot be rejected at the 5% significance level.

Also, at the 5% level of significance, global trade openness Granger-causes global natural resources in the short-run; global trade openness Granger-causes global economic growth in the short-run; global economic growth Granger-causes global trade openness in the short-run; global financial development Granger-causes global population growth in the short-run; global natural resources Granger-causes global investments in the short-run; global trade openness Granger-causes global investments in the short-run; global population growth Granger-causes global investments in the short-run; global financial development, natural resources, trade openness, population growth and investments all Granger-cause global economic growth in the long-run; and global financial development, natural resources, economic growth, trade openness, and population growth all Granger-cause global investments in the long-run.

Hence, over the short-run, there are bi-directional causalities between global financial development and global population growth, and between global economic growth and global trade openness; while there are unidirectional causalities running from global trade openness to global financial development, global trade openness to global natural resources, global natural resources to global investments, global trade openness to global investments, and global population growth to global investments.

With respect to the research question of this study, in both the long-run and short-run, there are no causalities running from global natural resources to global financial development, or from global financial development to global natural resources.

4.2.6 Diagnostic Checks

In order to ensure that the residuals of the vector error correction model (VECM) are normally distributed, have a constant variance (are homoscedastic), and show no pattern or trend over time (there is no autocorrelation), diagnostic checks have been done and the results are shown in Table 13.

Table 13: Diagnostic Checks

VEC Residual Portmanteau Tests for Autocorrelations		
H_0: No autocorrelations up to lag h		
	Test Statistic	Lag
Q-Stat	76.80079	3
Adj Q-Stat	81.70772	3
VEC Residual Serial Correlation LM Tests		
H_0: No serial correlation at lag h		
	Test Statistic	Lag
LRE stat	34.51275	1
LRE stat	39.02404	2
LRE stat	39.62950	3
Rao F-stat	0.939902	1
Rao F-stat	1.099243	2
Rao F-stat	1.121393	3
H_0: No serial correlation at lag 1 to h		
	Test Statistic	Lag
LRE stat	34.51275	1
LRE stat	84.71742	2
LRE stat	506.3997*	3
Rao F-stat	0.939902	1
Rao F-stat	1.158276	2
Rao F-stat	299.9750*	3
VEC Residual Heteroscedasticity Tests (Levels and Squares) – Joint Test		
H_0: No heteroscedasticity		
	Test Statistic	
Chi-sq	554.3247	
VEC Residual Normality Tests		
H_0: Residuals are multivariate normal		
Test Type	Chi-sq Test Statistic	
Cholesky (Lutkepohl) – Joint JB Test	11.40528	
Residual Correlation (Doornik-Hansen) – Joint JB Test	15.50473	
Residual Covariance (Urzua) – Joint JB Test	149.3137	

NOTE: Author’s construction. VEC represents Vector Error Correction. *, **, *** show that the null hypothesis is being rejected at the 1%, 5%, and 10% significance levels, respectively.

Table 13 shows the results of the residual diagnostic tests. In order to check whether the residuals of the vector error correction model (VECM) are autocorrelated, both the VEC residual Portmanteau and the VEC residual LM tests have been carried out. For the Portmanteau test, the null hypothesis is that there are no autocorrelations in the residuals up to the given lag. This test is valid only for lags which are larger than the lag length used in estimating the VECM. Since the VECM was estimated using a lag interval of one-to-two, the test is only valid as from lag 3. For both the Q-Stat and the Adj Q-Stat test statistics, we are not able to reject the null hypothesis at 5% significance level, since the respective probability values are greater than 5%. Hence, based on the Portmanteau test, it is concluded that there are no autocorrelations in the residuals up to lag 3.

