IRANIAN ECONOMIC REVIEW
Print ISSN: 1026-6542
Online ISSN: 2588-6096
https://ier.ut.ac.ir/
University of Tehran

Moderation Role of Energy Prices on Financial Instability, Trade Openness, and Economic Growth in Non-OPEC Countries

Umar Muhammad Dabachi[a], Suraya Mahmood[a,*], Ali Umar Ahmad[b], Aminu Hassan Jakada[c], Ahmad Tijjani Abdullahi[d], Mohammed Atiku Abubakar[a], Kabiru Kamalu[a]

a. Faculty of Business and Management, Universiti Sultan Zainal Abidin Malaysia, 23100 Kuala Terengganu, Malaysia.
b. Faculty of Maritime Study, Universiti Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia.
c. Department of Economics and Development Studies, Faculty of Arts and Social Sciences, Federal University Dutse, Dutse, Nigeria.
d. Department of Economics, Faculty of Social and Management Sciences, Bayero University Kano, Gwarzo Road Kano, Nigeria.
* Corresponding Author, E-mail: p4621@pps.umt.edu.my

Article Info

Article Type: Research Article

Article history:
Received: 18 January 2021
Received in revised form: 18 May 2021
Accepted: 03 May 2021
Published online: 09 May 2023

Keywords:
Energy Crisis of 2014, Financial Instability, Interaction Term of Energy Price, Second Generation Approach.

JEL Classification:
E51, Q49, C01, K32.

ABSTRACT

This paper examined the interaction effect of energy prices on the relationship between financial instability, trade openness, and non-OPEC countries' economic growth. The paper used panel time series data from 1970-2018. In addition, the paper applied a second-generation approach. The results of the cointegration test revealed a long-run relationship among the variables. Moreover, the results showed that financial instability, energy price, and the 2014 energy crisis have a negative effect on economic growth, while, trade openness has a positive effect on economic growth. Additionally, the results confirmed that the interaction term of energy prices and financial instability is negatively affecting economic growth, but the interaction term of energy prices and trade openness is positively affecting the economic growth of non-OPEC countries (emerging ASEAN economies). However, the results of the causality test indicated a one-way causal relationship between financial instability to economic growth, energy price to economic growth, and trade openness to economic growth. The empirical findings also suggested that interventions from the policymakers of the emerging ASEAN country could provide rigidity or policies on financial repression, instead of a more flexible financial system, designed to expand growth and stability in focused macroeconomic policies through financial rules. To control energy use and stabilize prices in ASEAN countries, there should be a comprehensive energy policy, which may have a negative impact on their economies, as most of the emerging ASEAN countries have not relied on oil revenues.

Cite this article: Dabachi, U. M., Mahmood, S., Ahmad, A. U., Jakada, A. H., Abdullahi, A. T., Abubakar, M. A., & Kamalu, K. (2023). Moderation Role of Energy Prices on Financial Instability, Trade Openness and Economic Growth in Non-OPEC Countries. *Iranian Economic Review*, *27*(1), 255- 277. DOI: https://doi.org/10.22059/ier.2021.81634

Publisher: University of Tehran Press.
DOI: https://doi.org/10.22059/ier.2021.81634

1. Introduction

Over the past decades, most of the countries in Asia experienced a pretty large rise in gross domestic product, where between 1970 and 2018 the average annual growth rates were higher and above that of the world average. Even though many of the non-OPEC Countries (emerging ASEAN economies) experienced a much greater increase in their real domestic growth product (RGDP), very few nations achieved a high-level income status throughout the region, while the majority of them still struggling with the income trap (World Bank, 2014; Ahmad et al., 2018; Kamalu et al., 2019; Jakada et al., 2020a; 2020b; 2020c; 2020d). Overall, these higher-income emerging ASEAN economies demonstrated a positive trend in their GDP growth above the world (RGDP) average as well as the developed countries average.

Nonetheless, despite the positive and higher real GDP growth experienced by some countries in the ASEAN region between 1970 and 2018, the region experienced turbulent periods of decreasing trends in real GDP growth (see Figure 1).

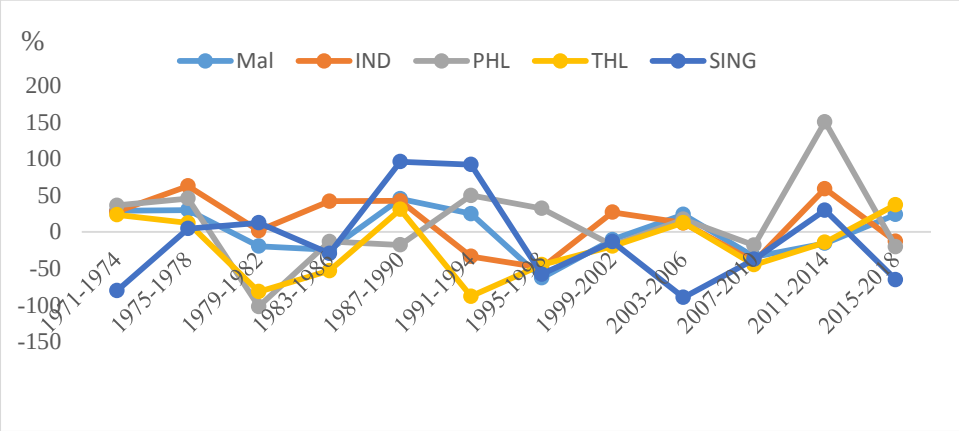

Figure 1. Time Series Plot of Emerging ASEAN Average Percentage Changes of the Gross Domestic Product; GDP from 1970-2018
Source: WDI, 2020.

On the other hand, in emerging economies such as ASEAN countries, the focus has been put on the money market with little regard for the activities in the capital market. In addition, none of the previous studies reviewed in this work compare the emerging ASEAN countries' economies. This study, therefore, focuses on the analysis of the emerging ASEAN countries' domestic product concerning three important factors, namely financial instability, energy prices, and trade openness. It is quite crucial to analyze and evaluate the effect of these factors on the economic growth of these countries to formulate better policies to ensure greater growth of gross domestic product per inhabitant to improve the quality of life of people in ASEAN countries. The paper is organized as follows. The following section discusses the brief of the literature review, which is relevant to the conceptual review, and the empirical analysis of this study. The next section is about methodology and empirical strategies. The fourth section estimates the results, and the final section concludes.

2. Literature Review

2.1 Conceptual Literature Review

2.1.1 Economic Growth

The large disparity in growth experiences in various countries in recent history is an astonishing statistic on economic growth. Several parts of the world have been witnessing persistent economic growth for more than a century, such as Western Europe and the US. Thus, these countries have been very rich in culture. This is not true in absolute terms (GDP) in addition if wealth is measured as per capita income that Gross Domestic Product per person (Panayotou, 2016; Alkhawaldeh et al., 2020).

Contrary to what Americans and Europeans did a few years ago, even now, there are nations where expansive sections of the population reside near the level of life. Similarly, a set of nations that were poor around World War II managed to reach an even higher rate of economic growth than the developed nations of the Western World. This defining economic growth in one model proved difficult to explain. Some models clarify the economic development of the now-developed countries, but most of them ignore why most of the world is still poor. For industrialized countries, models which seek to explain the difference between development and development are more efficient to reproduce the economic growth facts (Safronchouk, 2020).

In the 1960s, the theory of economic growth mainly encompassed the neoclassical model, as elaborated by Ramsey, 1928; 1965. The convergence property is the key feature of this model, used extremely as a hypothesis only in recent years. The higher the projected growth rate, the lower the initial level of real gross domestic product per capita (GDP).

