NEAR EAST UNIVERSITY
INSTITUTE OF GRADUATE STUDIES
DEPARTMENT OF BANKING AND FINANCE

THE EFFECT OF FOREIGN DIRECT INVESTMENT, CAPITAL INVESTMENT AND ECONOMIC GROWTH ON CARBON EMISSIONS ON THE ETHIOPIAN ECONOMIC (1990–2019)

MSc. THESIS

EMMANUEL VICTOR LAMINE

Nicosia

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December 2022

Approval

We attest to having read the thesis submitted by EMMANUEL VICTOR LAMINE Titled "the effect of foreign direct Investment, Capital investment and gross domestic product in carbon emission on the Ethiopian economy (1990-2019) In addition, we are of the view that it fulfils all of the requirements, both in terms of its breadth and its level of quality, to be a thesis for the Master of Social Sciences degree.

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Declaration

I hereby declare that all information, documents, analysis, and findings included in this thesis were obtained and presented in accordance with the academic regulations and ethical principles of the Near East University Institute of Graduate Studies. As required by these standards and regulation, I have credited and referenced all non-original sources and data used in this study.

EMMANUEL VICTOR LAMINE

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EMMANUEL VICTOR LAMINE

Abstract

The Effect of Foreign Direct Investment, Capital İnvestment and Gross Domestic Product in Carbon Emission on The Ethiopian Economy (1990-2019)

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The purpose of this thesis is to analyze, from 1990 to 2019, the impact that carbon emissions in the Ethiopian economy have as a result of foreign direct investment, economic development, and capital investment. It is generally accepted that the recipient nation would see an increase in both economic growth and overall productivity as a result of receiving foreign direct investment (FDI). This theory is backed up by a substantial amount of academic research. According to this idea, in addition to the supply of direct financial finance, positive externalities may be created by foreign direct investment (FDI).These positive externalities may be the outcome of adopting technology and know-how that were originally developed in another country. According to the findings of research that was carried out by Batten and Vo (2009), foreign direct investment (FDI) is advantageous to the expansion of an economy because it leads to the dissemination of technology, the production of spillover effects, increases in productivity, and the establishment of new management practices and capabilities. Recent research conducted by Fernandes and Paunov (2012) shows that foreign direct investment (FDI) has a favorable impact on both industry productivity and creativity. In order to conduct the regression analysis for this thesis, the ARDL model was used. The findings indicate that foreign direct investment will have a beneficial influence on carbon emissions in the long run but a detrimental impact in the near term. GDP Growth has a negative effect on carbon emissions both in the long run and in the short run, but gross capital formation has a positive influence both in the long run and in the short run on Ethiopia's economy's carbon emissions. According to the lowcarbon development theory, the business cycle serves to contribute to a decrease in the amount of inefficiency that may be found in the energy sector. This is one of the hypotheses that underlie the theory. According to its results, the low-carbon development theory receives further support from our research. It is the duty of each region to stimulate research and development of environmentally friendly energy sources in order to enhance the overall quality of the energy mix and make it less harmful. This may be accomplished by encouraging the use of environmentally

friendly energy sources. It would be beneficial for governments to consider modifying their regulations in a manner that would promote the use of cleaner energy sources while also preserving the natural environment in order to make this process work more efficiently.

Keywords: FDI, CO2, GDP Growth, Capital Investment, ARDL Model, Renewable energy.

Özet

Karbon Emisyonunda Doğrudan Yabancı Yatırım, Sermaye Yatırımı ve Gayri Safi Yurtiçi Hasıla Etkisinin Etiyopya Ekonomisine Etkisi (1990-2019)

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Bu tezin amacı, 1990'dan 2019'a kadar, doğrudan yabancı yatırım, ekonomik kalkınma ve sermaye yatırımı sonucunda Etiyopya ekonomisindeki karbon emisyonlarının etkisini analiz etmektir. Doğrudan yabancı yatırım (FDI) almanın bir sonucu olarak alıcı ülkenin hem ekonomik büyümede hem de genel verimlilikte bir artış göreceği genel olarak kabul edilmektedir. Bu teori, önemli miktarda akademik araştırma ile desteklenmektedir. Bu fikre göre, doğrudan finansal finansman arzına ek olarak, doğrudan yabancı yatırım (DYY) tarafından pozitif dışsallıklar yaratılabilir. Bu olumlu dışsallıklar, orijinal olarak başka bir ülkede geliştirilen teknoloji ve bilgi birikiminin benimsenmesinin sonucu olabilir. Batten ve Vo (2009) tarafından yapılan araştırmanın bulgularına göre, doğrudan yabancı yatırım (DYY), teknolojinin yayılmasına, yayılma etkilerinin üretilmesine, verimlilikte artışa yol açtığı için bir ekonominin genişlemesinde avantajlıdır. ve yeni yönetim uygulamalarının ve yeteneklerinin oluşturulması. Fernandes ve Paunov (2012) tarafından yürütülen son araştırma, doğrudan yabancı yatırımın (DYY) hem endüstri üretkenliği hem de yaratıcılık üzerinde olumlu bir etkiye sahip olduğunu göstermektedir. Bu tezin regresyon analizini yapmak için ARDL modeli kullanılmıştır. Bulgular, doğrudan yabancı yatırımın uzun vadede karbon emisyonları üzerinde olumlu bir etkiye sahip olacağını, ancak yakın vadede zararlı bir etkiye sahip olacağını göstermektedir. GSYİH Büyümesinin hem uzun vadede hem de kısa vadede karbon emisyonları üzerinde olumsuz bir etkisi vardır, ancak brüt sermaye oluşumunun hem uzun vadede hem de kısa vadede Etiyopya ekonomisinin karbon emisyonları üzerinde olumlu bir etkisi vardır. Düşük karbonlu kalkınma teorisine göre iş döngüsü, enerji sektöründe bulunabilecek verimsizlik miktarının azalmasına katkıda bulunmaya hizmet eder. Bu, teorinin altında yatan hipotezlerden biridir. Sonuçlarına göre, düşük karbonlu kalkınma teorisi araştırmamızdan daha fazla destek alıyor. Enerji karışımının genel kalitesini artırmak ve daha az zararlı hale getirmek için çevre dostu enerji kaynaklarının araştırılmasını ve geliştirilmesini teşvik etmek her bölgenin görevidir.

Bu, çevre dostu enerji kaynaklarının kullanımını teşvik ederek başarılabilir. Bu sürecin daha fazla işlemesi için yönetmeliklerini daha temiz enerji kaynaklarının kullanımını teşvik edecek ve aynı zamanda doğal çevreyi koruyacak şekilde değiştirmeyi verimli bir şekilde düşünmeleri faydalı olacaktır.

Anahtar Kelimeler: DYY, CO2, GSYİH Büyümesi, Sermaye Yatırımı, ARDL Modeli, Yenilenebilir enerji.

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CHAPTER I

1.1 INTRODUCTION

It is generally accepted that the recipient nation would see an increase in both economic growth and overall productivity as a result of receiving foreign direct investment (FDI). This theory is backed up by a substantial amount of academic research. These positive externalities may be the result of the adoption of foreign technology and know-how. According to this idea, in addition to the supply of direct financial finance, positive externalities may be created by foreign direct investment (FDI). Batten and Vo's (2009) research shows that foreign direct investment (FDI) is good for an economy's growth because it leads to the spread of technology, the creation of spillover effects, an increase in productivity, and the development of new management practices and capabilities. A recent Fernandes and Paunov (2012) study demonstrate that foreign direct investment (FDI) positively affects innovation and industrial productivity.

An example of one of these potential ramifications is the production of gases that contribute to global warming. Notably, if there is a correlation between greenhouse gas emissions and foreign direct investment in agricultural production, then the effect of this correlation could, in theory, go either way, depending on the direction that the correlation goes, Tang, C. F., & Tan, B. W. (2015). In other words, the effect of this correlation could have a positive or negative impact, depending on the direction that the correlation goes. This would be the case regardless of which way the correlation goes. This is the case regardless of which direction the investment is directed. If local businesses in host countries use technology that is linked to higher greenhouse gas emission intensity, then foreign direct investment could lead to positive spillover effects in host countries, which would result in a reduction in overall emission intensity. This would be the case if the technology was linked to higher greenhouse gas emission intensity.

This is true if the technology in question is linked to a higher intensity of greenhouse gas emissions. This is the situation if non-native multinational corporations from other countries adopt technology that reduces the likelihood that their greenhouse gas emissions will exceed those of native corporations. This discovery is similar to the pollution halo theory, which says that this is the only way that this event could have happened if the theory is correct.

This is because foreign multinational corporations use technology that produces fewer greenhouse gas emissions than domestic corporations (Zarsky 1999). Additionally, foreign direct investment may result in agricultural modernization, which may lead to the output moving farther away from ecologically responsible standards. For instance, an increase in agricultural output could be achieved by ignoring the environment in favor of favoring economies of scale, specialization, mechanization, monoculture crop production, and agricultural production that is both capital intensive and energy-intensive. The environment would be ignored in this case in favor of agricultural production. In this scenario, environmental concerns would be put on the back burner in favor of encouraging agricultural output that is both resource-intensive and capital-intensive (Koohafkan et al. 2012; McMichael 2014; Altieri et al. 2015). It is possible that this will, in the long run, result in a greater intensity of greenhouse gas emissions in developing nations that are hosting international events.

The pollution refuge hypothesis is another viable option for explaining such an impact. This hypothesis proposes that differences in environmental legislation drive manufacturers to relocate their operations, which in turn generates pollution havens in less developed countries (McGuire 1982). When it comes to the agriculture industry, the absence of a price on carbon and laxer rules on emissions of greenhouse gases might be a factor that brings in foreign direct investment. It is possible that this will increase the amount of emissions produced in the country that is hosting the event. In fact, there is a chance that the effects of foreign direct investment will manifest themselves in both positive and negative ways. This is something to keep in mind.

Greenhouse gas emissions hurt the environment in every part of the world. This is true for both developed and developing economies. Because of this, it is not true that pollution is the only big problem facing wealthy countries. The destruction of the environment that is caused by greenhouse gases is having a significant impact on the planet. Natural catastrophes, such as fires in the woods and floods in many nations, are the primary causes of environmental degradation across the globe. These natural disasters are the most significant contributors to the problem (Khan et al., 2019a, b). All of the natural disasters listed above are bad for infrastructure, natural resources, agricultural land, and people.