Similarly, for the LM test for autocorrelation, there are two null hypotheses: no serial correlation at the given lag, and no serial correlation at lag 1 to the given lag. With respect to the first null hypothesis (no serial correlation at the given lag), using both the LRE stat and the Rao F-stat test statistics, we are not able to reject the null hypothesis at 5% level of significance for each of lags 1, 2 and 3, since the respective probability values are greater than 5%. Hence, there is no serial correlation at either of lag 1, lag 2 or lag 3. With respect to the second null hypothesis (no serial correlation at lag 1 to the given lag), using both the LRE stat and the Rao F-stat test statistics, we are not able to reject the null hypothesis at 5% level of significance for both lag 1 to 1 and lag 1 to 2, since the respective probability values are greater than 5%. Hence, there is no serial correlation at either lag 1 to 1 or lag 1 to 2. For lag 1 to 3, using both the LRE stat and the Rao F-stat test statistics, we reject the null hypothesis at 5% significance level, since the probability value is less than 5%. Thus, serial correlation is detected in the residuals at lag 1 to 3. However, the VECM was estimated using a lag interval of 1 to 2; so, the residuals of the VECM are not autocorrelated. Overall, considering both the Portmanteau test for autocorrelation and the LM test for serial correlation, it is clear that the residuals are free from autocorrelation.

In order to check whether the variance of the residuals of the VECM is constant, the VEC residual heteroscedasticity test (Levels and Squares) has been performed. For this test, the null hypothesis is that the residuals are homoscedastic (that is, they have a constant variance). In the joint test, the probability value of the Chi-square test statistic is greater than 5%. Also, looking at the individual components (results not shown in Table 13), all the probability values for both the F and Chi-square test statistics are greater than 5%. Hence, the null hypothesis cannot be rejected at the 5% significance level, and it is therefore concluded that there is no heteroscedasticity.

In order to check whether or not the residuals are normally distributed, three separate VEC residual normality tests have been performed – the Cholesky (Lutkepohl) test, the Residual Correlation (Doornik-Hansen), and the Residual Covariance (Urzua) test. For these tests, the null hypothesis is that the residuals are multivariate normal. In each of the normality tests, the joint Jarque-Bera (JB) test has been considered. In all the tests, the probability values of the Chi-square test statistic are greater than 5%, implying that we are unable to reject the null hypothesis at 5% level of significance. Hence, the VEC residuals are normally distributed.

Since all assumptions are valid (the VEC residuals are normally distributed, they are homoscedastic, and they are not autocorrelated), the lag structure therefore holds, and we trust the optimal lag length chosen to perform the Johansen cointegration test and to estimate the VECM.

5. Conclusions, Recommendations and Suggestions

In this section, the empirical findings are summarized, recommendations are made, and suggestions for future related researches are provided.

5.1 Conclusion

The aim of this study was to empirically verify if the natural resource curse also applies to the financial sector from a global perspective over the 1980-2019 period. The contributions of natural resources in an economy have been well discussed in the literature. So many studies have dwelled on how natural resources affect economic growth and development, income, welfare and happiness, foreign direct investments (FDIs), environment / ecological footprint, governance and institutional quality, fiscal policy / government expenditure, and human capital / human development. Despite the fact that one will normally expect countries to benefit from having an abundance of natural resources, many of these studies have revealed the negative effects of natural resources in what is now generally known as the natural resource curse (the resource curse hypothesis). The term "natural resource curse" was first mentioned by Richard Auty in 1993. In an attempt to explain this natural resource curse, so many theories have been put forth such as the Dutch Disease theory, the institutional theory, the staples theory of economic growth, and the theory of rent curse.

When it concerns the resource-finance nexus, the literature has been scarce, with only Gylfason and Zoega (2001) making a major contribution in the resource-finance research area prior to 2010. This is quite surprising, considering how important the financial sector is in a country. Also, many of the studies in the literature had limited scopes, rather than exploring how natural resources influence financial development from a global perspective. This research was aimed at bridging this knowledge gap, and also contributing to the literature on both the determinants of financial development and the impact of natural resources on financial development. As evidenced by the 2007-2008 global financial crisis, the significance of financial sector development cannot be over-emphasized. In this research, the effect of natural resources on financial development was empirically investigated from a global perspective.

