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THE ROLE OF FOREIGN DIRECT INVESTMENT IN PROMOTING ECONOMIC GROWTH OF DEVELOPING NATIONS

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M.Sc.THESIS

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Approval

We certify that we have read the thesis submitted by Abdiladif Mohamed IBRAHIM titled **"The role of foreign direct investment in promoting economic growth of developing nations"** and that in our combined opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Business Administration.

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Declaration

I hereby declare that all information, documents, analysis and results in this thesis have been collected and presented according to the academic rules and ethical guidelines of Institute of Graduate Studies, Near East University. I also declare that as required by these rules and conduct, I have fully cited and referenced information and data that are not original to this study.

Abdiladif Mohamed IBRAHIM

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Abdiladif Mohamed IBRAHIM

Abstract

The impact of unemployment on economic growth of Ethiopia

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Economic development is essential for the success of a nation because a nation with high level economic development has the ability to raise the quality of life of its citizens through the provision of food, as well as improving the health facilities of the people. Developing countries do not have the ability to raise economic growth due to poor technological advances, poor machineries and infrastructure responsible for improving industrial production. The present research aims to investigate the significance of foreign direct investment in fostering economic development in the developing West African nations, using annual data set from 1990 to 2020. The main research novelty is that it seeks to examine if developing nations who have less capital and technological advancement to promote economic growth may make use of funds from foreign investors to advance economic development. The research is also crucial because it gives policies on what can be done in the developing nations to eradicate poverty through the improvement of economic performance. The data is also analyzed with the panel Autoregressive Distributive Lag tools, that is, the Pooled Mean Group, Dynamic Fixed Effects and Mean Group, together with the Fixed Effects and Random Effects tools. Major findings depict that foreign direct investment and capital promotes economic development, while labor and energy do not significantly influence economic development. Policies which can be followed to raise economic development in the study region are given.

***Key Words**:* Economic growth, Foreign direct investment, Capital, Labor

Soyut

Gelişmekte olan ulusların ekonomik büyümesini teşvik etmede doğrudan yabancı yatırımın rolü

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Ekonomik kalkınma, bir ulusun başarısı için şarttır, çünkü yüksek düzeyde ekonomik kalkınmaya sahip bir ulus, halkın sağlık olanaklarını iyileştirmenin yanı sıra, gıda sağlanması yoluyla vatandaşlarının yaşam kalitesini yükseltme yeteneğine sahiptir. Gelişmekte olan ülkeler, zayıf teknolojik ilerlemeler, zayıf makineler ve endüstriyel üretimi iyileştirmekten sorumlu altyapı nedeniyle ekonomik büyümeyi artırma yeteneğine sahip değiller. Mevcut araştırma, 1990'dan 2020'ye kadar olan yıllık veri setini kullanarak, gelişmekte olan Batı Afrika ülkelerinde ekonomik kalkınmayı teşvik etmede doğrudan yabancı yatırımın önemini araştırmayı amaçlamaktadır. ekonomik büyümeyi teşvik etmek için teknolojik ilerleme, ekonomik kalkınmayı ilerletmek için yabancı yatırımcılardan gelen fonlardan yararlanabilir. Araştırma, ekonomik performansın iyileştirilmesi yoluyla yoksulluğu ortadan kaldırmak için gelişmekte olan ülkelerde neler yapılabileceğine dair politikalar verdiği için de çok önemlidir. Veriler ayrıca, Sabit Etkiler ve Rastgele Etkiler araçlarıyla birlikte Panel Otoregresif Dağıtıcı Gecikme araçları, yani Havuzlanmış Ortalama Grup, Dinamik Sabit Etkiler ve Ortalama Grup ile analiz edilir. Başlıca bulgular, doğrudan yabancı yatırım ve sermayenin ekonomik kalkınmayı desteklediğini, emek ve enerjinin ise ekonomik kalkınmayı önemli ölçüde etkilemediğini göstermektedir. Çalışma bölgesinde ekonomik kalkınmayı artırmak için izlenebilecek politikalar verilmiştir.

Anahtar Kelimeler: Ekonomik büyüme, Doğrudan yabancı yatırım, Sermayenin, İş gücü

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List of Abbreviations

ARDL:	Autoregressive Distributive Lag
ASEAN:	Association of Southeast Asian Nations
BRI:	Belt and Road initiative
BRICS:	Brazil Russia India China South Africa
CD:	Cross-sectional Dependence
CPI:	Consumer Price Index
DFE	Dynamic Fixed Effects
DOLS:	Dynamic Ordinary Least Squares
ECM:	Error Correction Model
ECT:	Error Correction Term
EG:	Economic growth
EU:	European Union
FDI:	Foreign Direct Investment
FE:	Fixed Effects
FGLS:	Feasible Generalized Least Squares
FMOLS:	Fully Modified Ordinary Least Squares
GDP:	Gross Domestic Product
GFCF:	Gross Fixed Capital Formation
GLS:	Generalized Least Squares
GMM:	Generalized Method of Moments
ICT:	Information Communication and Technology
MENA:	Middle East North Africa
MG:	Mean Group
OECD:	Organization of Economic and Cooperation Development
OLS:	Ordinary Least Squares regression
PMG:	Pooled Mean Group
RE:	Random Effects
TSLS:	Two Stage Least Squares
UK	United Kingdom
US:	United States
USA	United States of America
VAR:	Vector Autoregressive

CHAPTER I
Introduction

Economic growth has been identified as the major indicator of measuring the economic performance of a nation. Each and every world economy is responsible for working towards enhancing the level of economic growth of The United Nations together with the World Bank have a mandate to ensure that nations attain the high-level economic growth. in their countries. This is so big cause economic growth remains the most important indicator in an economy due to the fact that it is the rate at which the gross domestic product of a nation increases every year. the gross domestic product of a nation is the amount of goods and services that are produced within the boundaries is of an economy during a specific period of time usually a year, Mankiw (2010). as a result, the economic growth of a nation can also be defined as the rate at which the gross domestic product of a nation rises time after time. The reason why economic growth is the reason why economic growth is so crucial to the government, economists and the citizens in general is because it is the one that is responsible for determining the quality of life of the people that are living in a nation. it follows that a nation that is experiencing a high rate of economic growth year after year he has the capacity of meeting the basic needs of its citizens, hence the quality of life of the people living in the country is raised. As a result, nations should ensure that they work towards attaining the high levels of economic growth in their respective countries. Apart from improving the quality of life through the through the provision of food for the citizens of the nation, a high rate of economy growth in a country and tells that a high standard health system is insured in the country. high standard health system in the country and tells that the mortality rate of the people living in the country is reduced and the life expectancy of people is also enhanced. Furthermore, diseases are also eradicated and it also follows that a country with health and strong people means that the labor force of that country is in is in a position to further raise the gross domestic product of that country. Countries that have sick and an unhealthy people might not have the capacity to further promote the production of products and services for future use.

The present research is concerned about the economic growth of the developing fifteen West African nations. Developing nations have been observed to exhibit for a very low rate of economic growth in the past years. there's been a widespread of hunger starvation and poor quality of life that is being observed among developing countries, which has led in various instances to the intervention of the World Health Organization and the United Nations to support the citizens of developing countries with food, healthcare facilities, among many others basic resources.

Various theories have been developed that are related to economic growth. among the major theories of economic growth is the Cobb-Douglas production function which was developed by the work of Cobb and Douglas (1928), Romer model of production which was pioneered through the work of Romer (1990) and the Solow production model which was pioneered by the work of Solow (1956). These theories have created the basic foundation of understanding how nations can work towards raising the economy growth in their respective countries. The Cobb-Douglas production function of Cobb and Douglas (1928) gives the importance of capital and labor force as the major indicators that are responsible for raising the economic growth of a nation. Cobb and Douglas (1928) provided that the level of output that is produced in an economy is solely determined by the levels of capital and labor force that exists in that economy. Therefore, this production function according to Cobb and Douglas (1928), a nation is not in a position to be able to produce an amount of output level that is more than the capacity of its level of capital and labor force. Thus, the level of output that is produced within the economy is fixed according to the level of capital in labor force the economy, Mankiw (2010). Therefore, the Cobb-Douglas production function shows the importance of capital and labor force in the production of output in any economy. Thus, labor force enter capital at the core components or the core inputs of output production in a nation. Cobb-Douglas production function also indicates that technological improvement is also responsible for enhancing the level of output in an economy. However, the function assumes that the level of technology available in the country is constant.

In addition to that, the Romer production function as well as the Solow function of production are the two major theories of production following the Cobb-Douglas production function (Mankiw, 2010). the solo production function just like the Cobb-Douglas production function emphasize is the importance of labor and capital in the production of goods and services in a nation. the solar production function however includes another variable that is human capital or knowledge which has been termed the effectiveness of labor, Solow (1956). The Solow production function further combines knowledge with labor force. It assumes that the knowledge and the labor force enter into the production function in a multiplicative manner, and the product that is produced after multiplying knowledge and labor force is termed effective labor. this was that the labor force that is employed in the industries that are responsible for the production of goods and services hence promotes the output level produced in an economy is endowed with some sort of knowledge which is vital in promoting the output level. The Romer function of production also labor and capital in enhancing output production in an economy, Romer (1990).

Of great importance is foreign direct investment (FDI) in raising economic growth among low-income countries. FDI inflows is the flow of funds from abroad by foreign investors into the country. FDI has been determined as one of the main factors responsible for raising economic development in a nation. There are quite a good number of researches that have been undertaken to ascertain the connection that exists economic development and FDI (Rahman, 2021; Ali et al., 2021; Temiz & Gokmen, 2014; Gopalan et al. (2018); Fadhil & Almsafir, 2015; Aksik et al., 2020; Pascale et al., 2020). Among the various researches done on the association of FDI and economic growth, a positive effect on economic development by FDI is presented (see, Rahman, 2021; Ali et al., 2021; Aksik et al., 2020; Pascale et al., 2020). However, other researches also present that FDI do not foster economic development (see, Temiz & Gokmen, 2014; Gopalan et al. (2018); Fadhil & Almsafir, 2015). However, irregardless of some researches which depicts a no association between FDI and economic development, there is ample evidence on the importance of FDI on economic development. If FDI is so crucial in enhancing economic development of nations, how important will it be on developing nations who have a lack of technological efficiency and capital to

foster economic growth. The present research attempts to ascertain the importance of FDI in raising the economic growth of developing West African nations, hence furthering the growing body of literature.

Research Aim

The aim of the research is to investigate the role played by FDI in promoting economic development in the developing West African nations. This has been prompted due to the fact that developing nations do not have technological and capital endowments that are sophisticated and sufficient to advance the economies of these countries through raising the level of output which in turn improves the living standards of the citizens, as well as enhancing the health facilities.

Originality of the research

- The major novelty of the research is that it considers all fifteen West African countries, which have almost the same economic conditions as they are all developing nations to examine the main factors which can improve their economic performance.
- The present research also uses robust methods of data analysis the panel Autoregressive Distributive Lag (ARDL) techniques, that is, the Pooled Mean Group (PMG), Dynamic Fixed Effects (DFE), and Mean Group (MG) tools. The findings are also compared and contrasted with the outcomes from the Fixed and Random Effects techniques. Employing various tools of data analysis ensures the attainment of quality results since this enables comparisons to be done

Importance of the research

- The present research is essential in developing the policies which are meant for improving the development of economic conditions in the developing nations. Once ways of developing economic conditions have been given, this will go a long way in enhancing the quality of life and standard of living of citizens in such countries, as well as advancing the health systems of the citizens.
- The present research is also essential because the findings presented in this research can also be generalized in other similar developing nations with almost similar conditions. Thus, a study such as this one done in the developing nations can produce outcomes which can make policies that are also relevant to other developing nations.

Research questions

The research questions listed below are answered in the present research:

1. Does foreign direct investment play a crucial role in raising economic growth of developing nations?
2. What is role of capital in raising the economic growth of developing nations?
3. Does labor force impact economic growth of the developing nations?
4. What is the effect of energy resources on the Economic growth of developing nations?

Strength of the research

The research strengths are given as follows:

- Panel data of fifteen developing West African countries is used, hence the problem of using time series data of a single country is

overcomes. Undertaking research using time series data of a single country comes along with some short-comings, considering that the outcomes generated cannot be generalized in other regions.

- The research also uses second-generation techniques in investigating the unit root in panel data, due to the existence of cross-sectional dependence (CD) in the panels. Therefore, robust results are presented on the research. Second-generation techniques of data analysis are also employed and a greater number of tools are used to compare and contrast the outcomes presented. Relying on a single method of data analysis mat at times results in biased outcomes, since some methods are not robust.

Limitations of the research

The research Limitations are given as follows:

- Technological advancement, a major factor in influencing economic growth as per the postulations of the theories of economic growth is not included in the analysis. However, this factor is not specified in the analysis due to the unavailability of the data. The data of technology for developing west African nations was not readily available, hence we could not include it.
- The factor energy has been specified without separating the main types of energy sources available. There are basically two main types of energy, that is, renewable and non-renewable, which are often specified separately in the model to ascertain the effect of each type on economic growth. However, the present research sought to follow that way of not separating the two main energy sources because this is not the major concern of the research. The research is not much concerned on the asymmetric effects of different types of energy but rather of the effect of FDI on economic growth. Specifying energy as a whole is sufficient for avoiding the omission of some vital factors, which may result in biased results.

CHAPTER II

Literature Review

The association between economic and FDI

We begin by presenting an analysis on the relationship that exists between economic growth and FDI, according to the postulations of past studies. It is very crucial to understand the relationship that exists between economic growth and foreign direct investment, in order to map the direction of the research. Evaluating the findings on the association of FDI and economic growth as per the postulations of past researches enables us to criticize, analyze, as well ascertaining the research gap that exists in the literature studies. The findings presented by past researches ascertains the existence of a long-term association between economic growth and FDI (Rahman, 2021; Dash & Parida, 2022; Arvin et al., 2021; Irandoust, 2016; just to mention a few). The research study that was undertaken through the work of Rahman (2021) postulates for the existence of a long-run association between economic growth and FDI. The findings show that these variables exhibit for a significant long-term relationship, which tends to result in a long-run equilibrium. That's according to Rahman (2021), GDP and FDI have a tendency of moving together towards a long-run equilibrium, hence these variables are related in a long-run relationship. The research of Rahman (2021) which show the existence of a long-run association between GDP and foreign direct investment was done considering the data set from the ASEAN and the BRICS countries. Therefore, this research postulates that in the ASEAN, as well as the BRICS nations GDP and foreign direct investment exhibit for a significant long-run association. Thus, the ASEAN and BRICS countries needs to consider the importance of foreign direct investment in exhibiting economic growth, whilst economic growth is also resembled as a crucial indicator for fostering foreign direct investment. There are also many other researches that were done in different locations that shows that FDI and economic growth have a significant long-run association. For example, the study that was done in India through the work of Dash and Parida (2022), depicts that FDI and economic growth exhibit for a long-run association which is strong. Dash and Parida (2022) show the existence of a two-way link between FDI and economic growth, such

that FDI has the tendency of influencing economic growth while at the same time economic growth may also tend to influence FDI. In addition to that, in a study that was done among the twenty largest countries of the world which are popularly known as the G20 economies, Arvin et al. (2021), is of the postulations that FDI and economic growth are significantly linked in this region. Therefore, it is observed from the postulations of these studies that the growth of the economy in various regions is significantly linked with FDI, whereby changes in the FDI of the nation results in great changes in the economic growth of the nation, and at the same time changes in the economic growth of a nation are vital for influencing the FDI of the country. Therefore, it is very crucial to ascertain the link that exists between FDI and economic growth of a nation in order to come up with the policies that are a crucial for raising either economic growth or FDI. For example, in the present research we seek to analyze the link that exists between FDI and economic growth in the developing West African nations. To be specific we seek to ascertain the effects of FDI on economic growth in the developing West African nations. Ascertaining this association will have the impact of coming up with policies that can help to improve the economic growth of these developing nations, considering the fact that developing nations have less sophisticated technologies, as well as little capital to foster economic growth. Therefore, if a significant association is observed between FDI and economic growth then FDI will become a major tool in these developing countries to foster economic growth.