Economists and environmental specialists are continually becoming aware of these significant issues. At this point, the whole globe is contending with

environmental problems, the majority of which are attributable to the release of greenhouse gases. According to the findings that were published by the OECD in 2020, the production of carbon dioxide by economies is the primary contributor to the emission of greenhouse gases. Canada is the country that emits the most carbon dioxide into the atmosphere, followed by Australia, the United States of America, and Luxembourg, in that order. Luxembourg has the lowest rate of carbon dioxide emissions. According to the Organization for Economic Cooperation and Development (OECD), in 2018, Canada was responsible for 15.5% of the world's total carbon dioxide emissions, Australia was responsible for 15.3%, the United States was responsible for 14.9%, and Luxembourg was responsible for 14.8% of these emissions.

Hermes and Lensink (2003) say that a lot of foreign direct investment helps a country's economy grow and become more modern. According to the historical statistics made available by the World Bank, foreign direct investment (FDI) may have been a key factor in tackling the growth issues, particularly in the nations that make up the group of twenty (G20). The group known as the G20 is comprised of the heads of state or government from twenty of the most powerful economies in the world. The economies of Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, South Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, and the United States of America are among the strongest in the world. Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, South Korea, Mexico, Russia, South Africa, Turkey, the United Kingdom, and the United States of America: South Africa, Turkey, and the United Kingdom are three more nations outside the United States that have robust economies. This group includes a representative from the European Union who is a member of one of its member states. According to World Growth Indicators, the G20 nations are responsible for more than 80% of the world's gross output, 80% of global commerce, and 62.5% of the world's population.

The majority of the countries that make up the G20 are experiencing significant expansion, and along with this expansion comes a rise in the need for energy. The International Energy Agency forecasts that the annual growth rate of the world's energy consumption will average 1.8% on a yearly basis between the years 2005 and 2030. This projection covers the period from 2005 to

2030. These projections come from the organization's analysis of historical data. This information was obtained from their research (2007). The G20 economies will be responsible for 84% of the worldwide growth in the amount of energy that is used.

The degree of investment that is made in a country is one of the most important factors that helps to determine the level of economic growth and change that country will experience. The amount of a country's national savings is another factor that goes into deciding the degree of that country's investment. The national savings rate in a growing economy like Ethiopia is quite low, and this rate alone is not enough to support the country's development needs. According to the growth models developed by Harrod (1939) and Domar (1946), an increase in the production of capital results in an increase in the quality of life, which in turn results in an increase in economic growth. Solow (1956) claimed that during a dynamic process of investment development, a growth in the stock of capital leads to an increase in the productivity of labor and that this increase may be attributed to the dynamic process of investment development. He accomplished this goal by leveling criticism against the growth models presented by Harrod and Domar. His arguments centered on the fact that the percentage of production elements was fixed and that labor and capital could be used in the same way.

In more recent growth theories, such as Lucas's (1988) and Rebelo's (1991), the idea of capital has been expanded to encompass not just physical capital but also human capital and the accumulation of knowledge in addition to the traditional focus on physical capital. Romer (1986, 1990) and Helpman and Grossman (1991) both use research and development, as well as other factors like "knowledge capital," to explain growth. ecause it hinders economic growth and makes life more difficult for people (Rodrik, 1998; Asiedu, 2003; Adeolu Ayanwale, 2007), a great number of developing countries are now actively looking for foreign investment. In order to make their countries more appealing to investors, these nations are making changes to their economic and political systems.

The shift from a communist economy to a market economy in Ethiopia started in the same year (1991) as the execution of many significant reforms in what had previously been a communist nation. Since then, the government has implemented a variety of new policies, including liberalizing the system that controls international trade, decentralizing economic and political power, making domestic price regulation

less stringent, and lowering the value of the national currency. These are just some of the changes that have been made (Solomon Woldemeskel, 2008).

In addition, the investment law has undergone significant revisions on several occasions in order to accommodate the requirements posed by both local and international investors. The current government of Ethiopia has come to the conclusion that domestic savings alone are not sufficient to finance the level of investment necessary to achieve the level of economic growth that is desired. As a consequence, the Ethiopian government has moved to attract foreign direct investment by improving the business environment and offering a number of incentive packages. This research is different from other ones that have been done on the same topic of foreign direct investment in Ethiopia for two main reasons.

In the first place, it utilizes data beginning in the year that Ethiopia transitioned from a command economic system to a market-based one. This transition took place during the year 1991. The vast majority of the currently available research on the Ethiopian economy makes use of data, including some from the time period of the command economic system. Second, in contrast to the findings of earlier research, the variables that are used in the model are presented in a disaggregated form. Most of the research that has been done in the past confuses infrastructure with gross capital creation. Even fewer studies do this for telephone lines. On the other hand, the results of this research are dependent on four different factors. These include the amount of energy used per person in transportation, the amount of electricity used per person, the number of telephone lines per thousand people, and the total amount of gross capital creation.

This study's major objective is to analyze the underlying elements that govern the flow of foreign direct investment into Ethiopia's economy. The purpose of this research was to investigate the factors that influence the flow of direct investment from outside a country into that country by making use of empirical data gathered between the years 1991 and 2013. In addition to this, it throws light on a number of the policy problems that are viewed as vital for Ethiopia to solve in order to attract foreign direct investment. In other words, if Ethiopia wants to attract foreign direct investment, it has to address these policy concerns.

The irony is that Ethiopia's gross domestic savings as a share of GDP is extremely low, and according to the reports of the Ethiopian Economic Association from 2007, it is improbable that Ethiopia would achieve this growth rate by mobilizing

the meager domestic savings. But the irony is that Ethiopia's gross domestic savings as a share of GDP is extremely low. The paradox, however, is that Ethiopia's gross domestic savings as a percentage of the country's gross domestic product are exceptionally low. The contradiction comes from the fact that Ethiopia's gross domestic savings are much lower than average when compared to the country's gross domestic product. But the fact that Ethiopia's overall gross domestic savings represent a relatively tiny percentage of the country's total gross domestic output is an even more ironic situation. The fact that Ethiopia's gross domestic savings, when expressed as a proportion of the country's gross domestic product, are substantially lower than normal, creates the appearance of a contradiction. When expressed as a percentage of the country's gross domestic product, the incredibly low level of gross domestic savings in Ethiopia is funny, but it should not come as a surprise to anybody.

Ethiopia’s current government knows that domestic savings aren’t enough to pay for the level of investment needed for growth, so it has opened the door to investment from outside the country in a number of different areas of the economy.

Also, the government has been thinking about making changes to its investment policies and has given investors incentives like tax holidays, free or low-cost land leases, duty-free imports of capital goods, and exemptions from export taxes in order to attract foreign investment. These initiatives are all part of the government's effort to encourage foreign investment. By making a number of changes and offering a number of incentives, the government is trying to get more investment from outside the country.

In addition, the government has been investing a significant amount of money into expanding the country's infrastructure in the hopes of attracting new investors. This development includes things like the expansion of the country's power grid, motorways, and communication networks.

Ethiopia, on the other hand, has one of the poorest records when compared to many other African nations when it comes to obtaining direct investments from other countries. Ethiopia, on the other hand, has one of the poorest records when compared to many other African nations when it comes to obtaining direct investments from other countries. Ethiopia's share of the overall foreign direct investment flows that entered Africa in 2009 was merely 1.3%, as stated by the World Investment Report 2010, which was released by the United Nations Conference on Trade and Development. This information was found in the report. This information can be

found in the report. The United Nations is responsible for the production of this report. This information is available in the 2010 World Investment Report, which was published in 2010. Participating at the UNCTAD World Investment Forum allowed me to acquire this expertise.

When compared to the proportion of gross capital creation in East Africa, which is 10.5%, and in Africa, which is 18.7%, this figure is much lower. Ethiopia's population of 9 million people accounts for about 9 percent of the entire population of Africa. In addition, the performance of foreign direct investment in Ethiopia is quite low, coming in at 11.7% of gross domestic product, which compares badly to the 20.3% for East Africa and the 34.6% for Africa as a whole. How much foreign direct investment Ethiopia got compared to its gross domestic product.

But beginning in 1995, the government has been working on increasing the amount of direct investment from other countries. Because of this, it is now considered one of the 10 most attractive countries in all of Africa for direct investments from other countries.

At this point in time, it is very important to figure out what drives foreign direct investment in Ethiopia. This will help us figure out what factors are causing Ethiopia to get better at attracting foreign direct investment.

The World Commission on Environment and Development (WCED) did not use the phrase "sustainable development" until the publication of the Brundtland Report in 1987. This report is credited as being the origin of the term. This report was the first time the term was ever used. This concept refers to the process of sustainable development, which focuses on making the most efficient use of the resources available today while also ensuring that the resources available to future generations are not harmed in the process of addressing environmental concerns and promoting economic growth (WCED, 1987). In this context, how the environment is being harmed is a crucial problem for scholars to investigate.

The topic of climate change has been brought to the attention of people all over the world as a result of the growth in worldwide emissions of greenhouse gases. In this context, a number of nations have been investigating different approaches they may take to cut down on the quantity of greenhouse gases they release into the environment. In 1992, Rio de Janeiro, Brazil, played host to a conference on the environment and development that was organized by the United Nations. The United Nations was in charge of organizing the gathering. During the summit, participants

addressed a variety of themes, some of which were the repercussions of climate change and the depletion of the ozone layer.

The countries in at the Kyoto conference have agreed to reduce their greenhouse gas emissions from 2008 to 2012 in order to meet the Kyoto Protocol's goals and limit greenhouse gas emissions. (UNFCCC, 1998). Note: However, new discussions have been sparked as a result of studies published by the Intergovernmental Panel on Climate Change (IPCC). These findings have advocated that less developed nations should likewise make reductions in order to keep the temperature of the globe at or below 2 degrees Celsius.

These publications led to new dialogues. The climate conference that was held in Copenhagen in 2009 came to an abrupt conclusion when all of the deliberations were abandoned as a direct consequence of this.

The 21st Conference of Parties, also known as COP21, was held in Paris from November 30 to December 11, 2015, and it is yet another event that has the potential to be a defining moment in the discussions over climate change. COP21 was held from November 30 to December 11, 2015. The deal was signed by 196 countries all around the world, and as a consequence, a new era of development in the battle against climate change has started thanks to the Paris Agreement. This is due to the fact that 196 countries all over the world signed the pact.

When the backdrop of the Paris Accord is evaluate it is deemed to be an agreement that is founded on scientific evidence, is dynamic, and involves a lengthy process. So, people think that after the Paris Agreement, there will be a social revolution that is both resistant to climate change and low in carbon (Karakaya, 2016).