A time series approach was applied in this study for the period 1980-2019. An index for financial development was obtained from the IMF database, while total natural resources rents (% of GDP) – collected from the World Development Indicators (WDI) database of the World Bank – was used as a measure for natural resources. Other financial development indicators (economic growth, trade openness, population growth, and investment) – all collected from the World Development Indicators (WDI) database of the World Bank and proxied by GDP per capita (constant 2015 US$), Trade (% of GDP), Population Growth (annual %) and Gross Fixed Capital Formation (% of GDP), respectively – were included in the model as control variables. All the variables were log-transformed. The descriptive statistics of the data showed that the Gross Fixed Capital Formation (% of GDP) data have the least variation from their mean value, while the total natural resources rents (% of GDP) data are furthest from their mean value. The Jarque-Bera (JB) test also revealed that the data of all the variables are normally distributed.

Firstly, the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) unit root tests and the Kwiatkowski et al. (KPSS) stationarity (confirmatory) test revealed that all the variables used in this study are integrated of order one (I (1)), since they are generally non-stationary at their level forms and stationary at their first differences. The Johansen's 3-step procedure was therefore followed. In the first step of the Johansen's technique, an unrestricted standard vector autoregressive (VAR) model – which satisfies the stability condition – was estimated, and the optimal lag length was established to be three. In the second step of the Johansen's method, the

Johansen cointegration test was performed, and one cointegrating vector was found present, indicating that the variables are in a long-run relationship. In the final step of the Johansen's procedure, a vector error correction model (VECM) was estimated. The coefficient (-0.236312) of the error correction term (ECT) indicates that the short-run values of the global natural resources, global economic growth, global trade openness, global population growth, and global investment contribute to the long-run equilibrium level of the global financial development at a speed of about 23.63% every year.

The long-run (cointegrating) coefficients from the VECM validated the financial resource curse, as a statistically-significant negative relationship was found between global natural resources and global financial development in the long-run. This long-run adverse effect of natural resources is consistent with the findings of most of the studies in the existing literature (Gylfason & Zoega, 2001; Beck, 2010; Yuxiang & Chen, 2010; Hattendorff, 2013; Hassan, 2013; Hattendorff, 2014; Bhattacharyya & Hodler, 2014; Kurronen, 2015; Badeeb & Lean, 2017; Dwumfour & Ntow-Gyamfi, 2018; Adetutu et al., 2019; Dogan, Madaleno et al., 2020; Guan et al., 2020; Sun et al., 2020; Khan, Z. et al., 2020**;** Umar et al., 2021; Jiang et al., 2021; Shobande & Enemona, 2021). This negative relationship is observable in reality since, for example, many countries in Africa have poorly developed financial sectors despite the natural resource riches in the continent, while many countries in western Europe are financially developed, despite having limited natural resources. Most of these resource-wealthy countries tend to over-depend on their natural resources by investing so much resources in a few resource-dependent sectors, while neglecting the financial sector and other sectors. As a result, they become vulnerable to changes in the prices of the products from their resource-dependent sectors, and the development of their financial sector suffers.

The short-run coefficient of the global natural resources was found to be statistically insignificant, indicating that natural resources have no impact on financial development over the short-run. Regarding the control variables, economic growth, trade openness, population growth and investment were found to have a negative (inconsistent with the literature), positive (consistent with the literature), positive (inconsistent with a priori expectation), and positive (consistent with the literature) impact, respectively, on financial development in the long-run.