If all economies would of course be the same, except for their start of capital, then convergence would be in full use; that is, poverty would appear to rise per capita faster than wealthy economies. In contrast, if there are differences in economies with saving and having children, access to technology, willingness to work, and government policies, the convergence force only has a small impact. If per capita initial GDP is small in terms of long-term or stable position; in that case, the economic growth rate appears to be strong if it starts well below its target position. For instance, a developing country, which also has a small long-term position, can not grow rapidly due to its risks in terms of public policies, or a low saving rate (Chistik and Eliseev, 2019).

In the neoclassical model, the declining return to capital is derived from the convergence property. Economies with lower equity per employee (about their long-term equity per employee) are inclined to increase returns and higher economic growth rates. Convergence is conditional since the stable state levels of capital and per worker rely on the neoclassical model of saving propensity, population growth rates, and the role of production functions in different economies. Recent extensions to the model indicate that other causes of country-wide fluctuation need to be included, in particular government policies on domestic and foreign market distortions, security of ownership rights, and consumption levels. The theory of capital can be usefully extended to include human capital in education, health, and expertise from natural resources in the neoclassical system (Lucas, 1988; Rebelo, 1991; Caballe and Santos,1993).

The economy leads to a stable ratio between human and physical resources, but the ratio in an initial state may differ from its long-term value. The scale of this leaving has an effect on the per capita performance rate. A nation that begins with a very high ratio of human to physical capital (perhaps as a result of a war in which capital is mostly physical) tends to develop quickly since physical capital is more sensitive to rapid expansion than human capital. The strength of support is to promote the adaptation of international technology through a strong human capital commitment (Nelson and Phelps, 1966; Benhabib and Spiegel, 1994).

This aspect implies a product of interaction whereby the rate of economic growth of a country is more responsive to its initial per capita production, the bigger the initial human capital stock is. Another prediction of the neoclassical models is that human capital when expanded to include capital, would eventually cease to rise per capita in the absence of continuous advances in technologies. The consequence of this calculation similar to Malthus (1798) and Ricardo (1817) is that the returns to the total concept of capital have been reduced. Long-term figures for some countries have shown that positive per capita growth rates will continue for more than a century, but there is no strong decline in this rate of economic growth. Economic growth theorists of the 1950s and 1960s acknowledged and covered up this modeling void by the belief that unexplained (exogenous) means are accompanied by technological advances. This device will solve the theory by maintaining the forecast of conditional convergence with an optimistic and perhaps steady per capita growth rate in the long run (Walby, 2018).

2.1.2 Financial Instability

Financial instability showed itself in banking failure, substantial asset price instability, or a failure in sector market liquidity and, eventually, in an interruption in the installment and settlement framework (Carlos Bresser-Pereira, 2019). Because of its relations with the financial sector, financial instability affected the real sector. It brought enormous macroeconomic expenditure in conjunction with investment, production, and consumption, and thus overwhelmed the national goals of broader economic growth and development. Introduction of this argument by Kaminsky and Reinhart (1999), the results showed that financial instability is positively linked to financial growth. Use in this light, it can be seen that it is important for financial economic growth to protect financial stability and to know weaknesses within the financial system. Some of these vulnerable areas had macroeconomic initiatives, such as improvements in Family and Corporate Accounting States, as well as advances in credit and capital markets, all affected by the extent and appropriation of financial risks in developed countries' economies (Pedrosa, 2019). It is important to safeguard financial stability since it would allow us to identify vulnerabilities in the financial system and mitigate those vulnerabilities in the first place. It is important to safeguard financial stability since it would allow us to identify vulnerabilities in the financial system and mitigate those vulnerabilities in the first place. In emerging economies, such as ASEAN, most emerging economists recognized that the financial crisis of 2008 may not have affected the economies as the stock market and banks in emerging economies were not strongly

integrated into the world market. Although the crisis has little influence on developing economies, the financial sector of developing economies such as ASEAN has an impact on financial crises. The emerging financial market has thus been very unfavorable and substantial in developing countries (Enowbi and Kupukile, 2012).

The theoretical relationship between financial stability and economic growth can be considered dependent on the five different factors intersecting macroeconomics and finance. These factors; asymmetric information and problems with agencies in financial contracts, the chance that market risks will suddenly and dramatically re-evaluate, credit supply adjustments as a critical channel that systemizes market risks, the creation of the inside money conditions for banking decisions, and the creation of central bank liquidity as a replacement for the market risk (Keen, 2020). These shifts in the liquidity preferences of banks can become a major cause of economic upheaval. In the loan portfolio of the financial sector, for example, the ratio of non-performing loans to gross loans tests asset quality. A high proportion shows that the credit portfolio and financial contracts of the financial sector are worsening. This has a negative impact on payment balances, net profits, and solvency for financial institutions. As a result, investment activity is significantly hindered by loanable investment funds (Lamperti et al., 2019). A seriously impaired investment delays economic activity and slows growth steadily. Likewise, the low capital adequacy ratio of the banking system would indicate that banks would become insolvent more likely. Insolvency risks are increased as investment funding is no longer assured and therefore investment activity, efficiency, and development are slowed down. This reduces investment financing. Liquidity is again critical for economic operations in the banking sector. A financial system that is gradually liquid results in capital accumulation slowing down and productivity growth subsequently.

2.1.3 Energy Prices

Energy prices or the price of oil commonly refer to a barrel of benchmark crude oil as a benchmark price for crude oil buyers and sellers. Energy has become a major driver of economic growth in any region. It has a strategic effect on economic growth in any region. Economic growth and energy consumption are strongly correlated. Increased economic growth calls for more use of oil. Energy is important to the aggregate function of output and to improve any country's economic growth rate. In the economies of production, reproducibility is a key principle. Some output inputs are non-reproducible, while others can be produced for a fee within the economic framework (Mukhammadsidiqov and Turaev, 2020). The production factors are reproducible: capital, labor, and even natural resources, and energy is a non-reproducible productive factor, but, of course, reproducible factors are energy-fuel vectors. Consequently, the role of energy and its availability in economic development and growth processes has been highly emphasized by natural scientists and some ecological economists. In the extreme, it is used as a sign of the state of economic growth to use resources rather than to deliver goods. The first thermodynamic law (preservation law) suggests the theory of mass equilibrium. A greater or equivalent amount of matter shall be used as inputs with

a residual pollutant or waste product to achieve a specified material production. Thus, for any method of production that generates material outputs, there are minimum material input requirements. The second law for thermodynamics (efficiency legislation) means that the transformation of matter requires a minimum amount of energy (Woźniak et al., 2020). The transformation or movement of matter in any way includes all processing. Certain types of matter must be converted or transferred by substituting certain elements and chemicals. Consequently, limits should be defined for replacing other energy production factors. Every economic activity, therefore, needs to be energy-intensive so that energy is still a key output factor.

Some aspects - that is knowledge of structured matter can also be considered as non-reproducible inputs. Many observers claim that information is a fundamentally unreproducible output factor as energy, e.g. Spreng, 1993; Chen, 1994; Stern, 1994; Ruth, 1995. The economy must take information and accumulation as much into account as it pays to power. For the extraction of information from the environment, energy cannot be used actively without information and likely acquired experience.

Obviously, without acting on the part of economic agents, energy may provide unregulated heating, lighting, etc. Even non-smart organisms must make controlled use of energy through the use of knowledge. For instance, when plants use certain sunlight rather than simply heat and illuminate leaves, they use the genetic code for chlorophyll production, chloroplast building, and sugar production. Apart from energy, it is not easy to quantify information and awareness. However, it is a biophysical reason for the treatment of capital, labor, and so on as factors of production that have to be integrated into the equipment, staff, and materials for use. While capital and labor are easier to measure than knowledge and information, their evaluation is still very imperfect related to energy.