The postulations given in the researches that were done in the past depicts that FDI and economic growth affects each other, see for example Irandoust (2016). This means that if FDI and economic growth affect each other, the association is not a one-way relationship, rather it is a two-way link. The study of Irandoust (2016) that was done in the case of Estonia depicts that FDI and economic growth presents a significant bi-directional link. The findings from the postulations of a research study that was done by Irandoust (2016) shows that the enhancement in the structural reforms together with the rise in Gross Domestic Product enhances countries to promote the inflow of FDI, and this promotion of FDI will tend to encourage economic growth to rise. These postulations from this study shows that while economic growth may have a tendency of raising or encouraging the inflow of FDI this will have a turnaround effect on economic

growth, which will also be influenced by a rise in the inflow of FDI, Irandoust (2016).

While other studies depict for the present of a two-way relationship between FDI and economic growth, other studies shows that these factors are significantly linked in a one-way causal link. For example, in Lithuania and Latvia it is FDI that is responsible for fostering economic growth and not the other way round, Irandoust (2016). The postulations that are given in the research of Irandoust (2016), which indicates that FDI and economic growth exhibit for a one-way causal link are supported by the study of Yin et al. (2021), which depicts that FDI and the growth of the economies have a significant unidirectional causal association. In addition to that, the research that was done by Aksik et al. (2020) in the francophone and the anglophone African nations shows that FDI significantly influences economic growth of these respective regions. The research of Aksik et al. (2020) alludes that the impact of FDI on economic growth is enhanced through the means of IFRS.

While the research of Irandoust (2016), shows that it is FDI which is responsible for influencing economic growth in Lithuania and Latvia, as also supported by Yin et al. (2021), the research of Sadeghi et al. (2020) depicts that it is economic growth which is responsible for fostering the rise in FDI. However, Sadeghi et al. (2020) alludes that economic growth is only capable of fostering FDI after having been improved by the level of capital, as well as human capital. This shows that capital and human capital have a significant indirect effect on FDI through economic growth. At this juncture we have ascertained the existence of a significant association between economic growth and FDI. However, one question remains unanswered on whether these factors positively impact each other or the relationship is a one-way. It is very crucial to ascertain the exact link that exists between FDI and economic growth rather than a general significant association between the two. Ascertaining the exact causal effect between economic growth and FDI helps the government and policymakers on the direction to take to enhance economic growth of the nations, as well as encourage FDI of the nations.

In a research study that was done in China, Ali et al. (2021) is of the postulations that the outward FDI which is resembled by the establishment of logistics significantly improves the economic growth of the nation. Unlike other researches which shows that FDI inflow is the one that is responsible for fostering, the growth of the economy, Ali et al. (2021) depicts that outward FDI is also responsible for fostering economic growth. Therefore, the research of Ali et al. (2021), depicts that FDI outflow has significant positive effects on the economic growth of a nation. This means that if the economic growth of China is to be enhanced this would require China to promote more investments of its citizens to other countries. The positive effect of FDI outflow on the economic growth of China can be explained by the income that is generated in other countries where Chinese foreigners have invested, and after having realized profits in these nations, the greater percentage of the proceeds from the foreign investments is retained back to the home country. Thus, when China's citizens invest abroad, they have a tendency of generating income which they will bring back home to enhance economic growth. In the presence of policies that discourages foreign investors to take back all their income to their home country, FDI outflow will tend to have a negligible effect on the economic growth of the home nation. The research study that was done by Ali et al. (2021) which shows the importance of FDI outflow on the economic growth of China, also indicated the importance of the belt and road initiative (BRI), in fostering economic growth of China. The BRI according to Ali et al. (2021) further strengthens the association that exists between FDI outflow and economic growth.

In addition to the postulations that are given in the above section, research that was done in the Organization of Economic Community Development (OECD) countries, as per the postulations of Aksik et al. (2021) together of those Ali et al. (2021) are supported by indicating that FDI inflow, as well as the level of output that is being produced in a country are significantly related (Mensah & Mensah, 2021). The research that was done by (Mensah & Mensah, 2021) depicts that activities on the downward volatility of output observe a great and significant impact from inward FDI stock. The research also asserted that FDI provides a significant positive impact on economic growth, among nations with capital intensive industries (Mensah & Mensah, 2021). The above assertion is also

supported in research that was done in Malta, which shows that the growth in the GDP of a country is significantly related to the FDI (Magazzino & Mele, 2022). In addition to that, in the research that was done in the ASEAN, as well as the BRICS economies, an increase in economic growth was observed to be positively related to FDI in these regions, Rahman (2021). The research of Pascale (2020) that was done in the OECD nations is also of the postulations that FDI provides a significant positive effect on the growth of the economy through the means of green technologies. Therefore, the research of Pascale (2020) depicts the importance of green technologies in empowering FDI which in turn enhance economic growth of a nation. These studies depict that rising economic growth of an economy is vital for the purpose of attracting FDI in a nation. Therefore, in line with the postulations of past studies it is vital to increase economic growth of nations in order for foreign investors to be attracted to come and invest in that country. Foreign investors have a tendency of choosing those countries whose economic growth is high, which is a sign that once they have invested in some industries of that country they will be guaranteed of a positive return from their investments. Investors generally shy those countries whose economic performance is poor because investing in such countries means that a zero or negative return may be obtained. Poor economic performance of the country is a sign of poor performance of companies and industries in that country, hence the reason behind scaring away potential foreign investors.

While FDI is observed to have a significant positive effect on the growth of the economy, according to the populations of various studies that are provided in the above section, the complexity in economic growth in a country has been observed to present a negative but significant effect on the FDI of the forty countries that were studied in the research of Nguyen and Su (2021). On the other hand, the research that was done by Nguyen and Su (2021) in these forty countries also depicts the importance of FDI in reducing the severity of economic complexities among these nations. The research of Nguyen and Su (2021) also depicts that after the economic complexities have been reduced through raising FDI in the country, then the growth of the economy is also going to be improved. The research shows that when FDI is enabled to rise in a country this will lower the level of complexities that are arising in the economy of a country. Therefore,

FDI is observed to be vital in reducing various complicated situations that may arise in a country through promoting economic growth, reducing the level of unemployment, as well as stabilizing the economy in various ways. A study that was undertaken by Driffield and Jones (2013), depicts that the growth in the economic performance of a nation is fostered through raising foreign capital. The study of Driffield and Jones (2013) shows that foreign capital is a significant factor that is responsible for raising the economic growth of various developing nations. Driffield and Jones (2013) also further provided that the inflow of FDI among developing countries is vital for enhancing the development of these economies. This shows that the capital being brought by foreigners to developing countries is essential in raising economic growth, since these developing countries does not have sufficient amount of money to foster the industrialization of a nation, which in turn will increase the output level that is being produced in the country. The research findings are clear in that they show that the inflow of FDI into the developing countries come along with foreign capital that is being brought by foreigners in the country, hence the impact of encouraging economic development in the nation. Therefore, FDI inflow is vital for encouraging the development of the country and developing countries should work towards coming up with a conducive environment that attracts foreign investors. Moreover, it is also observed in the study that was done in the MENA region, that is, the 17 Middle East and North African countries, that FDI is a major factor that is responsible for improving the growth of these economies, Abdouli and Hammami (2015).

Not only developing countries have been observed to benefit from foreign investment, developed nations has been also depicted to obtain a great deal of benefit from FDI inflows. For example, the research that was done in the European Union by Dogan et al. (2020) shows that the economic growth in this region is by far improved through FDI inflows. Therefore, it doesn't matter which region is being considered, whether developing, developed or emerging nations, FDI is vital in fostering the economic growth of the nation. It is crucial for nations that seeks to enhance their growth to come up with ways of creating an environment that is attractive to foreign investors. By doing so the economic development of a nation is fostered. The findings are that has been observed in

research that was done in the EU nations according to Dogan et al. (2020), is supported by the postulations of a research that was done in the advanced nations, which shows that both horizontal, as well as vertical FDI significantly promotes the economic growth in these economies (Beugelsdijik & Zwinkels, 2008). The findings presented by Beugelsdijik and Zwinkels (2008) shows that FDI presents a high-level effect on the growth of the economy as compared to vertical FDI. Thus, in order for advanced nations to raise the economic growth levels of their countries they should concentrate more on advancing horizontal FDI than vertical FDI, however it must be noted that both types of FDI forces economic growth of the advanced nations.

In addition to that, another study that was done among the ten nations through the work of Silajdzic and Mehic (2015) asserted that a rise in the economic growth among these nations is strongly impacted by the spillovers in the knowledge. This knowledge spillovers arises through FDI inflows from foreign investors to the citizens of the host nation. When foreign investors move to other countries to invest, they bring along with them their knowledge and expertise to use in improving the performance of the company in which they have invested in. This knowledge which is brought by foreign investors, most probably through the employment of foreign experts, will have a tendency of being learned by local employees who will have an opportunity to utilize this information in various other companies, hence economic advancement is encouraged. As a result, the research of Silajdzic and Mehic (2015), depict that know-how and efficient seeking FDI have a strong influence on the importance of FDI in fostering economic growth of nations. The findings given in the research of Silajdzic and Mehic (2015), are supported by the postulations of a study that was done by Zamani and Tayebi (2022) in the economic corporation countries, which shows that the spillovers of FDI are by no means the most important factors that are responsible for improving the growth of these economies. This shows that spillovers from FDI are essential in raising the economic growth of the nation, hence it is vital to encourage economic growth for the purpose of encouraging FDI of a nation to rise.

There are many more other studies that were done to ascertain the association that exists between economic growth and FDI. One notable research is a study that was done by Zaman et al. (2021) in the BRI sixty-four countries which determines that FDI is essential in fostering the growth of the economies of these nations. This research study of Zaman et al. (2021) provides crucial findings which show that FDI is an important factor in raising the economic growth of nations. Moreover, another research that was done in the fifteen manner countries has the findings which depicts that, it is FDI which is responsible for fostering economic growth in these countries and not the other way round (Kalai & Zghidi, 2019). These findings that are given above are also supported by a study that was done in China by Hong (2014) which depicts that FDI is vital in significantly fostering the growth in the economies of China. The research of Hong (2014) further depicts the importance of factors, such as the economies of scale, original variations, infrastructure levels, wage levels and human capital in providing a significant interaction on the association that exists between the growth of the economy and FDI in China. In addition to that, the findings provided in the research of Fadhil and Almsafir (2015) depicts the importance of FDI inflows in Malaysia in enhancing the growth in the economy of this country, by ascertaining that the inflow of FDI strongly enhances economic growth in Malaysia. Findings that are given in the past researches so far points to the importance of FDI in raising the growth of the economies of countries, indicating for the importance of governments and policymakers to work towards encouraging the inflow of FDI in their nations if economic growth is to be raised.

In the research that was done in Turkey through the work of Faisal et al. (2021), it has been observed that FDI gives a positive impact on the growth of the economy of Turkey which is very crucial. The research of Faisal et al. (2021) highlighted the importance of FDI in raising the economic growth of Turkey, hence indicating that it is vital for the government of Turkey to come up with ways on attracting foreign investors for the purpose of raising the economy of the nation. In addition to that, another separate study that was done in the East Asian countries that are still emerging, alongside with the US, EU nations and China; the growth in the economies of these countries was observed to be influenced positively by an increase in FDI (Zhou & Latorre, 2021). All these studies so far

show the significance of FDI in fostering the growth of the economies of various nations. The findings that were observed in research that was done by Kahouli and Maktouf (2015) depicts and emphasizes on the importance of FDI on its significant role that it plays in the world economic systems of various nations, as well as the industries of those respected countries. This shows that investments by foreigners in various countries is essential in developing the economic system of the country. The industries too, of the host country where foreign investors start their businesses in, are also enhanced which in turn will result in rising economic growth of those respective countries. Gutierrez-Portilla et al. (2019) also supports the postulations that are given in the findings of the above research by supporting that FDI is essential in improving the growth of the economies of nations. The additional support on the positive impact of FDI on the economic growth of various nations is also provided for in the research of Gopalan et al. (2018) which shows that economic growth of nations is raised through the implementation of green FDI. Therefore, all these findings point to the fact that the host countries have a great deal of benefit from the influence of FDI, hence the motivation behind host countries creating some favorable conditions which can encourage foreign investors to invest in their countries.

We can observe that from the postulations of various researches that are given above, they depict for the existence of a bi-directional relationship between FDI and economic growth, where FDI has been observed to give a significant positive effect on economic growth and in other cases economic growth have been also observed to give a significant effect on FDI. Therefore, this shows that these are economic indicators, FDI and economic growth, exhibit for a two-way significant association. There are various studies that have been done in the past which shows for the existence of a bi-directional association between economic development and FDI of nations. For example, a study that was done among the ASEAN, as well as the BRICS countries by Rahman (2021), a significant bidirectional link between FDI and economic development has been obtained. In addition to the populations of Rahman (2021), the research findings of Rahman and Alam (2021) also depicts that FDI and economic development exhibit for a significant two-way association, indicating that these factors have a tendency of impacting one another. In addition to that, in research that was done among the

156 fragile and warfare nations the inflow of FDI was observed to exhibit for a strong link with the freedom in the economic performance of these nations, Moussa et al. (2016). The research study of Moussa et al. (2016), depicts that the lowest effect that is being observed between these two indicators is among the Oceania and fragile warfare nations, while the EU nations seemingly tend to have the highest impact, when the findings of the two regions are compared. In addition to that, it is also observed in the research study of Rwanda that the size of the population in this country together with its GDP significantly raise FDI, which in turn have the role of raising economic development in this region, Olorogun (2021). These research findings that are observed in the case of Rwanda, by Olorogun (2021), shows the importance of raising GDP of the nation to attract more FDI in the country, more FDI in the country which in turn will improve economic development in this country. Therefore, it is crystal clear that economic development and FDI have a significant association, whereby one factor tends to raise another and the other will have a tendency of fostering another. Thus, nations should work towards raising the growth of their economies which is a significant factor of attracting FDI, FDI which will further develop the economies of these countries.