Even though there are some minor changes in the pattern of foreign direct investment (FDI) over the course of time, there is a positive and inextricable link between the development of an economy and the inflow of foreign direct investment. This relationship is good, and it cannot be severed. Even so, these shifts are not likely to be significant. The majority of countries believe that more FDI would be beneficial to their economies. In light of this, a number of studies (Rahlan, 2006; Shaari et al., 2012; Mun et al., 2008) have advised the introduction of policies that are favorable to foreign direct investment (FDI) from other countries. Shaari et al., 2012; Mun et al., 2008; Joshi and Ghosal (2009); Lin and Wang (2004); Driffield and Tailor (2000); Acaravci and Ozturk (2012); and Schemerer (2012) all came to the same conclusion: foreign direct investment (FDI) increases the number of available employment opportunities.

Increased levels of foreign direct investment (FDI), which enhance both productivity and competitiveness, are directly responsible for the acceleration of economic development (Denisia, 2010).

The rise in production, which is directly responsible for this rise, can be directly ascribed to the expansion and development of the economy, and this can be promptly attributed to the increase in output. The rise in output may be linked to the growth in foreign direct investment (FDI), notably in the manufacturing sector. This is especially true in the manufacturing sector. According to the findings of a study by Chowdhury and Mavrotas, an increase in foreign direct investment as a whole has a positive impact on the development of the economies of Malaysia and Thailand. This is demonstrated by the fact that both countries have experienced recent economic growth (2003). The researchers were able to arrive at this conclusion as a direct result of the results that they acquired from the study. This conclusion was reached as a direct result of the findings that were gained from the investigation. Although Baharumshah and Almasaied (2009) and Shaari et al. (2012) independently arrived at the same conclusion regarding the benefits of foreign direct investment (FDI) in Malaysia, Baharumshah and Almasaied (2009) were the first researchers to establish that FDI was beneficial. Shaari et al. (2012) arrived at the same conclusion regarding the benefits of FDI in Malaysia.

Shaari et al. (2012) arrived at the same conclusion regarding the benefits of FDI in Malaysia. The Organization for Economic Cooperation and Development (OECD) released a body of research that it had compiled in 2012 and published. According to the results of this research, countries whose economies had not yet grown to their full potential believed that foreign direct investment (FDI) was the one and only feasible source of economic advancement and modernization.

This research was based on interviews with economic decision-makers in these countries. Because of this, decision-makers and governments, especially in poor countries, are shifting their focus to how to get money from other sources (Carkovic and Levine, 2002). Because of their straightforward nature, the bivariate Granger method causality tests that were used to reach a conclusion were deemed suitable. When there are at least two accounts to keep track of, the method becomes troublesome. As a result, it is impossible for bivariate specifications to record the information that is pertinent to the examination of the connection between two or more series. In his investigation of the connection between energy and economic expansion,

Glasure (2002) took into account monetary factors, the expenditures of the government, and the cost of energy. Ighodaro (2010) used Johansen's co-integration and multivariate analysis to arrive at his conclusions. To determine whether or not there is a connection between increasing energy use and expanding economies, the Granger causality approach was applied. The actions of the government were shown by one variable, while the monetary policy was shown by another. According to Hansen and Rand (2004), there is a significant correlation between the growth of the economies of 31 developing nations and the amount of foreign direct investment that has been brought into those nations. Zhang says that FDI, which stands for "foreign direct investment," is a major factor in economic growth (2001).

This is a result of the fact that FDI ensures productive manufacturing and administration, in addition to highly qualified workers. According to Jail and Mahmud (2009) and Apergis and Payne (2009), foreign direct investment may result in a wide range of different commercial activities, notably in the fields of transportation and manufacturing.

The pace of economic growth quickens as a direct result of the occurrence of this event. Zeshan and Ahmad (2013), on the other hand, thought that as economic development grew, so would the amount of energy used, and they were right. Because of this, the burning of fossil fuels for energy purposes, such as coal, natural gas, and oil, in order to generate economic activity will almost certainly always result in the production of carbon dioxide. This is due to the fact that this is a consequence of this. This occurs due to the presence of carbon dioxide, which is a greenhouse gas. Examples of these kinds of fuels include coal, natural gas, and oil, among other things. These fuels have applications not just in the automotive industry but also in the manufacturing industry.

When the Kuznet curve for the environment came up, each country was faced with a big problem: the link between economic growth and pollution. Several researchers have been interested in this topic, and their work has shown the existence of the environmental Kuznet curve (Mugableh, 2013; Shahbaz and Leitao, 2013; Saboori et al., 2012). Before creating any policy on foreign direct investment (FDI), policymakers should give serious thought to the possible harmful implications of FDI. This should be done both before and throughout the policy formulation process. Chandran and Tang (2013) examine the impact that foreign direct investment (FDI) has not only on the expansion of the economy but also on the natural environment in

their research. In particular, they investigate how foreign direct investment relates to different forms of biodiversity.

In spite of this, the findings do not seem to be persuasive in any manner. Their model of CO_2 emissions took into account things like population, exports and imports, foreign direct investment (FDI), and gross domestic product (GDP) per capita, among other things. Hitam and Borhan (2012) also took exports and imports into account. Nevertheless, the interrelationship between GDP per capita and population creates the potential for multicollinearity in their functions. This makes the chance of multicollinearity present. According to the findings of Mahmood and Chaudhary (2012), the presence of foreign direct investment in developing nations has three distinct impacts on the quality of the environment. When compared to emerging countries, these consequences are more likely to be found in industrialized nations. The first impact is known as the scale effect, and it is advantageous when the economy is growing and there is a demand for environmental products because it makes it simpler to find solutions to problems that are related to the environment. For example, if there is a growing demand for environmentally friendly products because of a growing economy, then there will be a growing demand for environmentally friendly products.

This is because there is a greater demand for environmental products when there is a growing economy. This is due to the fact that there is a greater demand for environmentally friendly items.

When a nation's economy grows without taking into account the need for improved management of its natural resources and stricter laws, a negative scale impact may result. The second kind of impact is a technical one, which is a beneficial one when foreign investors employ technology that is better for the environment and has positive spillovers on local investment as a result of increased competitiveness. The third kind of impact is called a policy effect, and it is a beneficial one when the government of the host country imposes stringent restrictions on the preservation of the environment and requires international businesses to comply with those requirements. When there is rivalry among developing nations to attract foreign direct investment (FDI), and host governments weaken their environmental laws for FDI, this may have a detrimental influence on policy.

In order to circumvent environmental rules, businesses relocate to less developed nations. Several nations place too little value on the natural world in order to entice

substantial investment while ignoring the potential negative effects on the environment (Mabey and McNally, 1999). It is vital to address the negative implications of foreign direct investment (FDI) in order to ensure that adequate policies are in place regarding FDI. FDI stands for "foreign direct investment." There is a correlation between a significant increase in the volume of trade and investment flows and a decrease in the efficiency with which scarce natural resources are used, as well as an increase in the environmental and social costs associated with these flows, in particular for those who are in a position that is less advantageous.

This is because trade and investment tend to compete for scarce resources, which leads to a decrease in efficiency. It is not yet obvious what the long-term impacts of having a lot of FDI will be on welfare, which is particularly troubling since environmental issues are becoming worse.

There are certain nations that do not take the problem of the environment seriously, particularly those nations that are still developing. Manufacturing activity increases, which in turn drives up economic development in emerging nations. It is possible that less stringent environmental regulations in developing nations will have a bigger impact on the environment than those in wealthy nations. The majority of developing nations are moving their policies in the direction of a more open market. As a result, there has been a reduction in trade barriers. As a result, foreign direct investment (FDI) inflows have shown signs of significant growth in emerging nations. Because of this, more and more polluting industries will move out of rich countries with strict

Groosman and Krueger (1991) conducted the first research to look at how international commerce They claimed that an increase in income would result in an increase in pollution in low-income countries and that this would be the case. On the other hand, pollution levels are falling in wealthier nations. They branched out in many different directions. The scale effect is one of the pathways that contributes to the damage that is done to the environment. When there are more investments from outside the country, there may be more industrial production, which may be bad for the environment.

1.2 Statement of the problem

As a consequence of a growth in global production, there has been an accompanying rise in the quantity of carbon dioxide that is discharged into the atmosphere, as well as in emissions of greenhouse gases and consumption of these

gases. Between the years 1980 and 2018, the International Energy Agency estimates that the worldwide emissions of carbon dioxide from resources that are not renewable have grown by a factor of 65%. (Glaum et al., 2000). Humanmade carbon dioxide emissions have had a big effect on the total amount of greenhouse gases released around the world. In turn, these emissions have had a big effect on carbon dioxide emissions. Aside from this, there are other factors that can't be changed, such as the passage of time and natural disasters.

In recent years, the implications of climate change have been grossly misrepresented due to the emissions of carbon dioxide that humans are responsible for causing. As a result of this, it appears to be of the utmost necessity at this time to develop both a centralized market for the purchase and sale of exhaust emissions and effective rules and regulations for the control of carbon dioxide emissions. This is because this is a consequence of the fact that it is of the utmost necessity to develop a centralized market for the purchase and sale of exhaust emissions. This occurs as a result of the fact that emissions of carbon dioxide constitute a significant factor in the progression of climate change. These two considerations are absolutely crucial for bringing about the reduction in greenhouse gas emissions that is desired (Froot et al., 1993; Chen et al., 1997). As a consequence of the growth of the economy, it is not completely out of the question that there may be a net increase in the amount of carbon dioxide that is released into the atmosphere. This possibility is not completely out of the question, since it is not completely out of the question. On the other hand, it is not absolutely out of the question that this would be completely impossible. This possibility should not be fully discounted.

On the one hand, financial inclusion makes it simpler for enterprises and individuals to do this, while on the other hand, affordable financial programs make the potential of making asubstantial contribution to renewable technology more practicable. Both of these aspects have a significant role (Bodnar and Wong, 2003; Kim et al., 2020).

To put it another way, comprehensive finance mechanisms lead to the creation of high-quality sustainability initiatives that are not only less expensive but also easier to access. These measures, in turn, lead to a decrease in the amount of carbon dioxide that is released into the atmosphere, which, in turn, leads to a reduction in the amount of carbon dioxide that is emitted into the atmosphere. This, in turn, leads to less carbon dioxide being made, which may be good for the environment (Gilchrist and Zakrajek, 2012). Due to the fact that financial institutions have an impact on everything, this

component of the ecosystem is subjected to a substantial amount of damage. As a direct outcome of this research that was carried out in Ethiopia, people will have a greater grasp of the impact that direct foreign investment may have on carbon emissions.