2.1.4 Trade Openness

Openness to trade is the number of GDP-standardized imports and exports. The Bilateral equity portfolios have good associations with the underlying trading trends, Mishra (2007) and Lane and Milesi-Ferretti (2008b). Investors are better able to access international market accounting and regulatory knowledge and invest in foreign assets. By enhanced trade integration, the default risk is also increased. Finally, trade transactions may produce direct financial flows across borders, including credits for trade, export insurance, and facilitation of payment. There were some consequences for the conventional theory of foreign trade. First, trade is mainly focused on what Krugman (1993b) calls first-nature benefits between nations with different factor enhancements (technology, production factors availability). Therefore, in similar regions, the conventional trade theory cannot justify the nature of various production systems. Secondly, trade could lead to a clash between production factors (workers in exporting capital countries face more market competition and lose their income). In the end, the best candidates to join trading blocs were countries with complementary factor donations to specialize in various commodities. These consequences did, however, not correspond to after-war facts: trade between equally endowed nations, trade between

industries, and the establishment of the EEC. Moreover, the conventional theory of trade does not work well if development factors are highly mobile. Krugman then increases the risk of second-nature advantages predominantly, such as a historical concentration of the population, over first-nature advantages in a given area. Krugman (1996c) describes trade theory before the new trade theory rises: "It was by no means understandable to observe that increasing returns could lead to the trade among seemingly similar countries. The idea that the trade could represent an overlay of increasing returns specializing in comparative advantages was not intrinsic: the main idea was instead to change the trend of comparative advantage by increasing returns. Indeed, as recently as 1984, many trade theorists still saw a tendency for large countries to export scale-sensitive goods as the major potential contribution of scale economies. There has never been much mention of the main arbitrariness of a specialist in the scale economy, its reliance on history and accidents." Krugman admittedly recognizes, however, that that is not Ohlins view in 1933 and indicates that Ohlin has already recognized and spoken of a "unified field theory" on factor-dependent and scale-based exchange as a significant factor in increasing revenues. This unified theory is a strong background in the method of 'integrated economy', where integration of the theory of trade with the location was the key to the theory of trade after 1980.

2.2 Empirical Review

Considerable economic research has been conducted in investigating the linkages between financial instability, energy prices, trade openness, and economic growth. Some of the latest major studies have been reviewed over the past four years, starting with the work, of Ouyang and Li (2018) which investigated the effect of financial development and energy consumption on the economic growth of China using a GMM panel VAR method with data from 30 provinces of China from 1996Q1 to 2015Q4. The study measured financial development using six different indicators and constructed financial development index with principal component analysis (PCA) techniques. Moreover, the provinces were divided into three regions namely: western region, eastern region, and central region to account for heterogeneity. The result revealed that the financial development index has a negative and significant effect on economic growth. And the result is the same when individual proxies of financial development (M2, insurance, and market capitalization) were used. In addition, energy consumption was found to have a positive and significant impact on economic growth in China, with no reverse effect only in the western region. Moreover, this result was justified by the Granger causality test. Thus, M2, credit to the private sector, market capitalization, and the financial development index were found to negatively affect energy consumption in all three regions. The Granger causality test revealed that heterogeneity exists among the regions, where bidirectional causality was reported between consumption and financial development in the eastern region, in the central region the causality run from energy consumption to financial development, and causality in the western region was found to be insignificant.

Contrastingly, Ridzuan et al. (2018) evaluated the inflation-growth nexus and finance-growth nexus both in the short run and the long run using time series data from 1985 to 2010. The paper employed Autoregressive Distributive Lag (ARDL) method to examine these two nexuses in the Malaysian economy. The other control variables include domestic investment, foreign direct investment (FDI) inflows, and trade openness. The results of this study confirmed the existence of the inflation-growth nexus in the Malaysian economy, which was found to greatly contribute to GDP growth better than finance-led growth. Also, other control variables were found to be positive and significant.

Another study by Swamy and Dharani (2018) examined the causality between financial development and GDP growth of the 24 developed countries with significant financial sector growth, using data from 1983 to 2013. The results show that the linear relationship between financial development and growth was found to be negative and significant in the long run. The bidirectional link was established between financial development and GDP growth. The study used moderation of inflation, interest rate, and population and found that they are substitutes for moderating the relationship between finance and growth in the Malaysian economy. And the interaction coefficient of trade openness was found to be positive and significant, which compliment the finance-growth nexus in Malaysia. Thus, a policy to promote trade openness will contribute greatly to the finance-growth link in the Malaysian economy.

In addition, the work of Huchet et al. (2018) propelled the debate on the finance-growth nexus by taking into account the economic integration aspect of world trade in measuring trade openness. The two variables added were product quality and diversification. The results revealed that economies with quality products and trade in diversified products experienced more growth than others. The result also indicated that a non-linear trend in the trade dependency ratio exists for countries with single or lower-quality products. The work of Saad and Taleb (2018) examined the effects of renewable energy consumption on GDP growth by comparing the long-run and short-run relationship between the variables in 12 European Union member countries from 1990 to 2014. The study employed the dynamic panel Vector Error Correction Model (VECM) and the Granger causality test. The result from the panel Granger causality test shows that in the short-run, there exists causality that runs from renewal energy consumption to economic growth and in the long run bidirectional causal links exist.

The study by Khobai et al. (2018) investigated the long-run link between trade openness and economic growth in Nigeria and Ghana from 1980 to 2016. The study used exchange rate, inflation, and investment as control variables. The unit root tests proposed by Elliot, Rothenberg, and Stock (1996) were employed to determine the nature of the stationarity of the data. The long-run relationship was estimated using the ARDL model and the results revealed that long-run relationships exist between the variables of interest in Nigeria and Ghana. Moreover, the result also found that trade openness has a positive and significant impact on economic growth in Ghana and a negative and insignificant effect on Nigeria. The study concluded that policymakers in

these countries need to apply different policies concerning openness to promote GDP growth in their economies.

Dabachi et al. (2020) examined the causal link between environmental degradation, energy consumption, energy price, energy intensity, and economic growth of the Organisation of Petroleum Exporting Countries (OPEC) of Africa, from 1970 to 2018. The study is based on the balance panel which used a simultaneous equations model and second-generation panel unit root, cointegration techniques, and causality test. The findings show that there exist long-run relationships between the variables. And the results from the causality test revealed that there is a bidirectional causal link between energy consumption and GDP growth; and between environmental degradation and GDP growth, and also between energy prices and GDP growth. The unidirectional causal link runs from GDP growth to energy intensity; and runs from energy consumption to energy intensity. Other findings of the study indicated that a bidirectional causal link exists between energy prices and energy intensity; also, between environmental degradation and energy intensity; and between environmental degradation and energy prices for all the countries. Therefore, the policy regarding energy in those countries should consider the nature of the causality among these variables so that it can promote economic growth and development in those countries. Thus, using the appropriate empirical analysis, this study was able to identify the linkages between financial instability, trade openness, and energy prices in the emerging ASEAN economic growth performance. In addition, this study used an interaction term of energy prices, and the 2014 energy crisis and determined their effect on emerging ASEAN economic growth. The use of dynamic panel methods of analysis will help this study to validate this issue comprehensively.