While various researches have shown that the inflow of FDI is the one that is responsible for fostering the growth of the economies of most nations, other researches are of the postulations which shows that outward FDI is also vital in fostering economic growth of the home country. For example, the study that was done by Razzaq (2021) In the case of China depicts that the growth of the economy of the BRI countries is being accelerated through outward FDI. This shows that the investment in various other countries by local people have a tendency of increasing the growth of the economy in the home country. For example, China in this case is one of the countries that have benefited much from outward FDI. Chinese investors have a tendency of undertaking various investments that are huge in countries, such as Africa and this has raised the economy of China. The rationale behind the positive effects of outward FDI on the domestic country is explained by the policy of bringing back profits to the home country by foreign investors. Thus, most Chinese investors to abroad have a tendency of bringing back their profits which they have gained in the host

countries to their country and these profits have a tendency of raising the economic growth of China. Therefore, it is essential that countries which have high rates of economic growth and strong capital performance may have a tendency of investing in other countries which in turn will advance the economic growth of the home country through the policy of bringing back profits.

In the midst of various researches that shows that FDI is essential in fostering the economic growth of various nations, other studies show that the inflow of FDI in the host country gives negative impact on the growth of the economy. In research that was done through the work of Sayari et al. (2018), a negative association between the freedom index of economic growth and FDI was observed among the thirty westerns, central, as well as the eastern EU nations. The research of Sayari et al. (2018) depicted that FDI and economic growth exhibit for a negative significant association among them, hence economic growth is neither vital for fostering FDI, nor FDI is essential for enhancing the growth of the economy. In addition to that, another research that supports the negative impact between FDI and economic growth, was done among the 20 developing countries which have significant benefits from remittance, which depicted that the inflow of FDI together with rising growth in the recipients of remittances decreases the economic growth of these nations, while at the same time raising the inequalities of income among these countries. Most developing countries have a tendency of exhibiting for a negative relationship between FDI and economic growth due to the bringing back of profits to the home country by foreign investors, as observed in the research of Razzaq et al. (2021) which shows that outward FDI has a significant positive effect on the economic growth of China due to the bring back of profits by Chinese investors from developing countries. Therefore, in nations that exhibit for a negative association between FDI and economic growth due to the bringing back of profits by foreign investors to their home nations, regulations that restrict or minimize on the levels of profits that can be taken back to the home country by foreign investors must be enacted. Devising such regulations that restricts foreign investors to take back their profits to their home country will result in enhanced positive relationship between FDI and economic growth such that rising FDI among most countries will be related with a significant rising in the economic growth of the nation.

While various researches show the presence of a significant association between FDI and economic growth other studies depicts that these variables are not statistically related. For example, the research that was done by Gopalan et al. (2018) depicts that FDI and economic development among the Asian nations does not provide for a significant link. Gopalan et al. (2018) considered mergers and acquisitions the forms of FDI in ascertaining its link with economic growth in the Asian nations, and observed that the mergers and acquisitions does not provide a statistically significant link with economic growth in this region. In addition to that, in another study that was done in Turkey on the link between FDI and economic growth, both short-term estimates, as well as long-term estimates of the research indicated that these indicators are not statistically linked (Temiz & Gokmen, 2014). In another study that was done in the case of Australia, it was observed that FDI do not provide any statistically significant influence on the economic growth of Australia, Turnbull, Sun and Anwar (2016). These postulations, are also supported by the findings given in the research of Fadhil and Almsafir (2015) which shows that technological FDI spillovers give a relatively low effect on the economic growth. Therefore, it is essential considering the findings given in these researches which shows that FDI and economic growth are not statistically related, to come up with the studies that are specifically related to various regions in order for governments to be enabled to carry out proper policies.

At this juncture we have observed that economic growth raises FDI according to the populations of various studies that have been discussed above. At the same time, we have also observed that FDI, both inflows and outflows, fosters economic development of various nations. We have also depicted for the existence of a bi-directional association between these two major economic indicators, depicting that economic growth of a country helps in attracting FDI inflows in the country, FDI which in turn would enhance the economic development of these nations. We have also observed that other results that were observed in the various researches that were done, shows that FDI and economic growth have a significant negative link which shows that rising FDI has a tendency of reducing economic growth of the nation. We have also asserted that the negative effect of FDI inflows on economic growth is best explained by the

principles of bringing back the profits by foreign investors to their home country and this can be corrected by coming up with the regulations that restricts foreign investors to bring back profits that have been gained on their investment abroad. At least a certain percentage of the proceeds from the investment should be retained in the host country to encourage economic development in this nation. We have also accepted that other studies give that economic growth and FDI are not statistically linked. There is no significant association that exists between these indicators among various countries as per the postulations of past researches. Therefore, we can observe that the results that are given in the past studies seem not to agree on the exact association that exists between economic growth and FDI.

While a greater percentage of the studies that were done in the past on the association between FDI and economic growth shows that the inflow of FDI gives a significant positive effect on economic growth, the other smaller percentage of the studies shows that these factors are negatively linked or have no significant association. The existence of different findings in different researches can be explained by the different economic conditions prevailing in the country of study. For example, studies that were done in the developing countries where foreign investors have a tendency of taking back the proceeds from the investment to their home country, have indicated the existence of a a strong negative link between FDI and economic growth. On the other hand, studies that have been undertaken in developed countries that have regulations that restricts foreign investors on the percentage of profits which they can take back to their home country, to allow for other proceeds from the investment to foster economic growth in the host country, have presented significant positive association.

In addition to that, different models of analysis, as well as the methodologies of data analysis may sometimes present different outcomes due to the robustness of the methodology that has been used. the present research is carried out at a time when the literature study is presented with a no consensus on the right association that exists between FDI and economic growth. Therefore, the present research is ascertained to cover the knowledge gap that exists in the literature, by coming up with a research study in the fifteen developing countries,

to see how FDI inflow affects economic growth in this region. The fifteen west African countries are developing nations that have fewer capital resources, as well as poor technological infrastructures which hinders economic development in this region. Therefore, it is essential to examine the importance of FDI inflows in this region in order to take advantage of the spillovers of capital and knowledge that comes along with FDI to foster economic development in this region.

Economic growth, the use of energy and trade

There are many factors that are related with economic growth of a nation on top of the above discussed factors; labor, capital and FDI. The studies done in the past indicated that the economic growth of a nation is affected by many other factors such as the use of energy see for example, Rahman (2021); Dogan et al. (2020); Faisal et al. (2021); Tiwari et al. (2022); Yin et al. (2021); Zameer et al. (2020), among various researches. These studies show the importance of the use of energy in fostering the growth of the economy of various nations, hence supporting the theory of production as depicted in the book of Zweifel et al. (2017), which provided energy as one of the most important factors of production among labor, capital and materials.

According to the study of Rahman (2021) among the ASEAN, as well as the BRICS countries, economic growth among these regions is significantly fostered by the use of energy. Rahman (2021) provides that energy is one of the factors that is essential for improving the economic growth of the ASEAN and the BRICS countries. Specifically, the findings depicted in the research of Rahman (2021) suggest for the existence of a bi-directional causal link between the use of energy and economic growth in these regions. Thus, the postulations of Rahman (2021) depict that while energy improves the economic growth of these nations, economic growth has a similar tendency of fostering energy improvement in these regions. Therefore, it is very essential for countries to enhance improvement in the energy resources of the country for the purpose of attaining economic development among these nations. Another study that was done in the EU countries by Dogan et al. (2020), the importance of energy in raising economic growth was ascertained. The research that was undertaken in the EU nations by Dogan et al. (2020) depicts that the types of energy, that is

non- and the renewable sources of energy fosters economic development in the EU region. These two sources of energy have been observed to positively enhance economic development in this region. The research of Dogan et al. (2020), depicted that while both types of energy foster economic growth, renewable energy was observed to provide strong link with economic growth when compared with non-renewable energy, which had slightly lower positive effects on economic growth.

Different findings have been also observed by various studies that has been undertaken across the globe, which shows that economic growth and energy gives a significant negative link (Tiwari et al., 2022). The findings that were obtained in research that was done in the Asian nations by Tiwari et al., 2022), depict that the growth in the economies of these nations decreases the use of energy by way of technical impact, as well as it is also observed that the initiatives that are meant for fostering renewable energy sources can be advanced through the improvement independence of the market. The findings that are presented in another study that was done in Turkey on the association between economic growth and energy shows that, the prices of oil have been determined to reduce economic growth of Turkey (Faisal et al., 2021). The research of Faisal et al., 2021) in Turkey which shows that oil prices negatively impact economic growth in this country is important in encouraging nations to stabilize the prices of oil in order to foster economic growth. High prices of oil among oil importing countries deteriorates the financial resources of the country, hence economic development is deterred. On the other hand, a study that was done among the hundred nations by Yin et al. (2021) depicts that the growth among these nations provides a means by which emissions of carbon is enhanced. This is supported by the postulations that are given in the research of Zameer et al. (2020) in the case of India which indicated that the combined effects of energy and economic growth promotes the emission of carbon in the air. Therefore, it can be observed that while energy is vital in fostering the growth of the economy, this has a significant impact on the emission of carbon which is not favorable to the environment, hence exacerbates health issues. Thus, it is crucial to come up with green technologies that encourages the use of clean energy in fostering economic growth for the purpose of avoiding emitting pollutants to the air.

The other factor that is crucial in ascertaining economic development of a nation is trade openness, though this variable is not considered in the research model that is provided in Chapter 3. Various studies that were done in the past provided the importance of trade openness in fostering economic development of various nations and regions (Arvin et al., 2021; Rahman; 2021; Nguyen & Su, 2021; Dogan et al., 2020). In a research study that was done by Oleyede et al. (2021) in the southern African Development community countries and the economics of West African countries give the existence of a significant and strong link between the economic growth of these nations and their openness to trade. In addition to the postulations of Oleyede et al. (2021), Arvin et al. (2021) in research that was done in the twenty most developed countries of the world, a short-term relationship was observed to exist between the openness of trade in these countries with their economy growth. Moreover, the research of Rahman (2021) in the ASEAN and BRICS countries depicted for the existence of a significant positive link between the openness of trade in this region with its economic growth. Nguyen and Su (2021) also postulated that in the developing nations, the openness of trade in this region significantly foster economic development. These postulations are supported by the research of Dogan et al. (2020). Therefore, there is existence of an overwhelming evidence on the importance of the openness of trade in various regions in fostering economic growth. This shows that it is vital for nations to come up with the policies that encourages trade with other countries in order to improve the growth of those economies. Rahman (2021) further provided that economic growth is also essential in fostering the openness of trade among countries. Oleyede et al. (2021) encourages governments to come up with policies that can have the effect of transforming the growth of an economy into substantial large amounts of profits through trade. This shows that countries that are enjoying from high levels of economic growth, through increased productivity or large amount of capital investments, together with the availability of sophisticated technologies which encourages the production of products in large amounts, can take advantage of trade by selling their products to other countries, hence gain from a big deal of profits. In the presence of various studies which shows that the openness of trade and economic growth are positively related, Zaman et al. (2021) depicts in a study of sixty-four nations that the openness of international

trade together with the exports of Information and Technology (IT) gives a negative impact on the economic growth of a nation. However, this negative impact that has been observed from the openness of trade and the exports of it, among these nations was observed to be insignificant depicting that there is no significant relationship between these indicators. However, it is crystal clear from the postulations of various studies that have been articulated above that the openness of trade is vital and essential in fostering the growth of the economies of nations. At the same time, economic growth is also essential in fostering international trade among countries, whereby those nations enjoying from high economic growth can take advantage of making profits through selling their products to other countries who might otherwise not have the capacity to produce more products as per the demand of their countries.

The findings that are presented in Table 1 of this research Thesis, under this section are a summary of the findings that are presented in the researches of past studies. In the Table 1 which follows, the author's information, region of study, period that was considered for data collection, methodology that was used, and the findings are presented.

Table 1.

Summary of the empirical findings of past researches

Author / Region	Time horizon / Method	Findings
Zhang (2021) China and Africa	2003 – 2018 Random Effects OLS	• The findings depict that China's FDI is enhanced by the level of exports as well as the level of industrialization. • African nations do not contain any vital benefit from FDI of Northern countries, while the FDI from China is observed to be vital in helping African nations.
Razzaq et al. (2021) China	GMM-Systems Feasible GLS	• An increase in the technological gap of China decreases the spillover of production from outward FDI of China • The productivity of output level in the BRI nations is raised by the rise in the outward FDI • The GDP growth of China is fostered by the BRI
Tiwari et al. (2022) Asian nations (sixteen)	GMM 1990 – 2019	• The use of renewable energy sources is affected positively by FDI • Trade and growth in the economy is essential for fostering the use of energy by means of technical effects