1.3 Purpose of the study

It is of the utmost importance to work toward accelerating economic growth in regions that are economically underdeveloped and where producers do not have access to the funds or financing needed to develop renewable technologies such as photovoltaic distributed generation. This is one of the reasons why it is of the utmost importance to work toward accelerating economic growth in these regions. With direct combustion, costs would be a lot higher and carbon dioxide emissions would be a lot higher than with these technologies. If you work toward this goal, it is of the utmost importance to do so.

These regions fall under the category of "regions that are economically underdeveloped and where producers do not have access to the funds or financing needed to develop renewable technologies." This is because direct combustion produces a far bigger quantity of carbon dioxide emissions than indirect combustion does. This is due to the fact that direct combustion results in the production of a much greater amount of carbon dioxide than does indirect combustion.

In Vietnam, the adoption of renewable home installations has significant challenges, the most significant of which is a lack of financial resources, namely a lack of official financing assistance and commercial credit choices (Lustig et al., 2011). These kinds of anecdotes illustrate how the availability of low-cost economic commodities can help encourage the deployment of technologies that reduce emissions and the acceptance of environmentally friendly solutions that cut carbon dioxide emissions by consuming fewer energy sources. This can help to encourage the deployment of emission-reducing technologies as well as the acceptance of environmentally friendly solutions. This can help to encourage the deployment of emission-reducing technologies as well as the acceptance of environmentally friendly solutions. This can help to encourage the deployment of emission-reducing technologies as well as the acceptance of environmentally friendly solutions. This can help to encourage the deployment of emission-reducing technologies as well as the acceptance of environmentally friendly solutions. This type of solution reduces carbon dioxide

emissions because it uses fewer energy sources. It is feasible that this will assist in stimulating the adoption of solutions that are ecologically friendly as well as the deployment of technology that reduces emissions. This might be helpful in assisting the installation of steps to minimize emissions and could also help stimulate the adoption of solutions that are favorable to the environment.

Inversely, there is a relationship between the financial systems of the various home economies.

The current phase of the economic downturn has a significant correlation with domestic and company profitability, which can be seen in fundamental budgetary constraints, productivity, and the structural rigidity of the banking sector. This link can be seen in the way that fundamental budgetary constraints, productivity, and the rigidity of the banking sector structure all work together. This link is caused by a number of factors, including the banking industry's budgetary restrictions, productivity, and rigid structure. Budgetary restrictions, productivity, and the rigidity of the banking sector structure all work together, and you can see this connection in how they all interact with each other. The underlying budgetary restrictions, productivity, and rigidity of the structure of the banking industry all work together to create this relationship, which can be seen in how they all operate together. This relationship was created by a combination of factors, including the fundamental budgetary restrictions, productivity, and rigidity of the structure of the banking industry, all of which work together to play a role. This relationship can be seen in how all of these factors interact with one another. The underlying budgetary restrictions, productivity, and rigidity of the structure of the banking industry all work together to create this relationship, which can be seen in how they all operate together. When a firm is going through a rapid recession, the market mechanisms become more reliable as a consequence of a rise in the average annual increase as well as an increase in the asset values of debtors. This is because when the average yearly increase rises, the asset values of debtors also rise (Bruno and Shin, 2017; Call et al., 2021).

On the other hand, when the economy gets worse, incomes go down and people become less reliable. Because companies have specific components that are consistently growing in size, money transmitters often have extra expenditures that are greater than the market value as well as percentage profits that are higher than the market value. It is possible to reach the conclusion that the solvency position of financial intermediation and the placement of checking accounts are intrinsically

correlated to the financial health of mortgage holders and, as a result, respond appropriately to volatile investor sentiment that is affected by economic transitions that occur between various stages of market cycles. This conclusion can be drawn from the fact that the financial health of mortgage holders is directly linked to the solvency of financial intermediaries and where checking accounts are located. This conclusion can be drawn from the fact that the financial health of mortgage holders is directly linked to the solvency of financial intermediaries and where checking accounts are located. This conclusion can be reached because it is possible to arrive at the conclusion that the solvency position of financial intermediation and the placement of checking accounts are intrinsically correlated to the financial health of mortgage holders. In order to reach this verdict, it is important to investigate the connection that exists between those who own mortgages, those who engage in financial intermediation, and the establishment of checking account locations. Specifically, "McBrady and Schill, 2007," and "Cook et al., 2008."

The goal of this research is to find out how foreign direct investment has changed carbon emissions in Ethiopia and then report on the results of that research.

1.4 Research Questions

1. Is there a link between foreign direct investments, economic growth, capital investment on carbon emissions?
2. What is the economic benefit of carbon emissions for Ethiopia?
3. How will Ethiopia manage to limit carbon emissions?

1.5 Research hypothesis

H0 There is no relationship between economic growth and CO_2 emissions in Ethiopia,

H1: There is a relationship between economic growth and CO_2 emissions in Ethiopia.

H0: There is no relationship between FDI and carbon emissions in Ethiopia.

H1: There is a relationship between FDI and carbon emissions in Ethiopia.

H0: There is no relationship between Capital investment and CO_2 emissions in Ethiopia.

H1: There is a relationship between Capital investment and CO_2 emissions in Ethiopia.

1.5 Significance of Research

In order to be more competitive, businesses and the economy are more likely to do things that pollute the environment. This leads to the release of carbon dioxide, which may make the effects of climate change worse (Cheng et al., 2019; Liu et al., 2021).

In addition, consumers are offered the chance to purchase luxury items such as vehicles, microwaves, and exhausts, the use of which may be detrimental to the health of the environment due to the fact that it results in an increase in the generation of greenhouse gases (Ma et al., 2013; Wu and Zhao, 2018; He, 2019). Establishing financial markets that anybody can use helps the economy flourish, which in turn increases the consumption of renewable resources, which is negative for the environment and leads to increased emissions of greenhouse gases (Lea, 2017; Jiang et al., 2019; Yang et al., 2020).

Emissions of carbon dioxide are difficult to bring under control due to the fact that government regulation, location, and a whole host of other elements, as well as the existence of other economic hurdles, all contribute to this difficulty. Li et al. and Zhu et al.'s research, which was both published in 2020, suggests that carbon dioxide (CO2) emissions are the single most important cause of global warming.

They are responsible for 80 percent of all greenhouse gas emissions. Between the years 1980 and 2015, there was a significant rise in the levels of these pollutants per person. Since 1980, the quantity of carbon dioxide that has been released into the atmosphere has climbed to a total of 5.7865 metric tons, from a total of 4.0452 metric tons in 1980. This is a huge leap forward. Between 1980 and 2015, there was an increase of this size. Carbon dioxide emissions increased by 1.5 percent during this time period (Song and Shi, 2018; Song et al., 2019). In the year 1970, the European Union (EU) had emissions of 7.0896 metric tons per person. However, by the year 2017, these emissions had decreased to 5.6895 metric tons per person, which is a significant drop when compared to the rest of the world. In 1970, the average individual in the EU was responsible for 7.0896 metric tons worth of emissions.

One of the functions of sentient beings is to use fossil fuels to generate electricity, which results in the emission of greenhouse gases, which, in turn, contributes to an acceleration of the warming trend caused by the continuous buildup of carbon dioxide in the atmosphere. This can be seen as one of the functions that sentient beings perform. This is because the emission of greenhouse gases results in the acceleration

of the warming trend (Luo et al., 2019; Heidari et al., 2019). As a direct consequence of this, the world is in danger of experiencing severe ramifications, one of which may be the destruction of many centuries' worth of progress and peace. This research will help officials of the government in Ethiopia to know the danger of carbon emissions or their effect on economic growth. The general population is of the opinion that if significant steps are not taken to cut down on pollution, the world will eventually face an ecological disaster (Luo et al., 2019).

This research will help officials of the government in Ethiopia.

1.6 Contribution to study

A scientometric overview of the research on global carbon emissions is the focus of this work, which tries to fill this gap in the existing body of knowledge. The scientometric review uses a quantitative method to do an analysis of the landscape and intellectual core of the current carbon dioxide emission.

This thesis will also take a look at the gaps in the current body of knowledge on carbon emissions by identifying and discussing the quality and extent of the publications that are currently accessible. The findings of the study provide a thorough picture of the current state of the work that is being done to analyze the levels of carbon emissions in Ethiopia. Additionally, the results of the study provide likely directions for the research that will be done in the future. The results will also be a helpful and up-to-date resource for practitioners and policymakers as they plan their future work and finances.

1.7 Definition of terms

Carbon emission: Carbon dioxide is a gas that is created as a byproduct of the combustion of carbon as well as the breathing of living creatures. In other words, carbon dioxide is produced whenever carbon is burned. This gas is odorless and colorless and does not contribute to the development of cancer in humans or other animals.

It is what's known as a "greenhouse gas" because of the fact that it causes the atmosphere to retain heat. The process of putting greenhouse gases and/or their precursors into the air over a certain area and for a certain amount of time is called "emissions," and it is part of what the word "emissions" means. Carbon dioxide emissions, commonly known as CO_2 emissions, are created whenever cement is used

in the building industry, as well as whenever fossil fuels are utilized for the generation of electricity. It's possible that these emissions are already in the atmosphere.

It's possible that these emissions have already been let loose into the atmosphere. There's a chance of that happening. These emissions take into account not only the carbon dioxide that is produced as a result of the combustion of solid, liquid, or gaseous fuels but also the carbon dioxide that is produced as a result of the flaring of gas. This is because the combustion of solid, liquid, or gaseous fuels produces more carbon dioxide than the flaring of gas does. This is due to the fact that the burning of solid, liquid, or gaseous fuels creates a higher concentration of carbon dioxide than does the flaring of gas. This is due to the fact that the burning of solid, liquid, or gaseous fuels produces a greater amount of carbon dioxide than does the flaring of gas. When solids, liquids, and gaseous fuels are all burned simultaneously, the amount of carbon dioxide produced is at its maximum.

Economic growth: The word "economic growth" refers to an improvement in a society's standard of living, as measured by a rise in the quantity and quality of the commodities and services that it produces. This improvement may be quantified in terms of GDP (gross domestic product).

Everyone's spending affects someone else's income, and the amount of goods and services a society can make is directly related to the amount of money it can make.