3.1 Methodology and Empirical Strategies

This work examined the impact of financial instability, oil prices, and trade openness on GDP growth for five emerging Asian countries using dynamic panel data techniques of analysis from 1970 to 2018. These data are obtained from the world development indicators database of the world bank (World Bank, 2020). This study used economic growth as a dependent variable, which is a proxy by the real GDP (RGDP) depilator (2010=100). The financial instability (FI) as one of the explanatory variables of this study include was measured by a composite index comprised of total domestic credit, domestic credit to the private sector, stock market capitalization, broad money(M2), and bank lending rate. Another explanatory variable in the growth equation is the energy prices (EP) measured by the ratio of crude oil price and consumer price index. The other variable of interest is the trade openness (TOP) proxy by summing total export and import of goods and services in monetary terms (US Dollars) as the percentage of GDP. Moreover, this study modeled the impact of the 2014 energy crisis on the GDP growth of ASEAN emerging economies.

$$GDP_{it}=f(LNFI_{it}, LNEP_{it}, LNTOP_{it}, EC_{it},) \quad (1)$$

3.2 Interaction Effect

This study used interaction terms between financial instability and energy price, and between trade openness and energy price to moderate their joint impact on real GDP growth in emerging ASEAN countries by following Jaccard et al. (2003). Thus, the auxiliary regression of the products of the two variables will be estimated against each variable separately. The interaction equation will be specified as follows:

$$LNFI_{it} \times LNEP_{it} + LNTOP_{it} \times LNEP_{it} = \delta_1 + \gamma_1 LNFI_{it} + \gamma_2 LNTOP_{it} + \gamma_3 LNEP_{it} + U_{it} \quad (2)$$

$$\mathrm{LNGDP}_{it} = f(\mathrm{LNFI}_{it}, \mathrm{LNEP}_{it}, \mathrm{LNTOP}_{it}, \mathrm{LNFI}_{it} \times \mathrm{LNEP}_{it}, \mathrm{LNTOP}_{it} \times \mathrm{LNEP}_{it} \quad (3)$$

where the white noise error term is denoted by U_{it}: U_{it} iid (0, σu^2). Thus, the interaction term is derived by estimating the regression and generating its residual.

This work will be started by conducting a slope homogeneity test to determine whether variables have homogenous or heterogeneous slopes. This is the first step in the panel data study, which will pave the way to use dynamic panel data techniques of analysis. The second important step is to conduct a cross-sectional dependency test, to determine whether the variable has a cross-sectional dependency in the error that may relate to the existence of common shock. Moreover, the second-generation panel unit was conducted to determine the nature of the stationarity of the data. CIPS and CADF second-generation panel unit root tests were used based on the following specifications:

$$Y_{i,t} = (1 - \varphi_i)\alpha_i + \varphi_i y_{i,t-1} + \pi_{i,t} i = 1,2,3,\dots,N \; and \; t = 1,2,3,\dots,T \quad (4)$$

$$\pi_{it} = \gamma_i f_t + \mu_{it} \quad (5)$$

where f_t in Equation 5 represents the unobservable effect of each country, μ_{it} Reveals the error term that indicates individual-specific. Thus, the unit root hypothesis is formulated as follows:

$$\Delta y_{it} = \delta_i + \beta y_{i,t-1} + \tau_i f_i + \mu_{it} \quad i = 1,2,3,\dots,N \; and \; t = 1,2,3,\dots,T \quad (6)$$

Thus,

$$H_0: \beta_i = 0 \; upon \; all \; i) \quad (7)$$

$$H_1: \beta_i < 0 \; i = 1,2,3,\dots,N_1 \beta_i = o \quad i = N_1 + 1, N_1 + 2 \dots\dots\dots, N. \quad (8)$$

where in equation 7 the null hypothesis of the existence of a unit root in the series is specified and in equation 8 the alternative of no unit root in the series is formulated. We failed to accept the null if the p-value is significant, and the series will be stationary, and vice versa.

Within the cross-sectional independence hypothesis, this statistic converges to a standard normal distribution (Dabachi et al., 2020). While, Westerlund and Edgerton's (2007) test, permits for structural breaks in both slope and intercept, CSD, and also allows for cross-unit-specific time trends, serially correlated errors, and heteroscedasticity. The test solves CSD with bootstrapping. The residuals are conceded to an $AR(1)$ description. Using stationary component V_{it} and the regressor's first

differences, defined vector as q= $(v_{i,t}, \Delta x_{i,t})$ and the infinite autoregressive representation as:

In specifying the cross-sectional dependency hypothesis, the statistics converge to a standard normal distribution. Nonetheless, the test proposed by Westerlund and Edgerton (2007) takes into account the existence of structural breaks in slope and intercept, cross-sectional dependency, serial correlation, and homoscedasticity in the series.

$$\sum_{j=0}^{\infty} \emptyset_{i,t} \varphi_{i,t-j} = \rho_{i,t} \tag{9}$$

Here, $\rho_{i,t}$ indicated the stationarity process, and equation 9 is an autoregressive model of limited-order σ; j=0 is used

Next, Pesaran et al. (1999) categorized a number of factors that can be recognized as homogeneity in the long-run relationship which was covered by all groups, for examples; common technologies, institutional development, and arbitration condition. In principle similar algorithm can be used to compute the PMG estimators regardless of whether the regressors are I(0)/I(1), underlying asymptotic theories for these two cases are basically diverse and, their derivations necessitate distinct treatments. The lag order was first chosen in every country on the unrestricted model by the Schwarz Bayesian criterion (SBC). The PMG estimation used in this study can be stated as follow. The work of Pesaran et al. (1999) argued that some common factors may serve as homogeneous factors in the affecting long run relationships for all groups, for instance, similar technological development, institutional factors and arbitration. However, the same algorithm is used to estimated Pool Mean Group (PMG) model irrespective of whether the series are I(1) or I(0), or combination of both. Asymptotically, the two cases are different, thus their estimations may require varied approach. The unrestricted model lag order was selected by following Schwarz Bayesian Criterion (SBC). The PMG model is specified as follows:

$$\Delta LNGDP_{it} = \beta_1 + \gamma T + \sum_{j=1}^{p-1} \partial_{ij} \Delta LNGDP_{it-j} + \sum_{1=0}^{q-1} \gamma_{ij} \Delta LNFI_{ij-1} + \sum_{1=0}^{r-1} \delta_{ij} \Delta LNEP_{ij-1} + \sum_{1=0}^{s-1} \varphi_{ij} \Delta LNTOP_{ij-1} + \pi_1 LNGDP_{ij-1} + \pi_2 LNFI_{ij-1} + \pi_3 LNEP + \pi_4 LNTOP_{ij-1} + \mu_{1it} + \varepsilon_{1it} \tag{10}$$

$$\Delta LNGDP_{it} = \beta_1 + \sum_{j=1}^{p-1} \partial_{ij} \Delta LNGDP_{it-j} + \sum_{1=0}^{q-1} \gamma_{ij} \Delta LNFI_{ij-1} + \sum_{1=0}^{r-1} \delta_{ij} \Delta LNEP_{ij-1} + \sum_{1=0}^{s-1} \varphi_{ij} \Delta LNTOP_{ij-1} + \sum_{1=0}^{z-1} \vartheta_{ij} \Delta LN(FI \times EP)_{ij-1} + \sum_{1=0}^{m-1} \vartheta_{ij} \Delta LN(TOP \times EP)_{ij-1} + \pi_1 LNGDP_{ij-1} + \pi_2 LNFI_{ij-1} + \pi_3 LNEP_{ij-1} + \pi_4 LNTOP_{ij-1} + \pi_5 LN(FI \times EP)_{ij-1} + \pi_6 LN(TOP \times EP)_{ij-1} + \mu_{1it} + \varepsilon_{1it} \tag{11}$$