Nguyen & Su (2021) Developing nations – forty	GMM 2002 – 2017	• Via the enhancement of the internet, poverty, as well as energy enhances the spillovers absorption, from the economic integration • The inflows of FDI which is negative is observed to be turned positive by internet development which also boosts the openness of international trade • The inflows of FDI do not significantly impacts international trade openness, while the accumulation of human capital does. • The complexity in the economic growth of a nation is negatively impacted by the inflows of FDI • The openness in the international trade of a nation is positively impacted through the complexity of economic development
Zameer et al. (2020) India	VECM ARDL 1985 – 2017	• The emissions, as well as the openness of trade exhibit for a bi-directional link • The intake of energy, together with FDI and innovation enhances the emissions of carbon in India's short-term

		period • Bi-directional association among the series energy, the openness of international trade as well as the innovation, in the long-term period. • The innovation of technology, as well as FDI presents a negative effect on the emissions of the carbon is observed in the long-run period • The emissions of carbon are fostered through the growthy of the economy, energy and the openness of international trade
Oleyede et al. (2021) West African nations Southern African countries	Hausman test Random Effects Pooled OLS Fixed Effects 2006 – 2017	• The growth in the economy of a nation should, with the openness of international trade gives a positive effect to each other • The policies meant to raise the growth of the economy must be enhanced for the purpose of enhancing gains from trade by the government
Song et al. (2021) Developing nations with high	DOLS	• The inequalities in the income are strongly impacted by the growth in the economy • Rising remittances and

remittance received (twenty)		improvements in the FDI reduces the growth in the economy of a nation, while they tend to increase the inequalities in the income • The indicators specified in the research model depicts the existence of a strong long-run association
Moussa et al. (2016) One hundred and fifty-six nations	1995 – 2013 Fixed Effects Pooled OLS Random Effects	• The freedom in the economics of a nation fosters the FDI • The nations with the lowest effect are the Oceania, as well as the fragile conflict nations
Yin et al. (2021) One hundred and one nations	1990 – 2014 GMM	• The positive significant effect of physical as well as human capital fosters the growth of the country's economy, which as tends to end up attracting FDI • While human capital is improving, the physical capital is deteriorating • The emissions of the carbon is directly impacted by the growth in the economy • The FDI and the emission of carbon gives a bi-directional association • FDI and the growth of the economy affects each other

		among the nations except for those nations which are the low-middle income.
Olorogun (2021)	1970 – 2018 Johansen cointegration ARDL	• The inflows of FDI are influenced with Gross Domestic Product, the development in the finance of the private sector, the rate of currency exchange and CPI, which in turn ensures the improvement of the economy • Advancement in the financial development of the private sector is strong in the short-term, while the long-term impacts is not significant
Faisal et al. (2021) Turkey	1995 – 2017 Fourier ARDL	• The growth hypothesis led by FDI is supported in the research • Foreign Direct Investment fosters the growth of the economy and the development of the tourism industry • The development in the economy is fostered by negative effects of the arrivals of the tourism as well as the FDI • The growth of the economy is not strongly impacted by the foreign direct investment of

		the nation • The prices of oil, as well as the number of arrivals of tourists strongly promotes GDP
Rahman and Alam (2021) Twenty great nations	1980 – 2018 ARDL PMG	• The openness in the international trade fosters economic growth in the long-run • The level of capital raises the growth of GDP in a country • The level of energy used enhances the growth of GDP • FDI raises GDP in the long-term • Labor force and human capital raises GDP in the long-term • In the short-term economic growth is reduced by human capital • In the short-term, trade, capital together with energy fosters economic growth • Economic growth raises FDI and energy • A bi-directional link between economic growth and trade; labor and human capital is significant
Goplan et al. (2018)	1990 – 2013 GMM	• FDI mergers and acquisitions have no significant influence on the growth of the economy

Asian countries		• The growth of the economy is significantly enhanced by green FDI
Osane & Koine (2016) Kenya	Regression and Correlation analysis	• The sharing of knowledge has been observed to play a pivotal role in enhancing the transfer of technology from foreign investors to the local ones • The investment in the energy sector industry is essential I enhancing the adoption of new technologies • A strong association between the infrastructure indicators of FDI, that is, the diffusion of knowledge, the management of knowledge, the facilitation of trade, the transfer of technical expertise l, together with economic growth, is observed
Liu et al. (2021) China	1995 – 2017 AMG method	• The combined effects of renewable energy, the innovativeness in technology, as well as FDI significantly reduces the emissions of carbon • These factors also impacts thee emission of carbon without the joint relationship with other indicators

Pascale et al. (2020) OECD	Random and Fixed effects GMM Pooled OLS	• The rising demand in the tourism influences the growth of the nation to rise • The link between green technology and FDI, enhances FDI to promote economic growth
Gutierrez-Portilla et al. (2019) Spain	1996 – 2013 Spatial Durbin panel technique	• The increases in the FDI inflows of a nation raises its economic growth
Nguyen & Doych (2022) 43 nations	1998 – 2016 GMM	• The long-run estimates depicts that the patents of ICT significantly promotes the growth of the economy • The outcomes from economies which are advanced depict that total patents strongly influences the growth of the economy • The growth of the nation's economy, manufacturing and service industries are influenced by the patents of ICT • The growth I the manufacturing sector is impacted through the combined effects of patents and GDP growth

Fadhil & Almsafir (2015) Malaysia	1975 – 2010 Regression analysis and Johansen cointegration	• The spillovers of technology arising from FDI do not significantly provide a gain on the nation's economic growth • The major factors that has been observed to raise the growth of the economy are FDI and human capital
Rahman (2021) ASEAN BRICS	1990 – 2017 Quantile regression Causality test	• Foreign trade and energy consumption influences FDI in the short-term • The growth of the economies gives a significant effect on foreign trade and FDI in the short-term • The growth of economies and energy consumption; energy and foreign trade; Labor force and the growth of economies; foreign trade and labor force, significantly affect each other • The cointegration findings portrays for a strong link between the indicators, growth of the economy, FDI, foreign trade, and energy • The growth in the economic performance of the nations is raised with the indicators, energy, foreign trade, capital and FDI

Kahhouli & Maktouf (2015) 39 countries	1990 – 2011 GMM	• The inflows of FDI is significantly enhanced by the conditions which is taking place in the home country • The research establishes that foreign investors requires the host nation to reduces FDI barriers, together with significant improvements in the climate of member nations • The research ascertains the significance of indirect effects from foreign investors to commercial policy • FDI is observed as the main factor which is responsible for raising the global economy
Muller (2021) Sub-Saharan African nations, 47	1996 – 2017 Baseline Feasible GLS	• The nation's exports together with investment locally hampers the process of industrialization in the nation • The findings depict the presence of a U-shaped link between economic growth and industrialization • The process of industrialization is discouraged by high levels of FDI in the Sub-Saharan African countries
Zaman et al.	2013 – 2018	• Exports and trade openness

(2018)		give a negative influence on economic growth which is not statistically significant.
	Systems GMM	
BRI (64) countries		• The capital level and FDI significantly fosters economic growth
Lee et al. (2020)	1996 – 2010	• The employment levels of the MNEs are lowered by the business activities of FDI which non-convectional
6o countries, from 787 Japanese MNEs	3SLS	• The employment levels of the MNEs are insignificantly related with non-core FDI

CHAPTER III

Methodology

Theoretical framework

The theoretical framework of the present research is derived from the famous theories of production, such as the Solow model of production, Cobb-Douglas production function, and the Romer (1990) productivity growth model (for review see Mankiw, 2010). One of the most famous and traditional production function is the Cobb-Douglas model, which considers capital and labor as the major factors responsible for enhancing economic growth in an economy. According to Mankiw (2010) the level of output production is determined by the level of capital and labor available in an economy, that is, the level of output produced in an economy can never be more than the capacity of labor and capital available in an economy. The Cobb-Douglas function of production emphasizes the importance of technology in boosting the level of output produced in an economy. Thus, the level of output in an economy according to the production function is solely determined by the labor and capital level of inputs, such that an increases in output can only be achieved through raising labor and capital inputs. Mankiw (2010) alludes that a production function may exhibit for what is known as the constant returns to scale if and only if an increase by a single unit on the level of inputs results in the output level by a single unit. However, Mankiw (2010) alludes that the production function has a tendency of exhibiting for what is known as the diminishing marginal returns, such that an initial increase in the level of inputs significantly raises output by a larger amount, while continuous and further increases in inputs causes the output level to increase at a diminishing rate. The basic production traditional function which forms the basis of the Cobb-Douglas production function is presented in Equation 1.

$$Y = f(L, K) \qquad (1)$$

In Equation 1, the letter Y represents the level of output that is being produced in an economy through the use the available inputs, such as, capital

and labor. Therefore, output level represents the Gross Domestic Product (GDP) of a nation. L represents the amount of labor that is present in an economy and is taken as given, K represents the capital level in an economy and is taken as given, while ***f( )*** represents a function of. The standardized Cobb-Douglas function of production is presented as illustrated in Equation 2, Cobb and Douglas (1928).

$$Y = AK^{\alpha} (HL)^{1-\alpha} \qquad (2)$$

In Equation 2 Y represents the level that is being produced in an economy and is the GDP of a country. The letters A, L, and H represents the total factor productivity, where L is the labor force and K is the capital. α represents the model parameter and is within the range $0< \alpha<1$. The Cobb-Douglas model of production through inputs ratio calculation, is utilized for attaining efficient production and has been long recognized as a useful model in estimating the technological change in production. The other crucial model of production is that of Romer (1990), which is based on the assumption that technology is endogenous, in such a way that technological improvements enhance some advancements in the economy.

While the Cobb-Douglas and the Romer models of production are essential in ascertaining the factors that encourages economic growth in a nation, the Solow model of production is equally importance. Similar to the postulations of the Cobb-Douglas model, the Solow production model gives labor and capital as the most vital inputs of output production. The Solow model of production, however, differs from the aforementioned models in that it emphasizes the importance of knowledge or effectiveness of labor in the production of output (Solow, 1956; see also Mankiw, 2010, for review). The Solow model of production can be specified in a model as given in Equation 3.

$$Y_{(t)} = F[K_{(t)}, A_{(t)}, L_{(t)}] \qquad (3)$$

In Equation 3, Y is output level and represents the GDP of a nation, L represents the labor force in an economy, A represents the knowledge endowed by workers in an economy which is the effectiveness of labor, and K represents

the level of capital in an economy. The Solow production function does not directly account for time frame directly, which is of course one of its limitations, however, the time frame is assumed to have been indirectly accounted for through K, A and L factors (Mankiw, 2010). Thus, according to the Solow production model, just like other production models, changes in the level of output is solely due to changes in the input factors, and that increases in knowledge lead to technological progress, Mankiw (2010). In the Solow production model, the factors A and L enters multiplicatively in the model, hence the product of A and L, AL, is effective labor. One of the major assumptions which forms the basic foundation of the Solow model is the existence of constants returns to scale in capital and effectiveness of labor, hence the two augments (Mankiw, 2010). The Solow model of production which considers the assumption of constant returns to scale is illustrated in Equation 4 below:

$$Y = F(cK, cAL) = cF(K, AL) \qquad (4)$$

In Equation 4 c is the constant term representing that constant returns to scale are present in the production function. The Solow production model also considers natural resources and land as not crucial, hence were not included in the model. Therefore, the Solow model of production gives knowledge and labor, that is, effective labor and capital as the major factors responsible for enhancing output level in an economy. The present research only considers the Solow production model and do not ascertain the breakeven investment, as well as, the balanced growth path because this is not within the research scope.

In the recent models of production energy has been included in modelling output level or GDP of a nation, Zweifel et al. (2017). After having incorporated energy factor in the production function, Zweifel et al. (2017) presents the production model as given in Equation 5.

$$Y = f(K, L, M, E) \qquad (5)$$

In Equation 5, E is the represents the energy factor, which has been observed as the main factor of production, M represent materials, while K and L

are the levels of capital and labor force, respectively. It must be noted that energy factor is basically divided into two sub-types, that is, non-renewable and renewable energy, and some researchers have sought to model these two types separately.

Model specification

The model of the present research dissertation is spelled by following the models explained in the above section of the Cobb-Douglas, Romer and Solow production functions (Romer, 1990; Cobb & Douglas, 1928; Solow, 1956, for the purpose of reviewing these models you can also see Mankiw, 2010). This means that the present research takes the Cobb-Douglas, Romer and Solow production function as the basis of the model specified in this research. Moreover, the production function of Zweifel (2017) on top of acknowledging the importance of capital and labor in enhancing the level of output produced in an economy included energy and materials as one of the essential inputs in the production process. Thus, labor, energy and capital are taken as the basic raw materials of output level production and the output level production is represented by GDP. However, this present research is not just concerned by GDP alone but by its growth over time, hence we use economic growth and the explained variable. In addition to the models presented by Romer, (1990); Cobb and Douglas (1928); Solow (1956); Zweifel et al. (2017), empirical research that was done by Abdouli and Hammami (2017; and 2020) considered the postulations presented in the above-mentioned production functions and expressed the level of output production as a function of labor force, capital, technology and energy inputs of an economy. These implies that an economy's level of production is strongly enhanced by the level of capital, energy, labor and technological endowments. Therefore, promoting these inputs or resources have a tendency of boosting the level of output production in an economy.

While labor, energy, capital is essential in promoting economic growth of an economy, trade openness and foreign direct investment (FDI) have been identified as key inputs that are responsible for fostering the growth of the economy. In research by Kalai and Zghidi (2019) which included the core inputs of output production as given by the Cobb-Douglas, Romer and Solow

models, trade openness and capital have been identified as one most crucial factor which enhances economic growth. The importance of FDI and trade openness in fostering economic growth is also supported by the research of Magazzino and Mele (2022) which specifies output level as a function of trade openness, FDI and the production sector. Other researches such as the research of Fadhil and Almsafir (2015) specified output level as a function of FDI, exchange rate and the indicator of GDP, while Faisal et al. (2021) used factors such as FDI, oil prices and tourism development to explain the level of output production in an economy.

The factors which impact the level of output are quite much, though we may not express them all in the model due to the negligible effect of other factors. For example, the research of Driffield and Jones (2013) added order and regulation, human capital, bureaucracy, investor profile, remittances, the rate of inflation, population size, investor profile, together with FDI, trade openness and capital in examining the level of output production in a nation. The other crucial factors that have been considered in explaining the level of output production in a nation are imports and exports. The research of Gutierrez-Portilla et al. (2019) also alludes that FDI, openness in trade, industry, services, human capital and Agricultural production are essential in enhancing the growth of output level of a nation. On top of labor force, Ali (2021) depicts that authority's involvement, level of investment and FDI are the main drivers of output level production. Dogan et al. (2020) suggested for a very interesting model of ascertaining output level, where they separated energy sources into its two types (non-renewable and renewable), and also included other factors such as, oil costs, law and order, FDI and the complexity of GDP. The models presented by various other researches as outlined above, indicated that while capital, labor, and energy are the core inputs of output production, FDI and trade openness are also vital. Therefore, the present research only considers capital, energy, and labor as per the postulations of the Romer (1990), Solow (1956), Cobb and Douglas (1928) and Zweifel et al. (2017), together with FDI, as per the postulations of (Gutierrez-Portilla et al., 2019; Dogan et al., 2020; Driffield & Jones, 2013; Fadhil & Almsafir, 2015; Faisal et al., 2021). Trade openness and other factors are not considered in the present research in order to concentrate on the importance of FDI in ascertaining output level of the

developing nations, West African nations to be specific. Therefore, the model specification in Equation 6 is used to ascertain economic growth of the developing west African nations.

$$EG = f(CAP, LBF, ENG, FDI) \qquad (6)$$

Where EG is economic growth of the developing west African countries from 1990 to 2020; CAP is the level of capital of the developing west African countries from 1990 to 2020; LBF is the labor force of the developing west African countries from 1990 to 2020; ENG is total energy use of the developing west African countries from 1990 to 2020; FDI is foreign direct investment of the developing west African countries from 1990 to 2020. The model specification given in Equation 6 is not very important in explaining how the input factors affect economic growth in the developing west African countries, hence the need to specify a statistical model, such as the one in Equation 7.

$$EG_t = \beta_0 + \beta_1 lnCAP_t + \beta_2 lnLBF_t + \beta_3 ENG_t + \beta_4 FDI_t + \mathbf{et} \qquad (7)$$

In the Equation 7, β_0 is the constant term of the model, β_1 to β_4 are the coefficient values of the model, t represents the time variant of the variable, while et is the white noise error term and the ln represents the log value of the series. The coefficients of the input factors β_1 to β_4 of Equation 7 are essential in explaining the effect of each and every input factor on the explained variable, that is, a negative coefficient value of any respective input series in the model, entails that the series causes economic growth to drop as a result of an increase in the input series, while a positive coefficient of an input series entails that raising the input charitable will be followed by rising economic growth. The constant term β_0 can either be negative or positive, while the white noise error term represents all other factors that has not been considered in the model or whose effect is relatively small that they cannot be included.