This conclusion says that the average income is proportional to the average output. This means that if society produces more goods and services, the average income will also go up.

The term "foreign direct investment" refers to net investment inflows made with the intention of acquiring a long-term management interest in a company that is operating in a different economy than the investor. Individuals or organizations based in economies other than the investor's own make this type of investment. This long-term management interest is defined as 10% or more of the enterprise's voting stock. The term "foreign direct investment" was coined by the World Bank.

Due to the fact that the investor is based in a nation that operates under a different economic system, this particular kind of investment is categorized as "foreign." This type of investment is called "foreign" because the investor is from a country with a different economic system. Because the investor is based in a nation that utilizes a different form of economic system, this particular variety of investment is referred to as "foreign." This specific form of investment is referred to by the phrase "cross-

border investment," which is the word that is used to describe the investment. When referring to the total amount of equity capital, reinvestment of profits, other long-term capital, and short-term capital in the context of a discussion about the balance of payments, the phrase "balance of payments" is used. In other words, it encompasses all of the different types of capital. All of these factors are included. To put it another way, it is the whole amount of the capital that is being referred to here.

Reinvestment of profits and other kinds of long-term capital are two examples of alternative forms of capital. This series illustrates the net inflows that foreign investors have made into the economy that is reporting them, which are calculated by subtracting the new investment inflows from the disinvestment inflows. It is then broken down by GDP.

CHAPTER II

2.0 Literature review

2.1 Introduction

This chapter will provide you with in-depth information on the many hypotheses regarding carbon emission as well as information on previous studies that have been conducted on the relationships between foreign direct investment (FDI), GDP growth, capital investment, and carbon emission. In addition, this chapter will provide you with information on previous studies that have been conducted on the relationships between FDI, GDP growth, capital investment, and carbon emissions. This chapter will also give you information on prior research that has been done on the linkages between FDI, GDP growth, capital investment, and carbon emissions. This material will be provided to you at the end of the chapter.

This chapter will also contain information on prior studies that have been undertaken on the relationships between foreign direct investment (FDI), GDP growth, capital investment, and carbon emissions. Researchers from a variety of nations carried out these studies. After you have finished reading this chapter, you will have access to the stuff that was stated before. This chapter will also contain information on prior studies that have been undertaken on the relationships between foreign direct investment (FDI), GDP growth, capital investment, and carbon emissions. These studies were carried out by researchers from a variety of countries. You will be able to see the material that is described in the preceding sentence after you have completed this chapter.

2.2 Theoretical framework

The steadily rising relevance of environmental concerns in people's production and day-to-day lives presents a substantial challenge that poses a danger to the growth of the social economy as it continues to move forward. The Chinese economy, trade openness, and population density are the three factors that this research focuses on to investigate the relationship between industrialization, economic development, and carbon dioxide (CO_2) emissions, Aslam B et, al (2021). In addition to this, an analysis of the environmental Kuznets curve (EKC) is performed. The estimations that were calculated show that population density, industry, and trade all contribute to a rise in CO_2 emissions in China, whereas per capita GDP contributes, in the long term, to an increase in CO_2 emissions. Additionally, it discovered a unidirectional association

between population density and trade openness structure as well as a bidirectional causal link between CO_2 emissions and industrialization. Both of these links were shown to be associated with industrialization. The temporal lag of CO_2 emissions, industrialization, and per capita GDP, each of which is a primary predictor of Chinese CO_2 emissions, is brought to light by the variance decomposition impulse analysis. Because the course wraps up with a discussion on the short-run and long-run consequences for China as well as presenting policy proposals for policymakers, the current study is expected to spark debate regarding the previous research on the subject of the literature.

The lack of data available in Vietnam has resulted in a paucity of research that investigates the interrelationships between non-renewable energy consumption, renewable energy consumption, gross domestic product, and CO_2 emissions, research by (Le T. H 2022). The many important stakeholders in this market, such as investors, regulators, and other financial actors, each have their own unique time periods in which they operate. In this study, we examine these linkages in the time and frequency dimensions in Vietnam throughout the period of 1985–2019 using cuttingedge multivariate wavelet analysis approaches, such as partial wavelet coherency and partial wavelet gain. The various coherencies between the rise of non-renewable energy consumption, GDP, and CO_2 show that these areas were situated at medium frequencies (five to twelve years) and centered on the period between 1985 and 2000, as well as the period between 2003 and 2019. Regarding the connection between renewable consumption and increases in GDP and CO_2 levels, the region only concentrated on the high-frequency band (ranging from 2 to 12 years) between the years 1985 and 2001 and the low-frequency band (ranging from 22 to 25 years) between the years 2011 and 2019. The two stages are shown by the partial coherency that exists between the use of non-renewable energy and GDP. Changes in non-renewable energy consumption led to changes in GDP in the first phase (from the beginning of the sample to the year 2000), and the link is a negative one. However, GDP is in phase with nonrenewable energy consumption in the second phase, and the relationship is positive (from 2000 to 2015). The fact that there is a partial phase difference between non-renewable energy consumption and CO_2 emission shows that changes in CO2 emission led to changes in non-renewable energy consumption and that the association was a negative one. Regarding the partial coherency between renewable consumption and GDP, the majority of areas were situated within the 2-to-

12-year frequency range that ran from 1985 to 2001, from 2001 to 2003, and from 2005 to 2012. This band was in effect during the whole period. The results show that the anti-phase relationship with GDP growth led from 1985 to 1991, while changes in renewable energy consumption led to changes in GDP growth from 2001 to 2003, and the association is negative from 2001 to 2003. In contrast, during the period 1985–1991, the results indicate that changes in GDP growth led to changes in renewable energy consumption. Since 2003, there has been an anti-phase link with the leading rate of growth in GDP. Finally, the partial wavelet coherency of renewable energy consumption and CO_2 emission shows that regions were statistically significant in the 3-4 and 7-15-year frequency bands, and there was an anti-phase relationship with CO_2 emission leading. These findings are based on the fact that regions were found to be statistically significant in the 3- to 4- and 7- to 15-year frequency bands.

It is becoming an increasingly important research subject to investigate the link between expanding economies, rising energy use, and rising CO_2 emissions. (Pejovic B.et al 2021) study the purpose to investigate the relationship that exists between the gross domestic product per capita, CO_2 emissions, and energy consumption from renewable sources for the 27 nations that make up the European Union and the Western Balkans for the time period of 2008–2018. During the investigation, a technique known as the panel vector autoregressive approach (PVAR) was used, and the panel VAR model consisting of three variables was assessed using the generalized method of moments (GMM). The primary conclusions drawn from this study are as follows: (1) there is a two-way relationship between gross domestic product and CO_2 emissions; (2) there is a two-way negative relationship between CO_2 emissions and energy consumption from renewable sources; and (3) there is no evidence that there is a causal relationship between gross domestic product and energy consumption from renewable sources. (4) The sign of the connection in the direction that goes from gross domestic product to CO_2 emissions is negative, while the sign of the relationship in the opposite way is positive. According to the findings, the majority of the fluctuations in CO_2 emissions are dictated by variations in GDP. As a consequence, it is possible to accomplish a reduction in CO_2 emissions over the long term by continually raising GDP. Growing consumption from renewable sources will lead to a direct decrease in CO_2 emissions, which will have repercussions that are beneficial to the environment. The findings that were gained from this study have the potential to be crucial for

decision-makers in the management of energy policy, environmental policy, as well as economic growth and development.

Pachiyappan, D., Ansari, Y., Alam, M. S., (et al 2021) study compares the "vector error correction" model (VECM) with the "auto-regressive distributed lag" model in order to analyze the relationship between CO2 emissions (CO_2E), GDP (gross domestic product), energy consumption (ENU), and population growth (PG) in India between the years 1980 and 2018. (ARDL). We used the unit root test, the Johansen multi-variate cointegration, and the Cholesky method for conducting the variance decomposition study. Approaches to cointegration known as VECM and ARDL-bound testing imply that there is a long-term equilibrium nexus between GDP, energy usage, population increase, and CO_2E. The findings of the empirical research point to the presence of a long-term equilibrium nexus between the variables. According to the findings of the Granger causality test, a short-term bi-directional causal relationship exists between GDP and ENU; however, only a unidirectional causal relationship exists between CO2E and GDP, CO2E and ENU, CO2E and PG, and PG and ENU. According to the evidence shown by variance decomposition, 58.4% of the future variations in CO2E are attributable to shifts in ENU, 2.8% of the future fluctuations are attributable to shifts in GDP, and 0.43% of the future fluctuations are attributable to shifts in PG. Last but not least, the findings of the ARDL tests suggest that an increase of 1% in PG would result in a rise of 1.4% in CO2E. Our article covers some key policy consequences.

Tan, F., Wan, H., Jiang, (et al 2021) evaluates whether increasing outward foreign direct investment (OFDI) can enhance carbon reduction in the context of growing urbanization is of practical relevance toward China's goal of sustainable development and carbon neutrality. By using panel data from China's 30 provinces during the period of 2003–2015 and taking into consideration both population and land, the impact of OFDI on carbon emissions is investigated from the dual perspectives of the urbanization threshold and the mediating path. This research was carried out using the urbanization threshold and the mediating path. The findings indicate that interprovincial OFDI has a significant impact on CO_2 emissions with the double threshold effect of urbanization, and that OFDI expansion will increase CO_2 emissions with urbanization. Despite this, the various stages of urbanization display inverted U-shaped characteristics, which first show an increase and then a decrease in CO_2 emissions. During the sample period, the optimization of industrial structures did not

pass the test for mediating effects, but the rationalization of industrial structures provided a mediating impact in the primary stage of urbanization and a suppressing effect in the high-level stage of urbanization. Import reliance only demonstrates a masking impact at the intermediate stage of urbanization, while the technological level demonstrates an intermediary effect during the primary stage of urbanization and a masking effect during the intermediate stage of urbanization. The deepening of open-field domestic investment (OFDI) has brought about a variety of repercussions on economic and social output in different areas of China that are undergoing urbanization, which has further impacted regional carbon emissions. It would be helpful to make constructive proposals for the regional coordination of development, new urbanization building, and urban low-carbon transformation if these consequences were discussed.