Equations 10 and 11 respectively, Δ stand for the first difference indicator, LGDP is the real *GDP, LFI* is financial instability*; LEP* is the energy price and *LTOP* is the trade openness. Where $\beta_1$is the intercept, $\partial_{ij}, \gamma_{ij}, \delta_{ij} \varphi_{ij}$ are the short-run parameters to be estimated, $\pi_1, \pi_2 \pi_3 \pi_4, \pi_5$ stand for long run parameters, *p, q, r, s,* and m are the different maximum lag selected, ε_{1it} is the normal error term. The error correction term

represents the short-run dynamics that show how the short-run deviation can be corrected. It is established that economic relationships are designed in such a way, a causal link in a particular economy or firm, may likely be obtained in some other economies or firms. Therefore, causal relationships can be evaluated in a panel data setting, due to heterogeneity across individual units (Dumitrescu and Hurlin, 2012). The non-Granger causality test proposed by Dumitrescu and Hurlin (2012) based on the heterogeneous panel is presented as follows:

$$\Delta LNGDP_{i,t} = \beta_i + \sum_{k=1}^{K} \partial_i^{(k)} \Delta LNGDP_{i,t-k} + \sum_{k=1}^{K} \gamma_i^{(k)} \Delta LNFI_{i,t-k} + \sum_{k=1}^{K} \delta_i^{(k)} \Delta LNEP_{i,t-k} + \sum_{k=1}^{K} \theta_i^{(k)} \Delta LNTOP_{i,t-k} + \varepsilon_{i,t} \quad (12)$$

$$\Delta LNFI_{i,t} = \beta_i + \sum_{k=1}^{K} \gamma_i^{(k)} \Delta LNFI_{i,t-k} + \sum_{k=1}^{K} \partial_i^{(k)} \Delta LNGDP_{i,t-k} + \sum_{k=1}^{K} \delta_i^{(k)} \Delta LNEP_{i,t-k} + \sum_{k=1}^{K} \theta_i^{(k)} \Delta LNTOP_{i,t-k} + \varepsilon_{i,t} \quad (13)$$

$$\Delta LNEP_{i,t} = \beta_i + \sum_{k=1}^{K} \delta_i^{(k)} \Delta LNEP_{i,t-k} + \sum_{k=1}^{K} \gamma_i^{(k)} \Delta LNFI_{i,t-k} + \sum_{k=1}^{K} \partial_i^{(k)} \Delta LNGDP_{i,t-k} + \sum_{k=1}^{K} \theta_i^{(k)} \Delta LNTOP_{i,t-k} + \varepsilon_{i,t} \quad (14)$$

$$\Delta LNTOP_{i,t} = \beta_i + \sum_{k=1}^{K} \theta_i^{(k)} \Delta LNTOP_{i,t-k} + \sum_{k=1}^{K} \delta_i^{(k)} \Delta LNEP_{i,t-k} + \sum_{k=1}^{K} \gamma_i^{(k)} \Delta LNFI_{i,t-k} + \sum_{k=1}^{K} \partial_i^{(k)} \Delta LNGDP_{i,t-k} + \varepsilon_{i,t} \quad (15)$$

Here, in equations 12, 13, 14 and 15 β_i stands for intercept, K is the common maximum lag order; and $\partial_i^{(k)}, \gamma_i^{(k)}, \delta_i^{(k)}$ and $\theta_i^{(k)}$ represents the parameters that are expected to vary across the groups. The is specified as a fixed effect with fixed individual specific effect and the null hypothesis is formulated based on a heterogeneous non-Granger causal link between variables,

$$H_0: \partial_i^{(k)}, \gamma_i^{(k)}, \delta_i^{(k)} \; and \; \theta_i^{(k)} = 0 \quad (16)$$

where, in equation 16 the null hypothesis stated that there is no causal link between all the variables, which will be rejected when the p-value is significant and vice versa.

4.1 Estimation Results

This work conducted descriptive statistics presented in Table 2 for the selected countries in our sample and shows that Kurtosis and Skewness are asymmetrical in distribution.

Moreover, the Jarqeu-Bera results are all significant at 1%, which indicated that the variables are normally distributed (Ahmad et al., 2015a; 2015b; 2015c). The correlation matrix also indicated that all the correlation coefficients are below 60% none of the variables has higher explanatory power, thus, the model is fit and well specified. The summary of the correlations matrix (Table 3) revealed that financial instability and trade openness tend to decrease the level of economic GDP growth, while energy prices tend to promote GDP growth in the top ASEAN economies.

Table 2. Descriptive Statistics

	$LNGDP_{it}$	**$LNFI_{it}$**	**$LNEP_{it}$**	**$LNTOP_{it}$**
Mean	1.692806	-4.08E-09	0.897575	4.634664
Median	1.783151	-0.391300	0.565522	4.552923
Maximum	2.675916	4.144408	6.834165	6.080681
Minimum	-2.111933	-3.160980	0.072590	3.356292
Std. Dev.	0.612229	1.751587	1.053169	0.746132
Skewness	-2.248998	0.378479	2.894326	0.440631
Kurtosis	11.42736	2.069413	12.04371	1.938825

Source: Research findings.

Table 3. Correlation Matrix

Variables	**$LNGDP_{it}$**	**LNFIit**	**$LNEP_{it}$**	**$LNTOP_{it}$**
$LNGDP_{it}$	1.000			
$LNFI_{it}$	0.065	1.000		
	[1.029]			
	(0.304)			
$LNEP_{it}$	-0.033	-0.230*	1.000	
	[-0.5114]	[-3.687]		
	(0.609)	(0.000)		
$LNTOP_{it}$	0.057	0.504*	-0.418*	1.000
	[0.904]	[9.102]	[-7.177]	
	(0.3667)	(0.000)	(0.000)	

Source: Research findings.

This study used two different cross-sectional dependency tests by Pesaran (2007) to evaluate the nature of panel data, and whether the series are cross-sectional independent. The cross-section dependence result presented in Table 4 indicated that real GDP, financial instability, trade openness, and energy prices are found to have a cross-sectional dependency, where we failed to accept the null hypothesis of cross-sectional independence. This result indicated that cross-sectional dependence exists in our variable in the series, therefore second-generation dynamic panel methods can be used, to estimate our models. The VIF statistics of all variables are within the range (see Table 4).

Table 4. Second Generation Pre-Test

	Delta	**p-value**	**VIF**
adj	5.542	0.000	
	5.848	0.000	
$\boldsymbol{LNFI_{it}}$			1.34
$\boldsymbol{LNEP_{it}}$			1.21
$\boldsymbol{LNTOP_{it}}$			1.54
Pesaran test	5.046*		

	Delta	p-value	VIF
Friedman test	121.550*		
Frees test	0.911*		

Source: Research findings.

The two different panel unit root tests were used and the results are presented in Table 4. The CIPS and CADF unit root tests conducted shows that all the null hypothesis of unit roots at first difference. Thus, the real GDP variable is significant at a level and first difference, which shows that RGDP is I(0). The variable financial instability, energy price, and trade openness are all significant at the first difference, which shows that they are all I(1).

Table 5. Second Generation Unit Root Test

Variables	CIPS	CADF	Order of Integration
$LNGDP_{it}$	-4.803*	-3.909*	I(0)
$\Delta LNFI_{it}$	-5.268*	-4.764*	I(1)
$\Delta LNEP_{it}$	-6.103*	-5.008*	I(1)
$\Delta LNTOP_{it}$	-6.001*	-5.244*	I(1)

Source: Research findings.

The result of the cointegration test was presented in Table 6. The study conducted by Westerlund and Edgerton (2007) ECM panel cointegration test and the results revealed that the null hypothesis of no cointegration was rejected at constant as well as trend and constant for all the four Westerlund statistics ($G\tau$, Gα, $P\tau$ and $P\alpha$). This indicated that all the variables: real GDP, financial instability, energy price, and trade openness are all cointegrated in the long run. Our results are supported by other findings in the pieces of literature (Aizenman et al., 2015; Mugableh, 2015; Heidari et al., 2016; Inoue and Hamari, 2016) that also found the existence of long-run relationship between real GDP, finance, energy prices and trade openness.