Economic growth leads to an increase in the demand for goods and services, including an increase in the demand for financial services. Increased demand for financial services will encourage the creation of more financial institutions, and this will increase the competition in the market, thereby causing an improvement in the quality of financial services. Also, economic growth is associated with increased productivity and technological advancement which leads to innovative ways of delivering financial services. Through these channels, economic growth, theoretically at least, is normally expected to have a positive impact on financial development. Empirically, many studies also revealed the positive connection of economic growth with financial development (Elsherif, 2015; Raza et al., 2014; Badeeb & Lean, 2017; Ibrahim & Sare, 2018). Hence, the finding of this study (negative relationship between economic growth and financial development) is not consistent with the literature.

Intuitively, one will expect investment to have a positive impact on financial development. This is because according to Keynesian theory, an increase in investment results to an increase in income, and higher incomes mean more financial ability to promote financial development. Also, an increase in investment in Research and Development (R&D) in particular, enables the discovery of more cost-effective ways of delivering top-quality financial services, thereby developing the financial sector. Huang (2011) and Elsherif (2015) also found a statistically-significant positive relationship between investment and financial development. So, the positive long-run relationship between investment and financial development, which has been found in this study, is both logical and consistent with the literature.

Causality analysis showed that in both the long-run and short-run, global natural resources does not Granger-cause global financial development, neither does global financial development Granger-cause global natural resources. Also, over the short-run, bi-directional causalities were found between global financial development and global population growth, and between global economic growth and global trade openness; while unidirectional causalities were found running from global trade openness to global financial development, global trade openness to global natural resources, global natural resources to global investments, global trade openness to global investments, and global population growth to global investments.

In order to ensure that the residuals of the vector error correction model (VECM) are normally distributed, have a constant variance (are homoscedastic), and show no pattern or trend over time (there is no autocorrelation), diagnostic checks were carried out. Both the VEC residual Portmanteau and the VEC residual LM tests confirmed that there are no autocorrelations (serial correlations) in the VEC residuals. The VEC residual heteroscedasticity test (Levels and Squares) revealed that the VEC residuals are homoscedastic. Three separate VEC residual normality tests (the Cholesky (Lutkepohl) test, the Residual Correlation (Doornik-Hansen), and the Residual Covariance (Urzua) test) confirmed that the VEC residuals are normally distributed (they are multivariate normal).

5.2 Recommendations

Based on the findings of this research, the financial resource curse is validated. The following recommendations are therefore put forth. Firstly, resource-rich countries should reduce their over-dependence on natural resource rents by not over concentrating too much of their capital and labor force in just a few resource-dependent industries. They should strive to increase investments in other sectors, so that their economies would not be vulnerable to declines in commodity prices. The importance of economic diversification cannot be over-emphasized here!

Secondly, the law-makers of resource-wealthy countries should enact laws which promote democracy, and fight against corruption and bad governance. This will prevent corrupt government officials from exploiting these natural resources and taking decisions for their selfish personal interests, rather than for the general benefit of all citizens.

Also, nations which are wealthy in natural resources usually miss out on export-led growth because they are generally high-price economies (Sachs & Warner, 2001). Thus, such countries should adopt a fixed or managed float exchange rate regime, rather than a freely-floating (flexible) exchange rate regime. By so doing, they can easily devalue their currencies to make their goods and services cheaper for exporters, thereby resulting to export-led growth.

5.3 Suggestions for Further Research

In order to further verify the validity of the financial resource curse hypothesis from a global perspective, further research is required. The following suggestions for further research in the area are made. Firstly, panel data techniques should be applied to explore the impact of natural resources on financial development in all countries in the world over a given time period. The countries should then be grouped based on the results, to appreciate if the financial resource curse is universal or if it depends on, say, the level of democracy and / or development in a particular country. Secondly, rather than using total natural resource rents, the impact of different natural resource rents such as oil rents, coal rents, mineral rents, natural gas rents, and forest rents should individually be tested to see if the effect of global natural resources on global financial development depends on the type of natural resource. Thirdly, rather than estimating just one model which includes natural resources and different determinants of financial development as control independent variables, it will be helpful to estimate different models where the control variables are added one after the other to the model and with different combinations of the control variables, to see if these will cause a change in the results.

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