Using the panel data methodology, Balli, E., Sigeze, C., (et al 2021) study examines the relationship between CO2 emissions, energy consumption, economic growth, and foreign direct investment for a sample of Asia-Pacific Economic Cooperation (APEC) countries from 1981:Q1 to 2021:Q1 over the course of the study's time span. Due to the fact that we find evidence of cross-sectional dependency, we resort to the cross-sectional augmented Dickey-Fuller panel unit root test in order to arrive at an accurate estimate. The cointegration test that was devised by Westerlund (2008) demonstrates that, in the long term, CO2 emissions, energy consumption, economic development, and foreign direct investment are all in equilibrium with one another. The pollution haven hypothesis is supported by long-run parameter estimates that show an increase in foreign direct investment (FDI) inflows has a detrimental influence on air quality. These estimates are based on the Common Correlated Effect Mean Group. The findings of the cointegration test indicate, in addition, that the influence of gross domestic product (GDP) on CO_2 emissions differs among the countries included in the estimate sample. In contrast to the contradictory data on the impacts of other factors, there is consistent and compelling evidence that a rise in CO_2 emissions is being caused by an increase in energy consumption across all APEC nations. Results from a panel causality test conducted by Emirmahmutoglu and Kose (2011) and published in Econ Model 28:870-876, reveal that there is a link between foreign direct investment and CO_2 emissions in Japan. In addition, there is a bidirectional causal link between GDP and energy consumption in Australia, China, Japan, and Singapore. This relationship is

causal in both directions. In general, empirical evidence indicates that in order for APEC countries to successfully attract foreign direct investment, they must adhere to stringent laws and invest in environmentally friendly clean technology.

Since the signing of the Paris Agreement, nations all over the world have been working hard to meet the carbon neutrality goals that they have set for themselves. However, due to the fact that the Chinese economy is one of the biggest in the world, the roles of foreign direct investment (FDI), technical innovation (TI), and trade are all very important in order for China to realize its goal of being carbon neutral. Liu, X., Wahab, S (et al 2021), as a result, the purpose of this research is to provide the level of trade, renewable energy consumption (REC), and foreign direct investment (FDI) from the years 1995–2017 as new factors in the process of fostering a sustainable environment in China. The research makes use of sophisticated panel procedures, such as testing for cross-sectional dependency and ensuring slope uniformity. According to the findings, a cointegration connection exists across all of the models that were used in this investigation. This indicates that both GDP and FDI have a favorable impact on carbon emissions. On the other hand, international commerce, REC, and TI all have a negative correlation with carbon emissions. In addition, the combined term for foreign direct investment, which includes REC and TI, has a negative association with carbon emissions, according to statistics from Chinese provinces. The ramifications of this research for public policy show that in order to obtain sustainable foreign direct investment (FDI), TI should be encouraged to reduce the pollution that is created by FDI. At the national level, there is an urgent need for the adoption of environmentally responsible policies and environmentally conscious activities.

The rise of economies is often accompanied by increases in energy consumption, which has a direct role in the process of climate change. As a consequence of this, the growth policies of today should likewise be aligned with the aims of environmental sustainability, Mohsin, M., Naseem, S., (et al 2022). Previous studies have focused a significant amount of attention on the socioeconomic factors associated with air pollution; however, very little investigation has been done into the consequences of these factors over the long and short term. The purpose of this research was to investigate the long-run and short-run relationship between carbon dioxide (CO2) emissions, energy consumption, particularly gas as a clean fuel, foreign direct investment (FDI), and gross domestic product (GDP) in Iran over the course of 40 years using an autoregressive distributed lag (ARDL) model. According to the

findings of the estimate, the environmental Kuznets curve (EKC) hypothesis may be applied correctly to Iran. In addition, empirical studies have shown that a Ushaped relationship exists between financial expansion and CO2 emissions in Iran over the course of a lengthy period of time. When compared to the use of other polluting fuels, the country's transition to gas as its primary source of energy was quickly followed by a reduction in the carbon and ecological footprints it left behind. In addition, the findings of our empirical research suggest that increased economic development and direct investment from outside both contribute, over both the long and short terms, to a reduction in Iran's pollutant and carbon emissions. Important suggestions for changes in energy policy have been provided in light of the results of the empirical research.

East Africa is a prototypical example of the less developed economies that have emerged since the turn of the 21st century, Adugna, R. (2022). The brilliant economic miracle that these economies have experienced since the turn of the century has also triggered a rapid increase in energy consumption and emissions of carbon dioxide. Nevertheless, earlier research on carbon accounting has never focused its attention on the area. This article reconstructs the 45-sector carbon emission inventories of eight East African nations from 2000 to 2017, using data from a variety of sources. Index decomposition analysis was used to identify the factors that contributed to the development of these countries' economies. In this study, we came to the conclusion that CO_2 emissions as a whole exhibit a pattern known as "two-stage exponential increase," with substantial variation across nations. In terms of the energy mix, technological advancements in hydro and geothermal energy were nearly completely offset by a rising hunger for oil and coal. As a result, the energy mix became the weakest and most valuable component driving emissions reduction (roughly 1.4 million metric tons). However, this was in no way sufficient to counteract the effects of the expanding global economy and population, which led to an increase in annual emissions of 13 Mt and 11 Mt, respectively, between the years 2000 and 2017. An additional contributor to the increase of 6.4 MT was the rising energy intensity brought on by the rise of industrialization and transportation. To achieve a win-win situation between sustainable economic growth and emission reduction, low-carbon policies should be tailored to local conditions and targeted at improving energy efficiency and using renewable energy sources. This will ensure that the policies have a positive impact on both fronts.

The primary purpose of this research was to analyze the link between Ethiopia's GDP per capita and the country's carbon dioxide emissions per capita from 1981 to 2020. In this study, none of the variables show any sign of change over time in their differences. Due to the existence of two cointegration equations, the Johansen cointegration method is used in preference to the EngelGranger technique. The conclusion that can be drawn from the findings of the vector error correction model is that there is both a short-run and a long-run connection between the amount of carbon dioxide emissions produced per capita, the gross domestic product produced per capita, and the degree of trade openness. In this particular investigation, the Environmental Kuznets Curve Theory held up for the course of the whole research project.

Since the implementation of economic reform in China, the country's economy has seen significant growth, Wei, X., Mohsin, M., (et al 2022). More and more people across the world are showing interest in China's outbound direct investment in other countries' economies. Despite the fact that China's energy problems and environmental degradation have gotten more severe as the economy has developed, the structure of the country's energy use has become more problematic. When it comes to resolving environmental problems and attaining sustainable growth, the production of environmentally friendly financing and resources for renewable energy are very necessary. This research investigates the connection between green finance, foreign direct investment, and GDP. The data for this study comes from 30 different regions in China and spans the years 2000 to 2019. In the second step, which employs first- and second-generation unit root tests for panel data, only the expansion of the economy is recognized by the I(2) indicator (0). Because of these factors, we decided to use an autoregressive distributed lag approach in conjunction with a pooled mean group, a mean group, and a dynamic fixed effect estimate model. According to the results, only renewable energy was shown to be significant and negative in terms of greenhouse gas emissions, while FDI was found to be significant and helpful only in the long run. In the long run, however, renewable energy was the sole factor. According to the findings of this study, we need to engage in more strategic thinking about how we can deploy in the renewable sector while simultaneously advancing techniques, advancement, human capital, research, and development that will boost green finance production and sustainable development in the long run.

Using an ARDL model, Emako, E., Nuru, S., (et al 2022) investigates how the impact of foreign direct investment (FDI) has contributed to the structural shifts that have occurred in Ethiopia. On the other hand, the authors found that trade openness and inflation had a negative impact on structural change, whereas foreign direct investment (FDI) and domestic investment both had a favorable impact. However, it does not seem that the expenditures made by the government have a major impact. According to the findings of the research, foreign direct investment is an essential instrument for Ethiopia's achievement of its transformation agenda in general and the realization of structural reforms in particular. To achieve this aim, the government has to improve absorption capacity and provide opportunities for local businesses to network with international investors in order to bring in appropriate amounts of foreign direct investment (FDI) and guarantee that it is utilized effectively.

Both the production of carbon dioxide emissions and the deterioration of the natural environment are significantly impacted by the three facets of globalization (economic, political, and social), foreign direct investment (FDI), and commerce as the primary external drivers. In theory, globalization is the force that drives international commerce and investment, both of which are harmful to the environment. The depletion of renewable energy sources that are tied to commerce as a result of globalization, notably via the destruction of forests and fisheries, is a side effect of globalization. On the other hand, globalization forces are providing massive tree plantations, environmentally friendly commodities, and technologies (such as renewables and hybrid cars) at a lower cost and lower rent, and as a result, consumers are adopting these things more quickly. This is due to the fact that they are more affordable (Copeland 2013). The liberalization of trade and investment, which leads to companies that produce a lot of pollution, has a negative impact on nations that have environmental policies that are relatively lax. The term for this line of reasoning is the pollution haven hypothesis (Copeland 2008). In addition, the pollution halo hypothesis posits that countries that are recipients of foreign investment will see a reduction in emissions as a result of foreign companies' use of cleaner or greener production technologies in their manufacturing processes. These countries typically adhere to more conventional methods of production (Mert and Caglar 2020). The empirical research primarily covers both of these hypotheses (the pollution haven and the halo hypothesis) with regard to wealthy and developing nations. Globalization may be broken down into three primary categories: social, economic, and political

globalization. These categories are then combined into a single index that is compiled by the KOF Swiss Economic Institute (Dreher 2006). Many recent studies, such as Chen et al. (2019), Khan et al. (2019a, b), Akadiri et al. (2019), You and Lv (2018), and Zaidi et al. (2018), used the KOF index to investigate the role that globalization plays in CO_2 emissions (2019). The researchers, Bu et al. (2016), used the KOF globalization index in the context of 166 economies during the period 1990–2009. They found that overall CO_2 emissions increase with the high-level exploitation of social, economic, and political globalization; however, the impact is different in the case of OECD countries and non-OECD countries.

According to Akadiri et al. (2019), who analyzed data on globalization, tourism, real income, energy usage, and CO_2 emissions from 1995 to 2014 for 15 industrialized nations, they discovered that there is a considerably positive connection between globalization and CO_2 emissions. Economic globalization was found to be a contributor to rising carbon emissions, Wang et al.'s (2020a, 2020b) study, which examined the effects of economic globalization on carbon emissions in the G-7 economies during the period of 1996–2017. The authors found that economic globalization contributed to the rise in carbon emissions. Both Sharmin and Tareque (2018) and Ahad and Khan (2016) investigated the impact of globalization on the deterioration of the environment. The findings of these studies indicated that globalization has a positive effect on CO_2 emissions, which contributes to the deterioration of the environmental quality in Bangladesh. In addition to the studies that have been discussed thus far, Shahbaz et al. (2017a, 2017b) investigated the environmental Kuznets curve (EKC) proposition in the context of the Chinese economy. Their findings demonstrated that globalization indices and sub-indices lower CO_2 emissions, which in turn leads to an improvement in the overall quality of the environment.