Table 6. Westerlund ECM Panel Cointegration Tests

Constant				Constant and Trend		
Statistics	**Value**	**P-value**	**Robust P-value**	**Value**	**P-value**	**Robust P-value**
Gt	-3.757**	0.016	0.040	-4.221*	0.006	0.000
Ga	-18.017**	0.406	0.040	-16.463**	0.865	0.020
Pt	-8.759*	0.003	0.000	-8.660*	0.019	0.000
Pa	-24.758**	0.002	0.020	-24.294**	0.060	0.020

Source: Research findings.

Notes: * and ** denotes rejection of the null hypothesis of no cointegration at 1 and 5% levels of significance respectively for Westerlund estimates. The AIC is used to choose the optimal lead and lag.

This work used the PMG method to estimate our models formulated equation in (10) and (11), the results are presented in Table 7. The study estimated two models, in which the GDP (LNGDP) served as a dependent variable. Model I is our baseline model estimated with three explanatory variables and model II was estimated with two interaction terms and known structural breaks (2014 Energy Crisis). Where the long-run coefficient of financial instability (LNFI) and energy prices (LNEP) were found to be negative and significant in both models. Also, the proxy of trade openness (LNTOP) was found to be positive and significant in both model I and model II. Conversely, the 2014 energy crisis is significantly and negatively affecting economic growth. The

negative impacts of financial instability on economic growth show that when there is a financial crisis or financial shock in the economy, it will negatively affect productivity and economic growth. Also, the negative effect of financial instability may result in a financial crisis that will also affect the real economy. This finding is supported by Batuo and Kupukile's (2012) study in African countries. The negative coefficient of energy price and the 2014 energy crisis also tend to cause instability in macroeconomic variables, destabilized productivities, consumptions, and investment expenditures, hence negatively affecting GDP growth. The negative sign of energy price conflict with the findings of Lee and Chang (2005), Behbondi et al. (2013), Amri (2017), and Bekhet et al. (2017), that reported that energy prices positively affect economic growth, as the higher energy prices improve export earnings.

Moreover, the insignificant coefficient of trade openness indicated that trade liberalization has little impact on the growth prospect of emerging ASEAN countries. The positive coefficient of trade openness was supported by the work of Faisal et al. (2017), Iyke (2017), and Keho (2017). The positive coefficient of trade openness also is justified by the endogenous growth theory that argued that trade openness promotes economic growth. in addition, openness promotes the efficient allocation of productive resource, promote technological development, and increases total factor productivity. But, in model II with interaction terms, the trade openness coefficient is negative and significant, which revealed that trade openness may hamper economic growth. Furthermore, the error correction term is reported to be negative and significant, which shows that any deviation from the long-run path can be corrected, with a speed of adjustment at 34% per year.

Table 7. Pooled Mean Group Estimates with Interaction Term

Dependent variable: $LNRGDP_{it}$						
Model I				**Model II**		
Long-run estimates						
$LNFI_{it}$	-0.600* [-8.028]	0.048	0.000	-0.125* [-8.028]	0.059	0.000
$LNEP_{it}$	-0.446* [3.301]	0.058	0.001	-0.388** [-2.445]	0.085	0.015
$LNTOP_{it}$	0.381* [2.855]	0.023	0.004	0.704* [-3.045]	0.022	0.003
$LN\,(EP\times TOP)_{it}$				0.197* [6.982]	0.042	0.001
$LN\,(EP\times TOP)_{it}$				-0.357* [3.982]	0.021	0.001
EC				-0.346* [-3.885]	0.141	0.000
Short-run estimates				***Short-run estimates***		
$\Delta LNFI_{it}$	-0.143* [6.218]	0.058	0.000	-0.773 [-0.095]	0.028	0.925
$\Delta LNEP_{it}$	0.591* [1.176]	0.063	0.242	0.179 [0.779]	0.061	0.437
$\Delta LNTOP_{it}$	0.335 [-1.124]	0.036	0.263	0.492 [1.937]	0.064	0.054
$\Delta LN\,(EP\times TOP)_{it}$				0.131 [-1.790]	0.021	0.076
$\Delta LN\,(EP\times FI)_{it}$				-0.360 [-1.790]	0.125	0.076

Dependent variable: $LNRGDP_{it}$						
Model I				**Model II**		
ΔEC				0.109 [1.790]	0.598	0.420
ect_{t-1}	-0.794* [-13.74]	0.058	0.000	-0.781* [-6.686]	0.117	0.000
Optimal lag length (1,1,1,1)				(1,1,1,1,1,1,1)		

Source: Research findings.

This study moderates the impact of financial instability with energy prices $LN(FI \times EP)$ on economic growth; and the impact of trade openness with energy prices $LN(TOP \times EP)$ on the economic growth of emerging ASEAN countries. When the outcomes of these interactions are positive and significant, moderating the effect of financial instability with energy prices, and trade openness with energy prices are complimentary and when it is negative and significant, the effect is substituted. The complementary effect means that the impacts of financial instability on economic growth continue to rise with a rise in energy prices. Similarly, the effect of trade openness on the economy also rises with an increase in energy prices in emerging ASEAN countries. Thus, the reverse will be the case when the effect of interaction is substituted.

From the Table, the result indicates that the interaction term trade openness energy prices were positively related to the economic growth in the long-run and short-run respectively in the emerging ASEAN economies. This positive sign shows that the effect of trade openness on economic growth increases with energy prices. Furthermore, the interaction term financial instability energy prices were negatively related to economic growth. This negative sign shows that the effect of financial instability on economic growth decreases with energy prices.

Based on the interaction result presented in Table 7, the interaction term between financial instability and energy prices is positive and significant, which indicated that moderating the effect of financial instability with energy is complimentary. Thus, the effect of financial instability on economic growth in ASEAN countries increases when energy prices rise. Nonetheless, the interaction term between trade openness and energy prices is negative and significant, which shows that they are substitutes. This revealed that the effect of trade openness on GDP growth in ASEAN countries increases when energy prices decrease.

Furthermore, the DH causality revealed unidirectional running from financial instability to economic growth, trade openness to economic growth, and economic growth to oil prices in the emerging ASEAN economies. The unidirectional causality running from energy prices to economic growth is consistent with Dristsaki and Dritsaki (2014), and Asongu et al. (2015) findings. This result also indicates that the emerging ASEAN countries' trade openness facilitates economic growth by the exploitation of economies of scale, reducing the obligatory constraint to allow increases in the import of capital and intermediate goods enhancing efficiency through increased competition, and encouraging the dissemination of knowledge through learning by doing. The results

of this study support the argument that trade openness will continue to be viewed as a key determinant of economic growth.

The study conducted a causality test proposed by Dumitrescu and Hurlin (2012), and the result presented in Table 8 shows that there is unidirectional causality that runs from financial instability (LNFI) to economic growth (LNGDP); also runs from energy price (LNEP) to economic growth, and another one runs from trade openness (LNTOP) to economic growth. No reverse causality exists between any of the explanatory variables and the dependent variable (LNGDP). The causality that runs from financial instability to growth indicated that in times of financial crisis or financial shocks, the level of economic activities will decline, which will negatively affect economic growth. Moreover, the causal link that runs from energy prices to economic growth may result from increased earnings from the sale of energy, which will increase the level of national income, hence GDP growth. This finding is supported by Dristsaki and Dritsaki (2014), and Asongu et al. (2015). The result of causality between trade openness and growth may emanate from increased competition, transfer of technology, and capital inflows which positively affect the level of productivity and promote growth and development. Overall, the results from the PMG estimators are consistent with causality results, which justified the findings of this study.

Table 8. Emerging ASEAN Granger Causality Results

	$LNFI \; -/\rightarrow \; LNGDP$	$LNFI \leftarrow/- \; LNGDP$
W^{Hnc}	-3.712*	0.470
Z_{NT}^{Hnc}	3.887	-0.840
	$LNEP \; -/\rightarrow \; LNGDP$	$LNEP \leftarrow/- \; LNGDP$
W^{Hnc}	3.125*	1.551
Z_{NT}^{Hnc}	3.031	0.735
	$LNTOP \; -/\rightarrow \; LNGDP$	$LNTOP \leftarrow/- \; LNGDP$
W^{Hnc}	3.879*	1.579
Z_{NT}^{Hnc}	4.132	0.777

Source: Research findings.