Data

All the data used is retrieved from the World Bank databases, that is, from http://www.data.worldbank.org. The data that is utilized in this research is

the data of the fifteen developing west African nations (Togo, Ghana, Burkina Faso, Mali, Nigeria, Benin, Guinea Bissau, Calbo Verde, Guinea, Liberia, Niger, Cote D'voire, Senegal, Gambia, and Sierra Leone) and the data set is annual data from 1990 to 2020. Therefore, the present research considers a panel data of fifteen west African nations.

The factors considered are economic growth, FDI, capital, energy and labor force. Economic growth is the explained factor of the present research model and refers to the rate at which the economy of a nation grows over a period of time. Economic growth is measured as the percentage change of total GDP of a nation year after year. Therefore, a positive value of economic growth implies that the GDP of an economy has been rising, while a negative value entails that the GDP has been dropping. FDI is the total value by foreign investors in a nation and this research uses the inflow of foreign investment. FDI inflow in the present research is essential in examining if the investment by foreigners in the home country may help to boost the growth of the economy. FDI, thus, is the main factor that is being considered in the present research to examine if promotes the country's growth. The capital level of the developing west African nation this research dissertation is the value of the Gross Fixed Capital Formation as given in the World Bank data bases. The level of capital, thus, do not imply the cash capital but rather the physical capital, such as the machineries, furniture and buildings among others. Labor force refers to the number of persons that are willing and available for work in an economy. Thus, the people that are considered to be in labor force are those who are aged 18 years to 65 years and either employed or are employed, but actively looking for a job (Mankiw, 2010). It is crucial for unemployed workers to be actively looking for the job in order for them to be considered as unemployed or part of the labor force, otherwise they will be considered as discouraged workers (Mankiw, 2010). Energy is the total amount of power that is being utilized to produce output in an economy. There are basically two major types of energy that is used in the production function, that is, renewable and non-renewable energy. The difference between the two types of energy is that, non-renewable energy is used once and diminishes thereafter, while renewable energy can be used various times without getting depleted. Moreover, non-renewable energy pollutes the environment due to the availability of carbon content in it, while

renewable sources do not contain carbon particles, hence are safe to the surroundings. Table 2 in this section presents a summary of all factors specified in the model of the present research.

Table 2.

Summary of indicators used in the research model

Variable	**Abbreviation**	**Measurement**	**Source**
Economic growth	EG	% change in GDP	World bank
Capital	CAP	Value of GFCF	World bank
Labor force	LBF	Number of people in labor force	World bank
Energy	ENG	Total use	World bank
Foreign Direct Investment	FDI	Foreign investment inflow as a % of GDP	World bank

Method

The methodology that is used in this research dissertation can be sub-divided into two major sections, that is, the preliminary testing and the employing of the main method of data analysis. The preliminary section utilizes five techniques, that is, descriptive statistics, Cross-sectional dependence (CD) testing, unit root testing, testing for heterogeneity and testing for cointegration. The descriptive statistics is essential in any research to examine the features of each and every series that is employed. The descriptive statistics takes into consideration, the mean, standard deviation, median, number of observations, maximum and minimum values of each single series considered in this research dissertation. The mean and median values of a series are the average values, but can be calculated using different formulas. The mean is calculated by summing up all the values observed in a series during the period of the research and then divide the total value by the total observation number. The median is calculated by way of arranging the series observations in either descending and ascending

order and then pick the value which falls at the middle. Both median and mean values are essential in showing how the series has been behaving over time. They help in answering the question on what the average value has been. The standard deviation depicts the rate at which the observed values of a series has been diverging from the mean. While a high value of standard deviation shows that the observed values has been diverting much from the mean, the low standard deviation shows that the rate of divergence has been low. The minimum and maximum values are the lowest and highest values of a series, respectively, that is, the lowest or highest value that has been observed in a series over a given time frame. The present research dissertation only considers the number of observations, mean, maximum and standard deviation. The individual graphs of each series are also plotted and presented in order to investigate the series behavior overtime among the fifteen nations under consideration.

Secondly, the CD test is done to investigate the presents of cross-sectional dependence in the panel series. Panel series are often observed to exhibit CD due to interdependence as well as trade that takes place among nations. Testing for the presence of CD in the panel series is crucial because panel series with CD issues cannot be checked for unit root with the first-generation methods. It is only the second-generation tools of checking unit root that may effective overcome CD, hence depicts robust outcomes. Therefore, the test of CD of Pesaran (2015) is used to check if the panel series have CD issues, the findings which will be essential in determining whether to use the first- or second-generation techniques of checking unit root.

Thirdly, the unit root check is undertaken to examine if the series are stationary or not and to investigate their order of integration. For example, series that are stationary with applying differencing are considered to have zero order of integration, while those that are stationary after differencing once are considered to have one order of integration and so on. Due to the presence of CD issues in the panel series as per the Pesaran (2015) CD test, the second-generation tools of Fisher -type and Im-Pesaran-Chin are considered. The Fisher -type and Im-Pesaran-Chin tool are considered in testing for the presents of unit root as well as ascertain the order of integration the panel series because they

present strong and unbiased outcomes irregardless of the fact that CD issues are present.

Fourthly, heterogeneity issues are tested in the specified model, by employing the slope heterogeneity technique. The presence of heterogeneity issues in a model entails that techniques that are strong over heterogeneity issues are essential to be used. Lastly, under the preliminary checking, the investigation of the presence of cointegration in the model is done. The three main tools to checking cointegration in a model are used, that is, the Westerlund, Pedroni and Kao tools. Checking the existence of cointegration in a model is essential in understanding if the series in a model have strong long-run association. A model that has a strong long-run association requires to be analyzed through employing methods that presents both short- and long-run estimates of the model, such as the ARDL tool or by employing cointegration regressions which only presents long-run coefficients. The present research dissertation utilizes that panel ARDL tool that presents both short- and long-run estimates. The ARDL tool is also observed to be a most suitable technique since it accepts series with either one or zero integration orders, or a mixture of both. The ARDL was developed first by Pesaran, Shin and Smith (1997), later modified by Pesaran, Shin and Smith (1999), and finally by Pesaran, Shin and Smith (2001), who included the bounds test analysis. The statistical representation of the ARDL tool is depicted in Equation 8.

$$EG_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta EG_{t-i} + \sum_{i=1}^{q} \beta_{2i} \Delta lnCAP_{t-i} + \sum_{i=1}^{q} \beta_{3i} \Delta lnLBF_{t-i} + \sum_{i=1}^{q} \beta_{4i} \Delta ENG_{t-i} + \sum_{i=1}^{q} \beta_{5i} \Delta FDI_{t-i} + \beta_{6i} EG_{t-1} + \beta_{7i} lnCAP_{t-1} + \beta_{8i} lnLBF_{t-1} + \beta_{9i} ENG_{t-1} + \beta_{10i} FDI_{t-1} + \beta_{11i} ECT_{t-1} + et \quad (8)$$

In the Equation $\boldsymbol{\beta_0}$ is the constant term of the model, $\boldsymbol{\beta_1}$ to $\boldsymbol{\beta_5}$ are the coefficient values of the short-run estimates of the ARDL tool, $\boldsymbol{\beta_6}$ to $\boldsymbol{\beta_{10}}$ are the

coefficient values of the long-run estimates of the ARDL tool, $\boldsymbol{\beta_{11}}$ is the coefficient of the error correction term (ECT), $\boldsymbol{t}$ represents the time variant of the variable, while $\boldsymbol{et}$ is the white noise error term. The ECT depicts the rate at which the series in a model will tend to move towards a long-run association. The decision on whether series in a model moves in a long-run association towards the long-run equilibrium is arrived at, if and only if, the $\boldsymbol{\beta_{11}}$ which is the coefficient of the ECT is negative and statistically significant at the level of 5%. In the event that the is positive and statistically significant at the level of 5%, then it is conclude that the series will not converge, but rather diverge and if the $\boldsymbol{\beta_{11}}$ is not statistically significant irregardless of whether its positive or negative, then no significant long-run association exists.

The present research dissertation uses the three main techniques of the panel ARDL tool, that is, the Mean Group (MG), Dynamic Fixed Effects (DFE), and the Pooled Mean Group (PMG). The outcomes from the MG, DFE and PMG tools are compared and contrasted to understand the relationship between the input series with the explained series, economic growth. The present research dissertation also utilizes the Fixed Effects and Random Effects tools to analyze the short-run findings of the model. The findings depicted by the Fixed Effects and Random Effects tools are compared and contrasted with the outcomes of the MG, DFE and PMG tool, for the reason of checking the robustness of the outcomes.

CHAPTER IV

Data analysis and results

Descriptive Statistics results and variable analysis

In this Chapter of the present dissertation, we begin by presenting the outcomes of the descriptive statistics. The present research uses five indicators of the 15 developing west African nations. The indicators employed include economic growth, foreign direct investment, capital, labor force and total energy use. The descriptive statistics findings that are presented in Table 3 of this dissertation depicts that each indicator used in this research has 465 observations. The number of observations per each variable are depicted as 465 because this research uses annual data of 15 countries for the period spanning from 1990 to 2020. Thus, 31 multiplied by 15 gives 465 observations per each indicator.

In Table 3 we also present the major descriptive statistic findings, that is, the mean, standard deviation and maximum values of each indicator under consideration. The mean of economic growth indicator of the 15 developing west African nations is depicted as 3.89%. This shows that on average the economy of these 15 nations has been growing at an average rate of 3.89% from 1990 to 2020. An increase in economic growth at an average rate of 3.89% may be considered somewhat low, but considering that these are developing nations, it is okay since it's a positive value indicating that the west African developing nations have been progressing during this period. Moreover, the mean of FDI is depicted in Table 3 as 3.5%, indicating that foreign direct investment had an average of 3.5% in the west African countries from 1990 to 2020. An average of 3.5% in FDI is not very large. This depicts that on average, FDI in these nations has not been growing at a high rate. West African countries had an average of approximately 4 270 000 000 in capital, 6 059 211 in labor force and 162.18 in the use of energy. The average capital value of the West African nations is very high, depicting that these nations have vast amount of capital resources to be channeled in the production of goods and services. The labor force in this region is also relatively high, depicting an average of 6 059 211.

The standard deviation of the economic growth indicator of these nations for the given period of study, presented in this dissertation is depicted as 4.89%, see Table 3. FDI is also depicted to have a standard deviation of 8.63%, while that of capital is 12 600 000 000. Labor force indicator is depicted to have a standard deviation of 12 200 000 and total energy indicator has a standard deviation of 206.36. The standard deviation presents the rate at which an indicator diverts from its mean over time. A high standard deviation depicts that the observations of an indicator have been diverting much from the mean value, while a small standard deviation depicts that there have been small and minor deviations from the mean. A standard deviation of 4.89% in the case of economic growth indicator is not very large, hence the values of economic growth obtained during the period 1990 to 2020 of the 15 west African nations has not been diverting much from the mean. The standard deviation of FDI, 8.63%, is still relatively low and shows that the observed values of FDI in the west African nations during the period 1990 to 2020 was not diverting much from its mean. The standard deviation of capital, labor force and energy use are relatively high. However, it is crucial to present standard deviation in percentage not absolute values for easy analysis. In this case determining whether the observed variables diverted much from the mean might be tedious.

We also present the maximum of economic growth, FDI, capital, labor force and energy of the 15 west African nations for this 31-year period as 26.4%; 103.34%, 110 000 000 000, 62 200 000 and 798.63, respectively. The maximum value is the highest value that was obtained during the period under consideration for each indicator. It depicts the highest possible value of a variable that was observed and in the case of economic growth, its highest value during the period under consideration is 26.42%, while that of FDI is 103.34%. The ones of capital, labor force and energy are presented above.

Table 3.

Descriptive statistics results

Variable	Obs.	Mean	Std. Dev.	Max
EG	465	3.8857	4.8879	26.4173
FDI	465	3.5035	8.6276	103.3374
CAP	465	4.27e+09	1.26e+10	1.10e+11
LBF	465	6059211	1.12e+07	6.22e+07
ENG	465	162.1758	206.3596	798.63

Note: Obs represents the number of observations. Std.Dev. represents the standard deviation. Max represents the maximum value of an indicator

In this section of the research, we also present the graphs of the indicators: economic growth, capital, labor force, FDI and energy for the 15 west African nations in the Figures 1 to 5. In all the figures, the horizontal axis represents the time period for the 15 nations under consideration, while the vertical axis presents the indicator value. The Figure 1 presents the line graph of economic growth of the 15 developing African nations. The Figure 1 depicts that the economic growth of the 15 nations has been hovering around the same value which is between 0% and 10%. We observe in Figure 1 that country 3 which happen to be Cabo Verde in around 2018 to 2020 had a very low economic growth of below 0%. Moreover, country 8 (Guinea-Bissau) from a period of between 1996 and 1998, and country 9 (Liberia) from 2004 to 2006 had very low economic growth values of around -30%, while country 14 (Sierra Leone) in a period around 1992 to 1994 and around 2018 to 2020, as well as country 15 (Togo) during the period around 1994 to 1996 had a low economic growth value of around -20%. We also observe that while Togo had experienced low periods of economic growth it also experienced periods of very high economic growth during the period around 2000 to 2006.

Figure 1.

Economic growth of the 15 west African nations – 1990 to 2020

(Source: Author's own illustration)

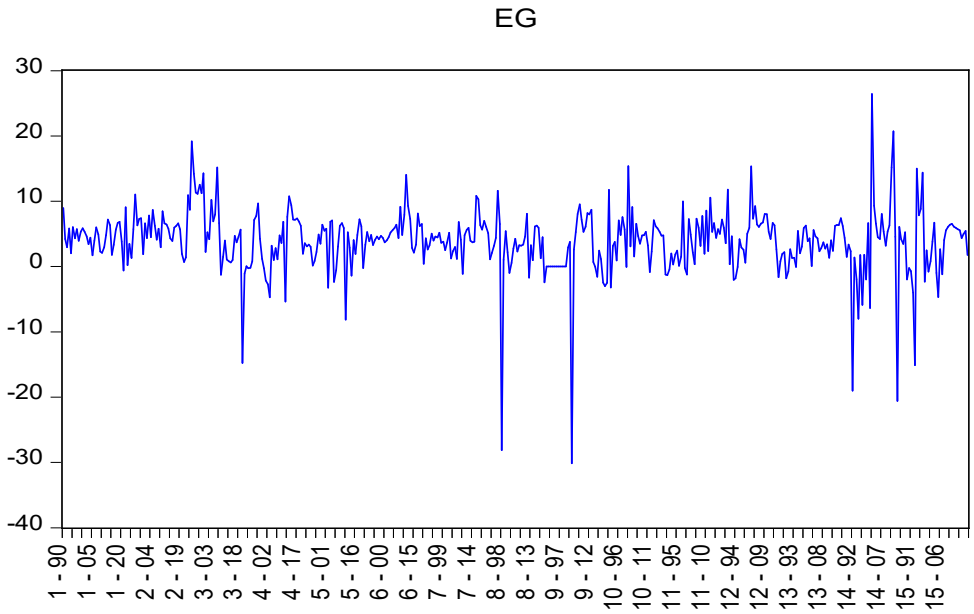


Figure 2 also presents the values of FDI for the 15 west African nations during the period under consideration. The figure depicts that the FDI inflow value in this region has not been deviating much, it has been fluctuating between 0 to 5% and sometimes to around 10%. High FDI value has been observed only in Liberia (country 9 as shown on the graph) for the period between 2005 to around 2018. The highest FDI value observed in Liberia during this period was around 100%.