Both the process of globalization and the state of the environment are significant factors that define the global economy. There are two quite different consequences that might be expected as a consequence of globalization's impact on the standard of living in the environment. Globalization, according to one school of thought among analysts, is recognized to be detrimental to the quality of the environment, while another school of thought among analysts argues to the contrary. The impact of globalization and foreign direct investment (FDI) on a nation's CO_2 emissions may be both positive and negative, depending on the nation. If we narrow

our focus to economic globalization (trade liberalization), we see that it reduces CO_2 emissions in OECD countries while increasing them in non-OECD countries (Managi et al., 2009). In a further investigation of the same connection (Chang et al., 2018), the authors came to the conclusion that trade openness increases CO_2 discharge in high-income states, but the converse is true for low- and middleincome nations. In their study of the effects of globalization on environmental quality, Shahbaz et al. (2016) looked at 19 African nations and came to the conclusion that, although CO_2 emissions have decreased in the overall sample of countries, the outcomes vary from country to country. Later, he investigated the Kuznets curve theory for the environment in China, and the results demonstrated that globalization reduces CO_2 emissions. In addition to this, he provided assurance that there is a causal relationship between growth and CO_2 and verified the reality of the EKC hypothesis (Shahbaz et al., 2017). In their research on OECD nations covering the time period from 1990 to 2014, Zafar et al. (2019) also found evidence supporting the existence of the EKC hypothesis. They checked the elasticities of the variables using completely modified OLS and continuously updated bias-corrected techniques and came to the conclusion that financial growth and globalization enhanced environmental quality by decreasing CO_2 emissions. In a similar vein, Haseeb et al. (2018) verified the existence of EKC in BRICS countries and stated that there are no causally significant effects of globalization and urbanization on CO_2 emissions. Instead, they perceived that pollution was caused by the combination of financial development and energy consumption. Another recent study employed tourism as a route of globalization to examine its effects for a selection of 15 countries that are popular tourist destinations, and it found that globalization positively and considerably increases carbon emissions (Akadiri et al., 2019). Koengkan et al. (2020) investigated the symmetrical effect of globalization on CO_2 emissions and came to the conclusion that the environment in Latin American and Caribbean states is negatively impacted by three distinct aspects of globalization: economic globalization, social globalization, and political globalization. The findings of this research are in line with those of Acheampong et al. (2019), who discovered that increased trade openness has a negative impact on the environment, although foreign direct investment (FDI) and the use of renewable energy both work to reduce carbon emissions.

At the 16th Conference of Parties to the United Nations Framework Convention on Climate Change, which took place in Cancun in the year 2010, an

agreement was made to restrict the amount of warming that the planet experiences to no more than 2 degrees Celsius in this century. This agreement was made in the context of limiting the amount of warming that the planet experiences to no more than 2 degrees Celsius in this century. This agreement was made in the context of limiting the amount of warming that the planet experiences to no more than 2 degrees Celsius in this century.

This agreement was made in the context of limiting the amount of warming that the planet experiences to no more than 2 degrees Celsius in this century. This agreement was made in the context of limiting the amount of warming that the planet experiences to no more than 2 degrees Celsius in this century. This agreement encourages more research into the economic factors that affect how much carbon dioxide is released into the air.

The United Nations Environment Programme (UNEP) has just come out with a study that was given the title "They referred to it as "The Emissions Gap Report 2014," and inside it, they emphasized a great deal of information that is quite important. In the document's title, "The Emissions Gap Report 2014" was referred to as the name of the report. One of these issues is that not nearly enough money is being put into developing solutions with minimal carbon emissions and effective use of resources. In addition, there are factors such as government subsidies that encourage the use of fossil fuels, water, and other limited resources; investments that are driven by short-term returns in traditional high-carbon sectors and practices; and a lack of political will to address the issue. All of these factors contribute to the problem. All of these different aspects have a role in making the situation worse.

The provision of subsidies stimulates the use of limited resources such as fossil fuels, water, and other forms of resources. This is because these types of resources are expensive. Traditional enterprises and activities that produce a lot of carbon emissions and have the primary objective of making money in the near future

The usage of fossil fuels, water, and other limited resources is promoted via the provision of subsidies. Investments in conventional high-carbon industries and activities that have short-term profitability as their primary motivation Subsidies are given out in order to encourage people to use scarce resources like fossil fuels, water, and other resources of that kind. Investments in conventional high-carbon industries and activities that have short-term profitability as their primary motivation Subsidies are given out in order to encourage people to use scarce resources like fossil fuels,

water, and other restricted resources. Investments in traditional high-carbon businesses and activities that are driven primarily by a desire to generate profits in the near term. In addition to this, it demonstrates that important market issues that make it difficult to utilize energy in an effective manner include imperfect information, divided incentives, and externalities. Nevertheless, Florides' (2009) theory that there is a positive association between temperature difference and CO_2 content is supported by not all of the empirical studies that have been conducted.

Traditional areas of inquiry in economics include topics such as economic development, industrial structure, technical advancement, international commerce, regional trade, population movement, and so on. In addition, the research that is being carried out right now investigates other potential explanations, such as the variation in the components that were input. In order to determine the number of carbon emissions, Chen et al. (2009) created an energy environment and combined it with a non-radial Malmquist index.

This goal was reached by eliminating the need for the production of fossil fuels and instead focusing on the generation of renewable energy. One of these extremely significant issues is the connection between growing the economy and preserving the natural world. This connection is often referred to as the "environmental Kuznets curve," and it is one of the most pressing concerns of our day. This curve depicts the link that can be observed between the expansion of the economy and the present state of the environment. It can be shown to be a positive correlation between the two.

Grossman and Krueger are credited with first proposing and further developing the EKC hypothesis (1991, 1995). Empirical research was used throughout the World Development Report in 1992 to provide evidence of its existence. According to the EKC hypothesis, there would initially be a rise in the amount of pressure placed on the environment whenever there is a higher rate of economic development. This is because there is a feedback loop between the growing economy and the growing stress on the environment.

But once a certain point is reached, more economic growth will make the environment less stressed. This happens when economic growth exceeds the point at which the EKC theory predicts that environmental pressures will begin to decrease. Even though academics have only just finished doing a lot of empirical research on EKC forms, they are often used to study both the improvement of the environment and the growth of the economy. Apergis and Ozturk (2015) used the GMM approach

to test the EKC theory on 14 Asian nations between the years 1990 and 2011, and they discovered the turning points of the U-shaped EKC. These findings were published in the journal Scientific Reports. These results were recently presented in an article that was published in the journal Economic and Political Weekly. This investigation was communicated to the public in the form of a paper that was published in the journal known as Scientific Reports. In a recent piece that was published as part of a newspaper called Economic and Political Weekly, these data were dissected and examined in detail.

Najid Ahmad et al. (2017) were able to demonstrate, with the assistance of the autoregressive distributed lag (ARDL) and the vector error correction model (VECM), that between the years 1992 and 2011, CO_2 emissions and economic development in Croatia had a connection that took the form of an inverted U. This was done by showing that both the ARDL and the VECM could show that this relationship existed. Both the autoregressive distributed lag (ARDL) model and the vector error correction model (VECM) were used in order to accomplish this goal. This finding may be attributed, among other things, to the work that was done by Najid Ahmad and his colleagues.

The years 1992 through 2011 were included in the scope of their investigation. China is a country that is expanding at a rapid rate and experiencing high rates of economic development; consequently, many academics are concerned about the connection between China's rapid economic expansion and the accumulation of environmental pollutants such as SO_2 and CO_2. China is a nation that is rapidly growing and experiencing high rates of economic development. (Li et al. (2016) employed either static or dynamic panel data analytic methodologies in order to evaluate whether or not the EKC hypothesis is valid when applied to China's province data. Their goal was to determine whether or not the EKC hypothesis was true.

2.3 Environment Kuznets Curve (EKC)

Over the course of the past two decades, the effects of economic growth on energy consumption, in addition to the connection between economic growth and environmental pollution, have been the subject of empirical research and a great deal of attention. This attention has been focused primarily on the connection between economic growth and environmental pollution. The relationship between rising economic activity and increasing pollution in the surrounding environment has

received the majority of this attention. Most of the attention in this conversation has been on the link between growing economies and rising pollution levels. Most of the attention in this discussion has been on the link between growing economies and rising pollution levels.

The correlation between expanding economies and increasing levels of pollution has received the majority of the focus throughout this conversation. Recently, a lot of attention has been paid to the connection between increased economic activity and pollution in the natural environment, as well as the connection between increased economic activity and energy consumption. This attention has also been paid to the link between a growing economy and the amount of energy used.

In addition to this, attention has been directed at the link that exists between the growth of the economy and the use of energy. This has been done in an effort to highlight the importance of this relationship. Our work has mostly concentrated on determining both of these interdependent interactions at the same time. The vast bulk of this effort has been placed on investigating how growing economies have an impact on the amount of energy that people use.

The Environmental Kuznets Curve (EKC) hypothesis provides a comprehensive explanation for the connection that exists between growing economies and increasing levels of pollution. This hypothesis was developed by environmental economists. The theory of economic growth didn't really get off the ground until 1955 when Simon Kuznets published his paper "Economic Development and Income Inequality," in which he developed the premise that would become the foundation of the theory. The Kuznets hypothesis, which came out in 1955, said that economic growth was one of the things that could explain how the distribution of income

The concept that underpins the EKC theory is that the spread of economic growth will first worsen harm done to the environment. This is significant because the state will put a higher priority on growing productivity than it would on worries about the environment. Continuous manufacturing activities may cause harm to the environment, which will result in the contamination of the land, water, and air. At some point in the future, those in positions of economic wealth will understand the significance of maintaining high quality and a clean environment. The tipping point will be reached when economic progress begins to lessen the amount of harm done to the environment.

To put it another way, the EKC hypothesis demonstrates that sustainable economic development will be beneficial to the environment and will result in improved environmental welfare (Nikensari et al., 2019).