5. Conclusion

This study examined the effect of financial instability, energy prices, and trade openness on the economic growth of emerging ASEAN countries. The study conducted various econometrics procedures and PMG methods were used to estimate our models. The findings indicated that financial instability and energy prices negatively affect growth, and trade openness was found to promote economic growth in ASEAN countries in our sample. The interaction of financial instability with energy price was found to be positive and complimentary and on the other hand, the interaction between trade openness and energy price was found to be negative, hence the effect is a substitute. The study made the following conclusions. Firstly, the study established that there exists a long-run relationship between financial instability, energy prices, trade openness, and economic growth in ASEAN countries. Secondly, the result from PMG also confirmed the cointegration test, where financial instability and energy prices were found to have a negative and significant effect on economic growth. And also trade openness was found to have a significant positive effect on economic growth in ASEAN countries. Thirdly, the positive coefficient from the interaction of financial instability with energy prices

confirmed the important role that energy prices play in stabilizing macroeconomic variables. Moreover, the negative coefficient from the interaction of trade openness and energy prices also indicated that the effect of trade restrictions and energy prices on economic growth substitute one another in ASEAN countries. There is an urgent need for ASEAN countries to consider adopting a coordinated policy framework regarding financial instability, energy prices, and trade openness as they have a long-run effect on economic growth in their economies. Openness regulations have to be considered because they can be a source of financial instability and may negatively affect capital formations, financial intermediations as well as financial development. A comprehensive energy policy should be formulated to regulate energy use and stabilize the energy prices in ASEAN countries, as energy may have a negative effect on their economies since most of the emerging ASEAN countries did not depend on oil revenue.

References

Adusei, M. (2014). Does Stock Market Development Promote Economic Growth in Ghana? *International Journal of Economics and Finance*, *6*(6), 119-126.

Ahmad, A. U., Abdullah, A., Abdullahi, A. T., & Muhammad, U. A. A. (2015a). Stock Market Returns and Macroeconomic Variables in Nigeria: Testing For Dynamic Linkages with a Structural Break. *Scholars Journal of Economics, Business and Management, 2*(8A), 816-28.

Ahmad, A. U., Abdullah, A., Sulong, Z., & Abdullahi, A. T. (2015b). Causal Relationship between Stock Market Returns and Macroeconomic Variables in Nigeria. *IOSR Journal of Humanities and Social Science, 20*(5), 74-96.

Ahmad, A. U., Abdallah, A., Sulong, Z., & Abdullahi, A. T. (2015c). An Autoregressive Distributive Lag for the Analysis of Macroeconomic Variables on Stock Market Returns in Nigeria. *Advances in Environmental Biology, 1*, 481-502.

Ahmad, A. U., Loganathan, N., Streimikiene, D., & Hassan, A. A. G. (2018). Financial Instability, Trade Openness and Energy Prices on Leading African Countries Sustainable Growth. *Economic Computation and Economic Cybernetics Studies and Research, 52*(1), 127-142.

Aizenman, J., Jinjarak, Y., & Park, D. (2015). Financial Development and Output Growth in Developing Asia and Latin America: A Comparative Sectoral Analysis. *National Bureau of Economic Research, 20917*, 1-18.

Ali, M. A., & Aamir, N. (2014). Stock Market Development and Economic Growth: Evidence from India, Pakistan, China, Malaysia and Singapore. *International Journal of Economics, Finance and Management Sciences*, *2*(3), 220-226.

Alkhawaldeh, B. Y., Mahmood, S., & Jakada, A. H (2020). An Empirical Assessment of the Effect of Taxes and Interest Rate on Economic Growth in Jordan: An Application of Dynamic Autoregressive-Distributed Lag. *Research in World Economy, 11*(3), 1-7.

Asongu, S., El Montasser, G., & Toumi, H. (2015). Testing the Relationships between Energy Consumption, CO_2 Emissions, And Economic Growth in 24 African Countries: A Panel ARDL Approach. *Environmental Science and Pollution Research, 23*(7), 1-11.

Awokuse, T. O. (2008). Trade Openness And Economic Growth: Is Growth Export-Led Or Import-Led? *Applied Economics, 40*(2), 161-173.

Batuo E. M., & Kupukile, M. (2012). Financial Instability, Financial Openness and Economic Growth in African Countries. *MPRA, 43340*, 1-31.

Behboudi, D., Panahi, H., & Moosavi, S. (2013). An Investigation of the Contribution of Renewable and Non-Renewable Energy Consumption to Economic Growth in OIC Countries. *International Journal of Economics, Management and Accounting, 21*(2), 45-47.

Bibi, S., Ahmad, S. T., & Rashid, H. (2014). The Impact of Trade Openness, FDI, Exchange Rate and Inflation on Economic Growth: A Case Study of Pakistan. *International Journal of Accounting and Financial Reporting, 4*(2), 236-257

Carlos Bresser-Pereira, L. (2019). Secular Stagnation, Low Growth, and Financial Instability. *International Journal of Political Economy, 48*(1), 21-40.

Chistik, O. F., & Eliseev, V. A. (2019). The Index of Inclusive Development in Formation of the New Concept of Economic Growth. *SHS Web of Conferences, 62*, 1-5.

Dabachi, U. M., Mahmood, S., Ahmad, A. U., Ismail, S., Farouq, I. S., Jakada, A. H., Mustapha, U. A., Aliyu, U., Abdullahi, A. T., Muhammad, A. A., & Kabiru, K. (2020). Energy Consumption, Energy Price, Energy Intensity Environmental Degradation, and Economic Growth Nexus in African OPEC Countries: Evidence from Simultaneous Equations Models. *Journal of Environmental Treatment Techniques, 8*(1), 403-409.

Demirguc-Kunt, A., & Levine, R. (1996), Stock Markets, Corporate Finance and Economic Growth: an Overview. *The World Bank Economic Review, 10*(2), 223-40.

Destek, M. A. (2015). Nuclear Energy Consumption and Growth Nexus in G-6: Evidence from Bootstrap Rolling Window. *International Journal of Energy Economics and Policy, 5*(3), 759-764

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association*, *74*(366a), 427-431.

Dritsaki, C., & Dritsaki, M. (2014). CO_2 Emissions, Energy Consumption, Financial Development and Economic Growth. *World Applied Sciences Journal*, *32*(2), 309-321.

Ductor, L., & Grechyna, D. (2015). Financial Development, Real Sector, and Economic Growth. *International Review of Economics & Finance*, *37*(2), 393-405.

Dumitrescu, E. I., & Hurlin, C. (2012). Testing for Granger Non-Causality in Heterogeneous Panels. *Economic Modelling*, *29*(4), 1450-1460.

Eriemo, N. O. (2014). Banking Sector Reforms and Critical Factors in Nigeria's Economic Growth Process. *Journal of Economics and Sustainable Development, 5*(17), 249-469.

Hahm, J. H., & Mishkin, F. S. (2000). Causes of the Korean Financial Crisis: Lessons for Policy. *National Bureau of Economic Research*, *7483*, 1-15.

Hailemariam, C., & Guotai, C. (2014). Stock Market Development and Economic Growth: Empirical Evidence for Emerging Market Economies. *International Journal of Economics, Finance and Management Sciences*, *2*(2), 171-181.

Heidari, H., Katircioğlu, S. T., & Saeidpour, L. (2016). Economic Growth, CO_2 Emissions, And Energy Consumption in the Five ASEAN Countries. *International Journal of Electrical Power & Energy Systems*, *64*(1), 785-791.