Figure 2.

FDI of the 15 west African nations – 1990 to 2020

(Source: Author's own illustration)

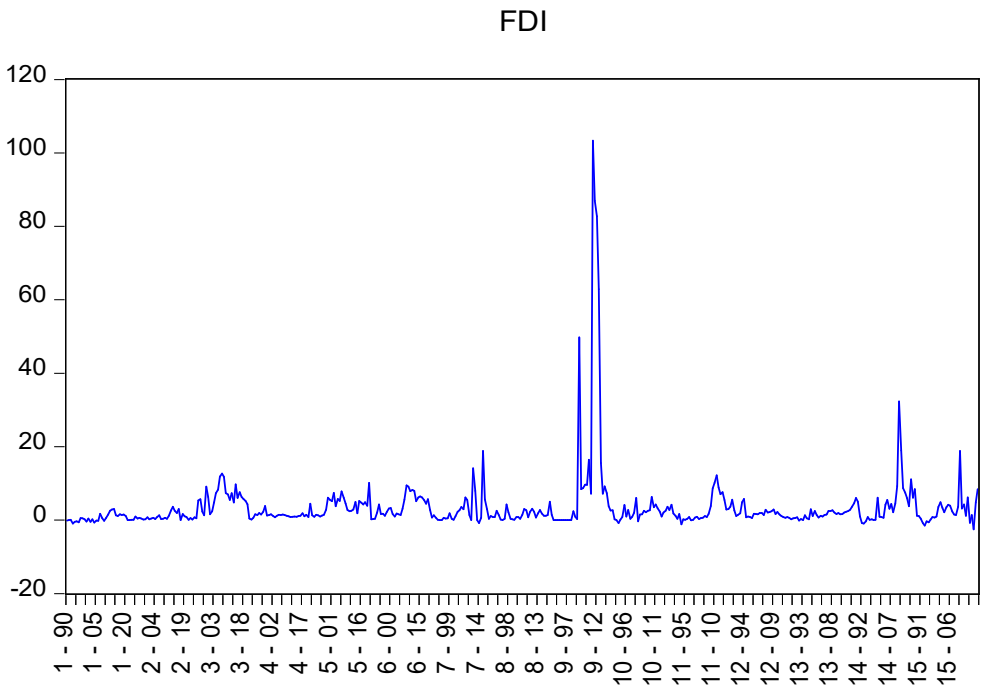
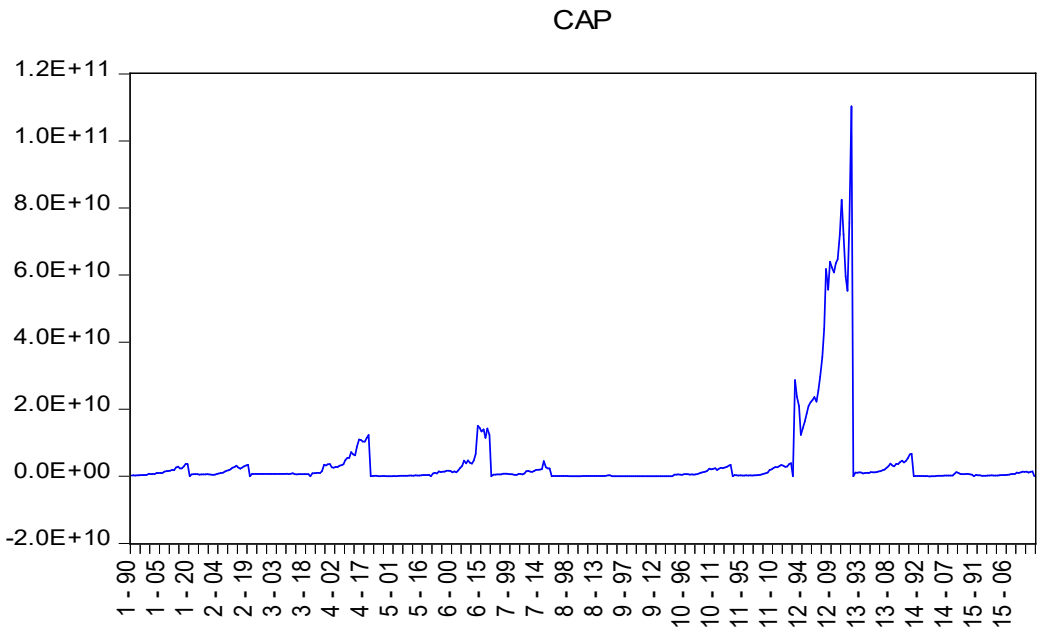


Figure 3.

Capital of the 15 west African nations – 1990 to 2020

(Source: Author's own illustration)

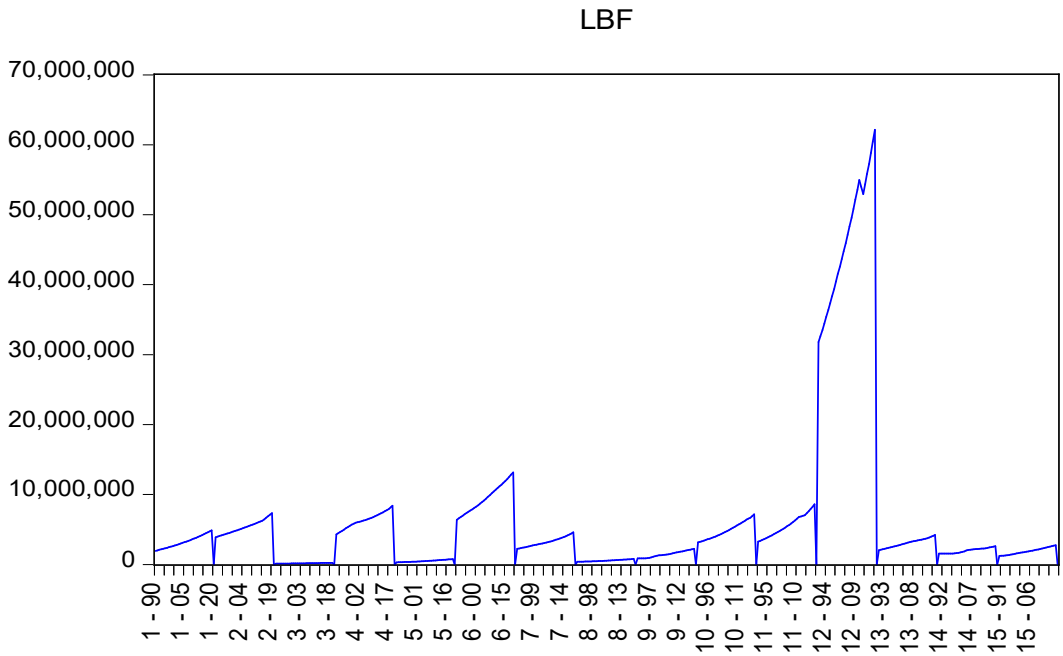


We also present the graph showing the capital value of the 15 developing west African nations in the Figure 3. The capital level of the all countries, except Nigeria is observed to be almost on the same band with minor fluctuations. High capital levels are observed in Nigeria (country 12 in the graph), with the highest value exceeding 100 000 000 000. Therefore, Figure 3 depicts that Nigeria among the 15 west African nations had the highest capital level which is far above the capital level observed in the other respective nations, while the rest of the nations have almost the same level of capital.

Figure 4.

Labor force of the 15 west African nations – 1990 to 2020

(Source: Author's own illustration)

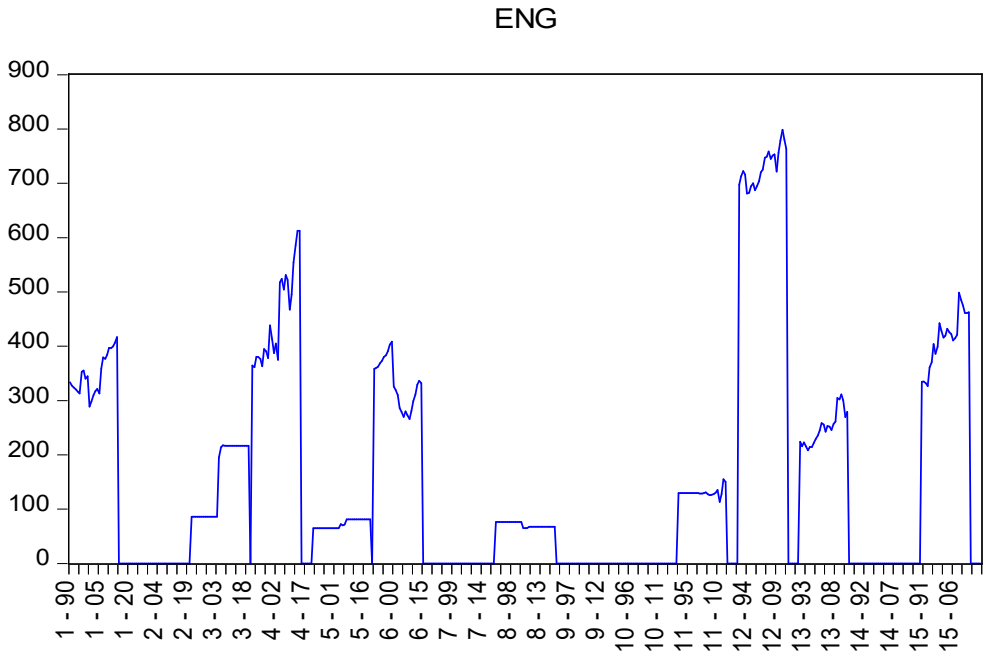


The Figure 4 depicts that all the 14 west African nations have the same level band of labor force, while Nigeria (the 12th nation on the graph) has extremely high levels of labor force during the period under consideration. Labor force in Nigeria is observed to exceed 60 000 000 people in labor force. This extremely high when compared to the other west African nations. Of course, it is not shocking for Nigeria to have such high number of people in labor force considering its high population size.

Figure 5.

Energy use of the 15 west African nations – 1990 to 2020

(Source: Author's own illustration)



The energy indicator of the 15 west African nations is one of the high fluctuating indicators employed. On average Figure 5 depicts that energy indicator was around 300, while other years in other nations had 0 values of energy resources as presented in the World Bank dataset. Figure 5 depicts that Nigeria had the highest value of energy of around 800, while Liberia had the lowest energy value considering that no data of energy is presented for Liberia in the World bank dataset.

Cross-sectional dependence test and unit root test

The next stage in the data analysis process of this dissertation is the testing of CD which is crucial in identifying the best tool of unit root test. The CD test was pioneered in the work of Pesaran (2015), who alludes that panel variables usually exhibit CD due to interdependence and trade among nations. Therefore, it is vital when using panel dataset to investigate if the panel series are free from CD or not. CD test is essential in determining the most suitable method of unit root. Panel datasets that have CD cannot be checked for unit root by using first generation techniques, rather second-generation techniques will be used. This is so because second generation techniques overcome CD problems in the panel data sets.

The outcomes presented in Table 4 depicts that economic growth, FDI and the log of labor force exhibit for significance CD at 1% level. Thus, these indicators have strong presence of CD in their panels, hence can only be checked for unit root through employing second generation techniques. Employing first generation techniques in these indicators to test for unit root, may lead to the attainment of biased outcomes. The log of capital and energy indicators could not be checked for CD because these panels are not balanced. CD test technique only works in balanced panel data sets. Therefore, basing on the results of economic growth, FDI and labor force, the present dissertation uses the second-generation tools to check for unit root.

Table 4.

CD test results

Variable	**CD test**	**p-value**
EG	3.69***	0.000
FDI	11.83***	0.000
lnCAP	-	-
lnLBF	57.03***	0.000
ENG	-	-

Note: *; **; *** represents significance at 10%; 5%; and 1% level

The present research dissertation uses the Levin-Lin-Chu and the Harris-Tzavalis tools of testing unit root. These tools are the second-generation techniques and this present research test for unit root with these tools by making use of the STATA software. The findings of the Harris-Tzavalis and Levin-Lin-Chu tools are presented in Table 5. Table 5 presents the outcomes of the t- and z-Statistics of the techniques employed and the p-values for each indicator. The t- and z-Statistics and the p-values are essential in concluding on whether the indicator in question has unit root or not. Considering the t- or z-Statistics value it is compared with the t- or z-Critical value, while the p-value is analyzed with the significance level of 1%, 5% and 10%. Thus, it is crucial to understand the null hypothesis and alternative hypotheses of unit root test for better interpretation of the findings. The null hypothesis states that, the indicator has unit root (not

stationary), while the alternative hypothesis states that, the indicator has no unit root (stationary). When using the t-Statistic value to conclude on whether the indicator has unit root or not, it must be noted that, the null hypothesis is accepted if the t-Statistic value is less than the t-Critical value, but if the t-Statistic value is greater than the t-Critical value then the null hypothesis is rejected and the alternative hypothesis is accepted. In the event that the t-Critical value is unavailable then the rule of thumb may be adopted. The rule of thumb states that if the t-Statistic is less than two, then the null hypothesis is accepted, otherwise a t-Statistic value which is greater than two allows one to reject the null hypothesis and accept the alternative hypothesis. In the case of p-value, the null hypothesis is accepted if and only if the p-value is greater than either 0.01, 0.05 or 0.1, that is, if it's greater than 1%, 5% or 10% significant level. Generally speaking, the 5% level of significance is widely used. Therefore, if the p-value is greater than 0.05, then the null hypothesis is accepted, while if the p-value is less than 0.05 the null hypothesis is rejected and the alternative hypothesis is accepted. It can be noted that, the conclusion drawn when using the t- or z-Statistic and p-values are always the same, they do not contradict. Therefore, due to the absence of the t- or z-Critical values, we base our conclusion with the p-values.