Hossain, T., & Maitra, B. (2020). Monetary Policy, Trade Openness and Economic Growth in India under Monetary-Targeting and Multiple-Indicator Approach Regimes. *Arthaniti: Journal of Economic Theory and Practice*, *19*(1), 108-124.

Inoue, T., & Hamori, S. (2016). Financial Access and Economic Growth: Evidence from Sub-Saharan Africa. *Emerging Markets Finance and Trade*, *52*(3), 1-11.

Jakada, A. H., Mahmood, S., Ahmad, A. U., Faruq, I. S., & Mustapha, U. A. (2020a). The Effect of Oil Price on the Quality of Environment in Nigeria. *International Journal of Scientific & Technology Research*, *9*(3), 1-8.

Jakada, A. H., Mahmood, S., Ahmad, A. U., Farouq, I. S., & Mustapha, U. A. (2020b). Financial Development and the Quality of the Environment in Nigeria: An Application of Non-Linear ARLD Approach. *Journal of Environmental Treatment Techniques, 8*(1), 403-409.

Jakada, A. H., Mahmood, S., Ahmad, A. U., & Bambale, S. A. (2020c). Heterogeneous Moderating Influence of Economic Growth on Financial Development and Environmental Quality in Africa. *Journal of Critical Reviews, 7*(14), 127-133.

Jakada, A. H., & Mahmood, S. (2020d). An Asymmetric Effect of Economic Growth, Foreign Direct Investment and Financial Development on the Quality of Environment in Nigeria. *The Journal of Management Theory and Practice (JMTP), 1*(1), 5-13.

Jalloh, M. (2015). Does Stock Market Capitalization Influence Economic Growth In Africa? Evidence from Panel Data. *Applied Economics and Finance, 2*(1), 91-101.

Judith, M. N., Ugochukwu, U. S., & Ugwuoke, R. O. (2014). The Impact of Bank Credit on the Growth of Nigerian Economy: A Cointegration Approach. *Research Journal of Finance and Accounting, 5*(10), 87-95.

Kamalu, K., Wan Ibrahim, W. H., Ahmad, A. U., & Mustapha, U. A. (2019). Causal Link between Financial Developments, Financial Inclusion and Economic Growth in Nigeria. *International Journal of Scientific and Technology Research, 8*(12), 2757-2763.

Keen, S. (2020). Emergent Macroeconomics: Deriving Minsky's Financial Instability Hypothesis Directly from Macroeconomic Definitions. *Review of Political Economy*, *32*(3), 342-370.

Kumar, R. R., Stauvermann, P. J., Loganathan, N., & Kumar, R. D. (2015). Exploring the Role of Energy, Trade and Financial Development in Explaining Economic Growth in South Africa: a Revisit. *Renewable and Sustainable Energy Reviews*, *52*(4), 1300-1311.

Kyophilavong, P., Shahbaz, M., Anwar, S., & Masood, S. (2015). The Energy-Growth Nexus in Thailand: Does Trade Openness Boost Up Energy Consumption? *Renewable and Sustainable Energy Reviews*, *46*(2), 265-274.

Lamperti, F., Bosetti, V., Roventini, A., & Tavoni, M. (2019). The Public Costs of Climate-Induced Financial Instability. *Nature Climate Change*, *9*(11), 829-833.

Larsson, R., Lyhagen, J., & Löthgren, M. (2001). Likelihood-based Cointegration Tests in Heterogeneous Panels. *Econometrics Journal*, *4*(1), 109-142.

Le, T. H. (2015). Dynamics between Energy, Output, Openness and Financial Development in Sub-Saharan African Countries. *Applied Economics*, *48*(10), 1-20.

Lee, C. C., & Chang, C. P. (2005). Structural Breaks, Energy Consumption, And Economic Growth Revisited: Evidence from Taiwan. *Energy Economics, 27*(6), 857-872.

Madalla, G. S., & Wu, S. A. (1999). Comparative Study of Unit Root Tests with Panel Data and a New Simple Test. *Oxford Bulletin of Economics and Statistics, 108*(S1), 1-24.

Modebe, N. J., Ugwuegbe, S. U., & Ugwuoke, R. O. (2014). The Impact of Bank Credit on the Growth of Nigerian Economy: A Cointegration Approach. *Research Journal of Finance and Accounting, 5*(10), 87-95.

Mugableh, M. I. (2015). Economic Growth, CO_2 Emissions, and Financial Development in Jordan: Equilibrium and Dynamic Causality Analysis. *International Journal of Economics and Finance*, *7*(7), 98-105.

Mukhammadsidiqov, M., & Turaev, A. (2020). The Influence of the Energy Factor on Modern International Relations. *The American Journal of Political Science Law and Criminology*, *2*(12), 5-15.

Narayan, P. K., Sharma, S., Poon, W. C., & Westerlund, J. (2014). Do Oil Prices Predict Economic Growth? New Global Evidence. *Energy Economics*, *41*(1), 137-146.

Nyasha, S., & Odhiambo, N. M. (2016). Financial Intermediaries, Capital Markets, and Economic Growth: Empirical Evidence from Six Countries. *Unisa Economic Research Working Paper Series, 19908,* 1-14.

Obademi, E. O., & Elumaro, A. (2014). Banks and Economic Growth in Nigeria: A Re-Examination of the Financial Repression Hypothesis. *American Journal of Business and Management*, *3*(1), 1-9.

Panayotou, T. (2016). Economic Growth and the Environment. *The Environment in Anthropology*, *1*, 140-148.

Parikh, A., & Stirbu, C. (2004). The Relationship between Trade Liberalisation, Economic Growth and Trade Balance: An Econometric Investigation. *HWWA Discussion Paper, 282*, 1-25.

Pedroni, P. (2004). Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the PPP Hypothesis: New Results. *Econometric Theory*, *20*(03), 597-627.

---------- (1999). Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors. *Oxford Bulletin of Economics and Statistics*, *61*(1), 653-670.

Pedrosa, Í. (2019). Firms' Leverage Ratio and the Financial Instability Hypothesis: An Empirical Investigation for the US Economy (1970–2014). *Cambridge Journal of Economics*, *43*(6), 1499-1523.

Pesaran, M. H. (2007). A Simple Panel Unit Root Test in The Presence of Cross-Section Dependence. *Journal of Applied Economics, 22*(2), 265-312.

Pesaran, M. H., Shin, Y., & Smith, R. J. (1999) Bound Testing Approaches the Analysis of The Level Relationship. *Journal of Applied Economics, 16*(3), 289-326.

Phillips, P. C. B., & Perron, P. (1988). Testing for Unit Roots in Time Series Regression. *Biometrika, 75*(2), 335-346.

Safronchouk, M. (2020). The Concept of Economic Growth Through Digital Economy Perspective. *SSRN, 3631153*, 1-23.

Sharma, R., & Bardhan, S. (2016). Finance-Growth Nexus across Indian States: Evidence From Panel Cointegration And Causality Tests. *Economic Change and Restructuring*, *50*(1), 1-20.

Siddique, H. M. A., & Majeed, M. T. (2015). Energy Consumption, Economic Growth, Trade and Financial Development Nexus in South Asia. *Pakistan Journal of Commerce and Social Science*, *9*(2), 658-682.

Walby, S. (2018). The Concept of Inclusive Economic Growth. *Soundings, 68*(68), 138-156.

World Bank. (2020). World Development Indicators. Retrieved from http://www. worldbank.org/data/online databases/onlinedatabases.html.

Woźniak, J., Krysa, Z., & Dudek, M. (2020). Concept of Government-Subsidized Energy Prices for a Group of Individual Consumers in Poland as a Means to Reduce Smog. *Energy Policy*, *144*, 1-12.