Coming to the findings of Levin-Lin-Chu and Harris-Tzavalis test of unit root presented in Table 5, it is observed that economic growth and FDI have no unit root at the level form. The p-values of both economic growth and FDI for the two tools, Levin-Lin-Chu and Harris-Tzavalis, have p-values of zero and this is less than 0.05, hence the findings are significant at 5% significant level. They are even significant at 1% level. The log of capital according to the findings presented by the Levin-Lin-Chu presented in Table 5, it has unit root at level because it's p-value is very large above 0.05. However, after having been differences, the log of capital has no unit root according to the Levin-Lin-Chu outcomes. The findings given in Table 5 of the Harris-Tzavalis test do not concur with the Levin-Lin-Chu postulations in the case of log if capital. Harris-Tzavalis test outcomes depicts that the log of capital has no unit root at the level form. The p-value presented by the Harris-Tzavalis test on the log of capital is less than 0.01 showing that the outcomes are significant at 1%. In addition to that, the outcomes of Levin-Lin-Chu and the Harris-Tzavalis tools presents that the log of labor force and total use

of energy have unit root at level. This conclusion is arrived at considering the high p-values above 0.1. However, after having differences these indicators, the unit root disappears and the Levin-Lin-Chu and Harris-Tzavalis tools agrees, considering the p-values which are lower than 0.01. The unit root findings presented in Table 5 depicts that, economic growth and FDI are stationary in level form as per both Levin-Lin-Chu and Harris-Tzavalis tools, capital is stationary in level considering the Harris-Tzavalis tool outcomes, but stationary after differencing it once as per the Levin-Lin-Chu test outcomes. Labor force and energy use are stationary after differencing them once as per the Levin-Lin-Chu and Harris-Tzavalis tool outcomes. Therefore, the indicators considered in this research have mixed integration orders, some are integrated at one order while others are integrated at zero orders.

Table 5.

Unit root test results

	Levin-Lin-Chu		**Harris-Tzavalis**	
Variables	***t-Statistics***	***p-value***	***z-Statistics***	***p-value***
EG	-5.3823***	0.0000	0.1565***	0.0000
FDI	-3.6776***	0.0001	0.6419***	0.0000
lnCAP	1.1323	0.8712	0.4441***	0.0000
lnLBF	0.5380	0.7047	0.9989	0.9999
ENG	3.1422	0.9992	0.9192	0.7301
ΔlnCAP	-10.1636***	0.0000	-	-
ΔlnLBF	-6.5943***	0.0000	0.6464***	0.0000
ΔENG	-4.5592***	0.0000	-0.0196***	0.0000

Note: *; **; *** represents significance at 10%; 5%; and 1% level. Δ represents the first difference of a variable.

Slope heterogeneity and cointegration testing

In this section, the Slope heterogeneity outcomes and cointegration results are discussed. The slope heterogeneity findings are presented in Table 6, while the cointegration outcomes are presented in Table 7. The outcomes of the slope heterogeneity that are presented in Table 6 depicts the presence of heterogeneity

issues in the present model. However, the heterogeneity issues are not that acute in the model considering that the first delta statistic of slope heterogeneity presented in Table 6 is not significant at 5% level. It is only the adjusted delta statistic of slope heterogeneity which is significant. Therefore, slope heterogeneity issues are not much in the model, hence no need to correct for it or employ methodologies that are strong over it.

Table 6.

Slope heterogeneity test results

	Delta	**p-value**
	1.921*	0.055
adj.	2.139**	0.032

Note: *; **; *** represents significance at 10%; 5%; and 1% level. adj. represents adjusted value.

The cointegration tools used in the present research dissertation are the Pedroni, Kao and Westerlund techniques and their findings are presented in Table 7. The Kao technique presents the t-Statistic values of the modified Dickey Fuller, unadjusted modified Dickey Fuller, Dickey Fuller, unadjusted Dickey Fuller and the Augmented Dickey Fuller. The findings presented by the Kao test considering the t-Statistic provided by these five tests, the indicators that are specified in the model of the current research are cointegrated. All the t-Statistic values have a corresponding p-value which is lower than 0.01. Thus, at 1% significance level, the indicators of the model are linked via a significant long-run association. Models that have indicators which are linked via a long-run association requires to be analyzed by using techniques that gives long-run outcomes.

Table 7.

Results of cointegration test

	t-Statistic	p-value
	Kao	
Modified DF	-17.5370***	0.0000
DF	-13.7260***	0.0000
ADF	-8.7924***	0.0000
Unadjusted modified DF	-27.2373***	0.0000
Unadjusted DF	-15.0032***	0.0000
	Pedroni	
Modified PP	-3.1638***	0.0008
PP	-14.4389***	0.0000
ADF	-12.6614***	0.0000
	Westerlund	
Variance ratio	-2.3678***	0.0089

Note: *; **; *** represents significance at 10%; 5%; and 1% level. DF represents Dickey Fuller test; ADF represents Augmented Dickey Fuller test; PP represents Phillips Peron test

The Pedroni tools findings also support the findings presented by the Kao tool. The t-Statistic values of the modified Phillips Peron, Phillips Peron and the Augmented Dickey Fuller of the Pedroni test depicts that, all the indicators specified are cointegrated. The t-Statistic values have a corresponding p-value which is less than 0.01, illustrating the presents of a long-run association among the indicators. Furthermore, the Westerlund provides the variance ratio t-Statistic value which has a corresponding p-value of less than 0.01. Thus, all indicators specified are linked via a long-run association. Because of the outcomes presented by the Westerlund, Pedroni and Kao test in Table 7, we conclude that all the indicators have a significant long-run connection and should be analyzed by employing methodologies which give long-run coefficients.

Panel ARDL, Fixed Effects and Random Effects models

This section of the research presents the outcomes presented through the use of panel ARDL techniques, that is, the Pooled Mean Group (PMG), Dynamic Fixed Effects (DFE) and Mean Group (MG) methods. The panel ARDL techniques are essential in the present research, firstly because the indicators used are integrated of mixed orders, one and zero, and secondly because the indicators are connected via a long-run significant association as presented by the cointegration techniques. Thus, the panel ARDL techniques gives both the short-run outcomes together with the long-run outcomes. We also employ the Fixed Effects and Random Effects methodologies to verify the robustness of the results presented by the panel ARDL tools.

The findings of the PMG tool depict that FDI and energy use have strong effects on economic among the west African countries in the long-run, while capital and labor force do not exhibit any significant effect on economic growth in the long-run. The findings of the PMG technique presented in Table 8 depicts that FDI positively impacts economic growth in the west African region. Thus, FDI is essential among developing nations in raising economic growth. The PMG findings depicts that, a rise in FDI by a single unit is associated with a significant rise in economic growth of the 15 west African countries by 0.1944 units. The findings are also significant at 1% depicting the existence of a strong association. These findings are crucial and they show that African developing nations can improve their economies by encouraging FDI inflows. There is need for developing nations to create an environment which is conducive in attracting investors if the growth of these nations is to be improved.

On the other hand, energy resources according to the findings of the PMG tool exhibit for a significant negative effect on economic growth of the west African nations. The findings depict that when energy is promoted by a single unit this will significantly reduce economic growth of west African nations by 0.0034 units in the long-run. The findings are significant at the level of 5%, but the coefficient value is not very large enough depicting that inasmuch as the relationship is strong but the effect is light. While, energy is observed to

negatively affect economic growth in the west African nations it has been widely considered as the main factor which promotes economic growth in various other regions. Capital and labor force do not significantly influence economic growth among the developing 15 west African nations, in the long-run. Their coefficient values are positive portraying for a somewhat positive effect of labor force and capital on economic growth, but the association is not statistically strong.

The short-run outcomes of the PMG tool depict that FDI and energy use do not significantly influence economic growth among the 15 west African developing nations, while capital and labor force provide a significant effect on economic growth. The short-run estimations of the PMG tool depict that capital present a positive influence on economic growth among the 15 developing west African countries. The findings depict that when capital in enhanced by 1%, then economic growth among the west African nations will have a tendency of rising by 4.39%. The PMG findings depict that capital have strong short-term effects of economic growth. The coefficient value of 4.39% is fairly high and the outcome is significant at 1% level, depicting the presence of a strong association among the indicators. Therefore, developing west African nations are encouraged to foster capital in order to improve their economies.

Labor force is depicted to exhibit for a negative influence of economic growth among the west African nations in the short-run as per the PMG findings. The PMG findings depict that an improvement in the labor force by 1% is associated with a decline in economic growth of the west African nations by 7.18%. The coefficient value of labor force is relatively high, its p-value is also less than 0.01, depicting that the link between the two indicators is statistically strong. Labor force has been presented as the main factor which enhances economic growth, since workers are responsible for working in the industries set up to produce goods and services. The west African countries have presented somewhat different outcomes from what is generally agreed, most probably because of the different conditions around these nations. There are high levels unemployment among developing nations with some workers lying idle having no work. Moreover, workers are always productive if equipped with the right tools and machineries and if given the right wages and salaries. Developing nations

have lower technologies and hence workers are counter-productive in the absence of technology. Energy resources do not statistically influence economic growth in the short-run.

The findings of the PMG technique depict asymmetric effects on the influence of all independent indicators on the dependent one. While FDI and energy presents significant influence of economic growth in the long-run, in the short-run these factors do not have any significance influence. Moreover, while capital and labor force do not statistically impact economic growth in the long-run, in the short-run they statistically impact economic growth of the west African nations. This depicts that energy, FDI, capital and labor force do not affect economic growth in a similar way across all time horizons. However, the long-run findings are vital since they are used for making policies. Therefore, FDI and energy which exhibit for significant long-run influence should be considered among the west African nations to foster economic growth. The error correction term (ECT) of the PMG technique is negative and significant, supporting the presence of a strong long-run association in the model. The coefficient of the ECT is 0.8758 depicting that the indicators will move towards a long-run convergence at a rate of 87.58% which high. Therefore, the adjustment rate to convergence will not take much time, rather it will be quick.

Table 8.

Results of panel ARDL test

	Coef.	z-Statistic	p-value
	Pooled Mean Group		
	Long-run estimation		
FDI	0.1944	3.30***	0.001
lnCAP	0.1239	0.33	0.741
lnLBF	1.0948	0.80	0.426
ENG	-0.0034	-1.99**	0.047
	Short-run estimation		
ECT(-1)	-0.8758	-11.80***	0.000
FDI	-0.0097	-0.09	0.926
lnCAP	4.3871	5.15***	0.000
lnLBF	-7.1784	-5.93***	0.000
ENG	0.0042	0.41	0.682
	Dynamic Fixed Effects		
	Long-run estimation		
FDI	0.0909	2.46**	0.014
lnCAP	0.6812	2.27**	0.023
lnLBF	0.1019	0.07	0.945
ENG	-0.0008	-0.31	0.755
	Short-run estimation		
ECT(-1)	-0.868	-17.89***	0.000
FDI	-0.1047	-2.87***	0.004
lnCAP	-0.0925	-0.41	0.682
lnLBF	-0.4306	-0.36	0.722
ENG	0.0049	1.28	0.199
	Mean Group		
	Long-run estimation		
FDI	-0.0668	-0.24	0.807

lnCAP	-0.1730	-0.16	0.873
lnLBF	-0.2659	-0.08	0.940
ENG	-0.0396	-1.17	0.243
	Short-run estimation		
ECT(-1)	-1.0547	-18.30***	0.000
FDI	0.1743	0.68	0.493
lnCAP	3.7959	4.15***	0.000
lnLBF	-5.4038	-1.96**	0.050
ENG	0.0495	1.48	0.138

Note: *; **; *** represents significance at 10%; 5%; and 1% level

The findings of the DFE technique of panel ARDL tool are presented in Table 8. The long-run estimations of the findings of the DFE technique depicts that FDI and capital are the main factors which influence economic growth among the developing nations of the 15 west African nations. The findings of the DFE depicts that a rise in FDI by a single unit is associated with a rise in economic growth in the west African nations by 0.091 units. The link between FDI and economic growth among the 15 west African countries is strong because the findings are statistically significant at 5%. Therefore, the findings of the DFE technique supports the findings given by the PMG tool, hence FDI fosters economic growth among the west African nations. Thus, west African nations ought to encourage FDI inflows because of its significance influence of economic growth in this region.

In addition, the DFE tool presents capital as the main factor that is responsible for influencing economic growth of the west African nations in the long-run. The findings of the DFE depict that an increase in capital level by 1% of the west African nations is associated with a rise in the economic growth of this region by 0.68%. The findings depicted by the DFE technique illustrate that capital structure of a nation is vital in fostering economic growth. The findings of the DFE tool on the association of capital and economic growth are statistically significant at 5%. While the PMG tool presents that capital level do not significantly influence economic growth in the long-run, but only in the short-run,

DFE technique shows that the two indicators are strongly associated in the long-run. Frankly speaking capital ought to raise economic growth, of course the debate may be on which time horizon this association is significant.

Labor force and energy are not statistically related to economic growth among the west African nations as per the DFE technique outcomes. The DFE tool findings concurs with those of the PMG tool on the link between labor force and economic growth in the long-run, but in the case of energy and economic growth, the two models depict differing outcomes. The short-run outcomes of the DFE technique also depict that FDI statistically discourages economic growth among the 15 west African nations. The DFE findings depicts that when FDI is raised by a single unit, then economic growth is reduced by 0.105 units. The association of FDI on economic growth as depicted by DFE in the short-run do not concur with the outcomes of the PMG technique. Capital, labor force and energy do not exhibit for a statistically significant influence on economic growth, as per the DFE technique. While the DFE and the PMG tool concur on the no short-run association of energy and economic growth, they somewhat do not concur on the link of capital and labor force with economic growth. The ECT of the DFE tool is a negative value and it is statistically significant depicting the presence of a strong long-run association in the model. The ECT value which is negative and statistically significant shows that the indicators will converge in the long-run and the rate of convergence 86.8% which depicts that the rate of convergence will be fast.

The MG long-run findings depict that capital, FDI, energy and labor force do not statistically influence economic growth among the 15 developing west African nations. The findings of the MG technique do not support the long-run findings of the PMG technique which depicts that FDI and energy significantly influences economic growth and the findings of the DFE which depicts that FDI and capital fosters economic growth. The short-run findings of the MG technique depict that capital and labor force exhibit a strong influence on economic growth among the 15 developing west African nations, while FDI and energy have no strong effect on economic growth in the short-run. The findings depict that when capital level rises by a single unit, economic growth will be fostered to increase

by 3.796 units. The findings given by the MG technique are statistically significant at 1%. Moreover, the MG short-run findings depict that labor force discourages economic growth among the 15 west African nations. The findings depicts that a rise in labor force by 1% significantly discourages economic growth by 5.4%. The short-run findings of the MG technique concur with the outcomes presented by the PMG technique. The ECT value of the MG technique is also negative and statistically significant depicting that the indicators are associated in a long-run link and they will converge. The rate of adjustment 105.47% is high depicting that the convergence of the indicators will overshoot.

Table 9.

Results of Fixed Effects and Random Effects

	Coef.	z-Statistic	p-value
	Random Effects		
FDI	0.0739	2.72***	0.007
ENG	-0.0009	-0.76	0.448
lnCAP	0.2423	4.66***	0.000
lnLBF	-0.0269	-0.26	0.792
	Fixed Effects		
FDI	0.0622	2.24**	0.026
ENG	0.00004	0.02	0.984
lnCAP	0.5706	3.57***	0.000
lnLBF	-0.4623	-2.03**	0.043

Note: *; **; *** represents significance at 10%; 5%; and 1% level

The present research dissertation uses the Fixed effects and the Random effects techniques to check the robustness of the findings presented in the panel ARDL tools. The Fixed effects and Random effects tools present the short-run findings, hence may only verify the short-run findings of the panel ARDL. The Fixed Effects technique findings presented in Table 9 depicts that capital and FDI fosters economic growth in the 15 developing west African countries. The Fixed effects findings depicts that when FDI is raised by a single unit then economic growth of the west African nations is raised by 0.074 units. The Random effects

findings depicts that when capital is raised by a single percent, economic growth of the west African nations is fostered to rise by 0.24%. The findings of the Random effects tool on the link between capital and economic growth is supported by the short-run outcomes of the PMG technique, while the link between FDI and economic growth as given by the Random effects technique is supported by the long-run findings of the PMG tool. The Random effects tool findings depicts that energy and labor force are not significantly related.

In addition, the Fixed effects technique shows that economic growth among the 15 west African nations is influenced by FDI, capital and labor force. FDI and capital are depicted to present a statistically significant positive influence on economic growth. The findings of the Fixed effects technique depict that a rise in FDI by a single unit is linked with a respective rise in economic growth by 0.06 units, while a rise in capital by a single percent is link with a rise in capital by 0.57%. Labor force is also depicted to negatively influence economic growth among the developing west African countries as per the Fixed Effects findings. The Fixed effects findings shows that a rise in labor force by a single percent reduces economic growth by 0.46 %. Energy do not significantly influence economic growth as per the Fixed effects findings. The positive link of FDI and economic growth supports the outcomes presented by the Random effects findings, and the PMG long-run findings. The positive impact of capital on economic is also supported by the Random effects technique findings and the short-run outcomes of the PMG technique. We also observe that, the negative effect of labor force on economic growth among the west African nations is supported by the short-run findings of the PMG technique.

CHAPTER V
Discussion

The present research is essential in ascertaining the hypothesis presented in the introduction section of the study. The findings presented in this research are very essential in providing the policies that are crucial to be used in the developing West African nations to attain high level economic growth. These nations require some strong policies that can successfully raise economic growth in this region. Economic development is essential for raising the quality of life of citizens through the provision of sufficient food and a proper health system. This is crucial considering that West African nations are developing nations and have a very low level of economic growth to meet the food requirements of the citizens. The present research findings have been developed to investigate if the series: FDI, capital, energy and labor are significant in raising economic development in this region. Any variables that will be observed to raise economic development in this region will be promoted for the purpose of fostering economic growth in this region. In as much as four economic growth drivers are specified as the dependent variables in the present research, FDI is the major driver since the present research intends to ascertain if the investment in developing nations by foreigners fosters economic growth.

The present research findings depict that FDI significantly impacts economic development of the developing West African nations through raising economic growth. The outcomes presented by the panel ARDL tool are supported by the outcomes depicted by the Fixed Effects and Random Effects models. However, we observe that it is the long-run outcomes of the panel ARDL tool that are related to the outcomes of the Fixed Effects and Random Effects tool. The short-run outcomes of the panel ARDL tool depicts otherwise. Specifically, the PMG and DFE long-run outcomes depicts that FDI positively impacts economic growth in the developing West African nations. However, the MG tool depicts that no strong effect from FDI to economic growth is observed in the long-run. The short-run outcomes of the PMG and MG tool also depicts that FDI do not impact economic growth in the West African nations, while the DFE presents for the existence of a strong negative association in the short-run. The long-run

outcomes of the PMG and DFE tool concurs with the postulations of the Fixed and Random Effects tools which depicts that FDI positively impacts economic growth in the developing West African nations. FDI positively affects economic growth in the long-run because there is a threshold that needs to be met in order for FDI to pose an impact on economic growth. Low FDI levels below the threshold cannot improve economic growth in this region.

The present findings of this research which depicts that FDI significantly foster economic growth positively, are in support with the postulations depicted in the researches done in the past (Rahman, 2021; Ali et al., 2021; Aksik et al., 2020; Pascale et al., 2020). The researches which have been done in the past in ascertaining how FDI impacts economic growth depicts that FDI positively promote economic growth, significantly. The present research outcomes also depict the presence of asymmetric on the effect of FDI on economic growth. Specifically, the ARDL tools which depicts that FDI has strong positive influence on economic growth in the long-run, shows that in the short-run no significant link is observed, while the DFE tool shows that while the effect is significant in the short-run it is negative. Therefore, high FDI promotes economic growth in the developing West African nations, while low FDI do not foster economic development in this region. The outcomes of the PMG and MG tools which depicts that FDI do not significantly foster economic growth are supported by the outcomes presented in past researches which observes a no significant influence of FDI on economic growth (Temiz & Gokmen, 2014; Gopalan et al. (2018); Fadhil & Almsafir, 2015). As a result, this research is significant in that it shows that FDI is vital in raising economic development in the West African nations. The present research depicts that high FDI in the developing nations is vital in raising economic development in this region. Low level FDI is not significant in raising economic development in this region. Therefore, developing west African nations must strategize towards attracting more foreign investors to invest in this region to raise economic development. The findings of the present research the first research question outlined in the introduction, depicting the significance of FDI in fostering economic growth. Moreover, the present research findings shows that the asymmetric effects of FDI on economic development are present. Low FDI do not strongly raise economic development, while high FDI does.

In the case of capital, the present research depicts that capital is vital in raising economic growth in the west African nation. The outcomes depict that capital level of west African nations significantly foster economic development in the long-run, as depicted by the DFE tool, while the PMG and MG tools depicts that capital do not significantly impact economic development. The short-run outcomes of the PMG and MG also depicts that capital is essential in raising economic development in the short-run and this is supported by the postulations of the random effects and fixed effects tools. This shows how essential capital level is in fostering economic development in the developing West African nations in both long- and short-run. The significant effect of capital among developing West African nations depicts that capital is vital in raising economic growth and this is supported by the traditional theories of production, such as, the Solow production function (Solow, 1956), the Cobb-Douglas production function (Cobb & Douglas, 1928), and the Romer model of production (Romer, 1990) which gives capital as the vital input of output level production. Recent researches have also supported the postulations of the traditional theories by emphasizing on the significant role played by capital in raising economic growth. In recent research of Bakhsh et al., (2022) capital is observed to foster economic growth and this supports the outcomes in the present research. Therefore, it is essential to raise capital level in the West African nations in order to raise economic growth in this region. The present research outcomes answer the second research question outlined in the introduction by showing that capital is significant in influencing high level economic development. Furthermore, the present research outcomes shows that capital do not present asymmetric effects on economic growth. Thus, both high and low-level capital is vital in raising economic development in the developing West African nations. Furthermore, because capital is positive and significant in both periods, then we can argue that no matter the amount of capital injected in the economy it is essential in raising the output level being produced. Therefore, both high and low capital level must be promoted in this region.

In addition, the present research outcomes depict that labor force do not significantly impact economic development in the long-run, as per the PMG, DFE and MG tools. While the long-run outcomes of the panel ARDL tools depict a no

association between labor force and economic development, the short-run outcomes of the PMG and MG tools depict that labor force negatively enhance economic development. The outcomes of the fixed effects and random effects also support that labor force negatively impacts economic development in the short-run among west African nations. The negative effect of labor force on economic growth in the short-run and a no strong association in long-run in the developing West African nations is not supported by the traditional theories of production, the Solow production function (Solow, 1956), the Cobb-Douglas production function (Cobb & Douglas, 1928), and the Romer model of production (Romer, 1990, which depicts that labor force fosters output level increase in a nation. These findings answer the third research question outlined in the introduction by depicting that labor force is not essential in raising economic development. The present research outcomes however, shows that significant asymmetric effects of labor force on economic development exists. The present research depicts that high level of labor force employed in producing output do not significantly raise economic development, while low level labor force reduces economic development in this region. Recent researchers depict that human capital is vital in raising economic growth (Fadhil & Almsafir, 2015), but this is not supported by the outcomes of this research. The insignificant and no connection between labor and economic in long-run and short-run respectively can be explained by the high levels unemployment in these developing nations which causes labor force to be counter productive, hence its essential to lower unemployment levels in order to ensure the effectiveness of labor force.

Finally, the present research depicts the presence of no significant influence of energy on the economic development of the developing West African nations. The panel ARDL tools depicts that energy do not enhance the development of west African nations in both the long- and short-run. The DFE and MG tools concurs on this ascertain, but the PMG tool depicts significant negative effect of energy in the long-run. The PMG tool depicts that high level use of energy among the developing West African nations reduces economic development. The fixed effects and random effects tools support the postulations of the panel ARDL tools on the no strong effect of energy on economic development. The negative and no strong link between energy and economic

growth, do not support the postulations of past researches which shows that energy is essential in raising output level (Zweifel et al., 2017). The present research outcomes answer the fourth research question by showing that energy is not important in raising economic development. Moreover, the outcomes of the DFE and MG tool do not support the existence of asymmetric effects of energy on economic growth. These tools show that the link between energy and economic growth is the same in both long- and short-run. However, the PMG tools shows significant asymmetric on the influence of energy on economic growth, indicating that high energy level reduces economic growth, while low energy level do not cause any strong influence. The negative effect of high energy level is due to the excessive use of energy sources which pollutes the environment for instance non-renewable energy. The no effect and insignificant effect of energy on economic growth can be due to lack of separation between the types of energy in the model. Different energy types may impact economic growth differently. Also developing nations lack the resources to improve energy development and this causes a poor link with economic growth.

CHAPTER VI
Conclusion and Recommendations

Conclusion

The present research, which investigates the impact of FDI economic growth among developing West African nations is vital for making policies that can raise economic development in this region. The outcomes presented are essential for fostering the growing body of literature as it supports the existing theoretical foundations presented in the literature on the main factors that are responsible for enhancing economic growth. Firstly, the present research shows the importance of FDI advancement in raising the economic growth of a nation. High and low use of FDI is essential in raising economic development of a nation. FDI is shown to be essential to foster FDI development since it is vital in raising economic growth in both the short-run and long-run. This shows how important FDI is in enhancing that food security and proper healthy facilities among many other basic necessities of the citizens are raised as a result of economic development. Secondly, the present research emphasizes on the importance of capital level in raising economic growth among the developing west African

nations. Capital level, which encompass of the vital machineries, equipment and buildings used in the industries which are responsible for producing goods and services is by far the main factor of production. An indication which depicts that capital is vital in raising economic growth supports the main theories of production, hence this research fosters the growing body of literature by validating these theories. Thirdly, labor force depicts negative and no significant effects on economic growth, in both the short-term and long-term. Theoretically, labor force fosters the level of output production in an economy, but the developing west African nations depict that it has negative significant effect, as shown by the PMG, the MG and fixed effects tools in the short-run, while other tools depicts that the association is not significant. The negative or insignificant impact of labor force on economic growth among the developing west African nations may be explained by the high-rate unemployment levels in this region. Labor force is the sum of unemployed and employed people. Therefore, rising labor force tends to add up to the already large number of the unemployed people which have no influence on economic growth. Thus, if unemployment is high, an increase in labor force simply raises the number of unemployed people without significantly raising economic growth. Fourthly, using energy to raise economic growth in the developing West African nations has no significant impact on the economic development in this region.

Policy recommendations

The following policy recommendations are presented in this research and they are useful for fostering economic development in the West African countries.

- FDI should be enhanced by encouraging more foreign investors to make investment in the developing West African nations because the findings presented in this research depicts that FDI raises economic development in this region. Raising FDI can also be achieved through creating an environment by making laws that are favorable or protect investors from losing their investments and profits.

- The infrastructure of the nation, buildings, equipment and machineries, which are the level of capital of a nation should be advanced in order to raise economic development in the West African nations. If the level of capital endowments in the nation is improved, then economic growth is promoted to due to the positive link ascertained in the present research.
- While labor force is vital in raising economic growth of a country this is not true in the West African countries. A rare outcome which can be explained by the existence of high-level unemployment in this region. Therefore, the rate of unemployment in the West African nations should be reduced if labor force is to foster economic development. A rise in labor force level which is associated with more unemployment does not raise economic growth because for it to be significant, the employed level should be raised.
- Lastly, there is need to come up with some technological advancement which may ensure the effectiveness of energy in raising economic growth. At this point energy is counterproductive and do not significantly raise economic growth in this region.

Recommendations on future studies

The present research is limited in various ways as presented in the introduction section; thus, future studies are recommended to undertake similar research to cover the gap existing in the literature. The recommendations for future studies are as follows:

- Future researches should separate energy sources between renewable and non-renewable energy and/or nuclear energy to examine the effect of each energy source on the developing West African countries. While the present research shows the no significant effect of energy on economic growth, there still remain a question unanswered on whether all types of energy do not foster

economic growth in the West African countries or whether another type fosters economic growth while the other one does not. Therefore, it is necessary to separate these energy types and examine them separately. By doing that robust policies will be developed concentrating on different energy sources.

- Future researches may also incorporate unemployment rate to investigate its effect on economic growth since the present research depicts that labor force do not affect economic development in the West African nations.

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Appendices

Appendix A
Ethics Committee Approval

NEAR EAST UNIVERSITY

SCIENTIFIC RESEARCH ETHICS COMMITTEE

18.04.2023

Dear Abdiladif Mohamed Ibrahim

Your project **"The Role Of Foreign Direct Investment In Promoting The Economic Growth Of Developing Nations"** has been evaluated. Since only secondary data will be used the project does not need to go through the ethics committee. You can start your research on the condition that you will use only secondary data.

Prof. Dr. Aşkın KİRAZ

The Coordinator of the Scientific Research Ethics Committee

Appendix X

Turnitin Similarity Report

ORIGINALITY REPORT

10%	4%	9%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Thomas Abuobeleye Akpanke, Abraham Deka, Huseyin Ozdeser, Mehdi Seraj. "Does foreign direct investment promote renewable energy use? An insight from West African countries", Renewable Energy Focus, 2023 Publication	1%
2	Siyakudumisa Takentsi, Kin Sibanda, Yiseyon-Sunday Hosu. "Energy prices and economic performance in South Africa: an ARDL bounds testing approach", Cogent Economics & Finance, 2022 Publication	<1%
3	Emmanuel Duodu, Samuel Tawiah Baidoo. "The impact of capital inflows on economic growth of Ghana: Does quality of institutions matter?", Journal of Public Affairs, 2020 Publication	<1%
4	"Robustness in Econometrics", Springer Science and Business Media LLC, 2017 Publication	<1%