The EKC hypothesis is based on the idea that the decline in environmental quality is a non-linear function of economic activity up until a certain income level is reached, at which point improvements in environmental quality begin to take place. This idea serves as the foundation for the EKC hypothesis.This idea forms the foundation of the EKC hypothesis. This idea serves as the foundation for the EKC hypothesis. The EKC hypothesis relies heavily on this idea as its primary building block. This theory, which serves as the EKC hypothesis' basis for construction, may be thought of as its foundation. The EKC hypothesis places a significant amount of weight on this concept as its basic element of construction.

This idea serves as the theoretical foundation for the EKC hypothesis. This pattern of behavior suggests that while a country is in the process of economic development, the environmental quality continues to deteriorate until a tipping point is reached. Once this threshold is passed, however, economic systems begin to see a drop in environmental degradation. An inverted U-shaped association between wealth and ecological fortification, which is supported by the EKC theory, is one strategy that may be applied in an effort to provide an explanation for this phenomenon. This hypothesis provides support for the EKC hypothesis. This concept lends weight to the idea that there is a relationship between money and ecological fortification that is formed like an inverted U. This notion provides evidence for the U-shaped link that exists between money and ecological fortification. However, the concept also implies that the U should be inverted. This hypothesis is one strategy that may be utilized to explain this phenomenon. This concept lends weight to the idea that there is a relationship between money and ecological fortification that is formed like an inverted U. This idea backs up the idea that there is a link between money and strengthening the environment that looks like an upside-down U. This gives weight to the argument. The vast majority of individuals believe that there is at least some justification in giving some thought to this concept (Grossman and Krueger, 1991; Sinha and Shahbaz, 2018). In order to get a deeper comprehension of those features, several subfields of research have each focused their attention on a different one of the behaviors that are shown by this species (for a detailed review, please see Shahbaz and Sinha, 2019). According to the findings of several studies, an N-shaped EKC is

the most effective strategy for establishing the link between economic growth and ecological resilience. This result was arrived at as a direct consequence of the fact that an EKC in the form of a N was used.

According to this EKC, the relationship is positive up until the first turnaround point, after which it begins to trend negatively as it draws closer to the second turnaround point, and then it begins to trend positively once it has passed the second turnaround point. The relationship continues to be positive after it has passed the second turnaround point. After reaching the second point of no return, the trajectory of the relationship continues to go in a favorable direction.

In other words, economic systems have the potential to go through a phase of environmental correction after a situation in which income directly impacts environmental degradation, such as the adoption of new energy regulations. This could be the case because economic systems could go through a period of "environmental correction."

This could be the case because economic systems could go through a period of "environmental correction." In this scenario, income directly impacts the rate at which environmental degradation occurs. This is not only theoretically possible but also practically doable as a result of the feedback loop that exists between money and the devastation of the environment. Because money and the destruction of the environment feedback on each other, this is not only possible in theory but also possible in practice.

This may take place in a scenario in which a person's money has a direct bearing on the deterioration of the environment. On the other hand, if these economies do not make the required efforts, they will once again be afflicted by a pattern of growing emissions. This will happen if they do not take part in the essential activities (Alvarez et al., 2017). The third stage of this pattern is different from the first two because it has a fast-paced development phase that is followed by a slower rate of economic growth. This stage often occurs after the second stage of this pattern and before the fourth stage of this pattern. This slowdown is the consequence of insufficient efforts being made to protect the environment. The third stage of the pattern is directly responsible for this slowdown in the pace of economic growth that happens (Torras and Boyce, 1998; Alvarez et al., 2017; Balsalobre et al., 2018; Sinha et al., 2018).

This level may be reached when previous advancements have been exhausted and technological obsolescence has resulted in the need for new technologies that limit pollution. When all possible improvements have been made (Balsalobre and Alvarez, 2016a, b), this stage may be reached. At this point in time, there is a desire for innovative solutions that can reduce pollution. In their work from 2019, Shahbaz and Sinha conduct an extensive evaluation of the previous research that has this trend shows how the size, make-up, and technological effects of economic growth affect the way the environment work. During the second phase of development, this deterioration is sped up as a consequence of a structural movement toward heavy industries, which, in turn, encourages a shift toward light manufacturing. This drive toward heavy industries is the cause of this degradation. As a result of this transition toward heavy industries, the deterioration of the first phase accelerated in the second phase. This is because the scale effect reflects how a rise in manufacturing will worsen environmental quality in the initial phase of development (Torras and Boyce, 1998), but in the second phase of development, this effect reflects how a rise in manufacturing will worsen environmental quality in the initial phase of development. This is due to the fact that the scale effect reflects how an increase in manufacturing will worsen environmental quality in the initial phase of development (Torras and Boyce, 1998). To put it another way, the scale effect illustrates how a rise in the amount of production will result in a decline in the quality of the surrounding environment during the early stages of growth.

This is because the scale effect shows that increasing output during the early stages of growth will be bad for the environment.

This is because the scale effect shows that a rise in output in the early stages of an economy's growth would hurt the environment. This is the case because the scale effect demonstrates how an expansion in production would be detrimental to the environment. This is due to the fact that the scale effect demonstrates that increasing production during the early phases of development will result in negative consequences for the environment. One example of what is known as the composition effect is the movement away from activities that cause more pollution and toward activities that produce less pollution, which eventually leads to an improvement in the quality of the environment. The enhancement in the overall quality of the environment that arises from the composition effect is a good thing. The cumulative effect of these changes results in an enhancement of the standard of the environment (Hettige et al.,

2000). The technical impact is a reflection of the arrival of technology that is kinder to the environment at a later stage of development than it was initially intended for. This technology was developed later than was originally envisaged. The N-shaped environmental sensitivity curve (EKC), which is dependent on the idea that environmental quality starts to deteriorate once again at a low growth rate, is directly affected by the effect of technology. This is because the EKC is dependent on the concept that environmental quality starts to deteriorate once again at a low growth rate. This is due to the fact that the EKC is predicated on the theory that a slow pace of economic expansion would inevitably result in a decline in the quality of the surrounding environment. The Environmental Kaleidoscope Index (EKC) is founded on the notion that there is a cutoff level beyond which the overall quality of the environment starts to deteriorate once again. This is the rationale behind why things are the way they are.

This has a direct bearing on the environmental sensitivity curve (EKC) (Alvarez et al., 2017; Balsalobre et al., 2018). (Alvarez et al., 2017; Balsalobre et al., 2018).

During this phase, the scale effect takes the place of composition and technical effects. This makes the technology of the previous phase obsolete.

Foreign Direct Investment

Direct foreign investments are carried out in Ethiopia based on several provisions of law. Direct foreign investments are distinct from indirect foreign investments in that the capital owner directly bears the risk of the investment. Indirect foreign investments are carried out in Ethiopia based on several provisions of law. This kind of investment is referred to as foreign direct investment (FDI) or foreign investment (PMA), and it was established by Law No. 1 of 1967 and Law No. 11 of 1970 Concerning Foreign Investment (Suharyono, 2017).

According to Zaenuddin (2018), a type of investment known as foreign direct investment is one in which the investors are actively engaged in the operations of the businesses in which they are invested. This makes sure that interested parties (foreign investors) can't be cut off from the business dynamics related to set company policies and goals to be reached.

In addition, increased foreign direct investment has the potential to raise tax revenues as well as enhance technology, management, financial resources, job creation, marketing, and human resource development in the home nation, such as the

acquisition of work skills (Kariuki, 2015; Todaro & Smith, 2003). In a similar vein, direct investment from outside plays an essential part in helping developing nations make up for lost ground in terms of development, foreign currency exchange, investment, and tax revenue (Anyanwu, 2011; Quazi, 2007; Smith, 1997). Direct investment from investors outside of the country can help boost productivity and make sure that economic development is done correctly and successfully.

2.4 Empirical literature

2.4.1 FDI and CO_2 nexus

Existing research warns that foreign direct investment may be harmful to the environment and environmental rules, particularly in regions that are abundant with pollution-intensive sectors and where environmental requirements are laxer.

This is especially true in regions where pollution-intensive sectors are allowed to operate with less regulation. Abdouli and Hammami (2017) looked into how often this kind of thing happens in industrialized countries as part of their research.

Integration of economies that are still in the process of expanding has become easier as a result of the acceleration of structural changes and economic measures that have been brought about by globalization. This is possible because globalization has changed the way the economy works.

In a similar way, by validating the PHH, we try to show that the number of industries in Middle East/ North Africa (MENA) nations that are very polluting has gone up.

It is a race among emerging nations to offer investment possibilities that are both alluring and lucrative enough to supply direct financial resources in order to expedite economic progress via the transfer of technology and the improvement in productivity. This conflict is taking place within the context of international rivalry among nations in the context of economic growth (Lee, 2013). Recent research has placed a significant amount of attention on investigating the potential for changes in environmental quality brought about by inflows of direct investment from outside (Nguyen and Nguyen, 2007; Anwar and Nguyen, 2010; Azman-Saini et al., 2010; Lau et al., 2014; Omri et al., 2014; Abdouli et al., 2018; Liu and Lin, 2019).

The pollution halo theory contends that the technological impact is what controls societies and the environment, but the population scaling hypothesis asserts that the scale effect is the more important factor. On the other hand, the composition impact is mostly concerned with pollution.

Therefore, it is difficult to uncover any data that supports the PHH for emerging countries. It is possible for a nation to acquire a competitive advantage if the cost of legally enforcing pollution restrictions is lower than the cost of other factors of production in that country (Copeland and Taylor, 2003). When compared to their equivalents that are capital-intensive, industrial activities that rely heavily on labor do far less damage to the surrounding environment. In this case, the spread of technology through foreign direct investment helps developing countries replace old equipment that pollutes the environment (Gallagher, 2004, 2009). In the context of this specific scenario, evidence to support the PHH has been provided by research that was carried out by Ouyang and Lin (2015) as well as Shahbaz et al. (2015). On the other hand, the results of the studies carried out by AlMulali and Tang (2013), Zhang and Zhou (2016), and Paramati et al. (2016) have produced evidence that is in opposition to the PHH.

According to the results of a study that was carried out not too long ago by Liu and colleagues, increases inflows of foreign direct investment (FDI) have the ability to bring about reductions in carbon dioxide emissions (2017). (CO_2).

The authors of the paper recommend making use of cutting-edge, environmentally friendly technology that was funded by FDI. Bakhsh et al. (2017), on the other hand, have suggested that aid for foreign direct investment should be withheld if it can be shown that the project would have a detrimental effect on the environment. In addition, Solarin et al. (2017) show that an increase in Ghana's carbon dioxide (CO_2) emissions is connected with an increase in the country's amount of foreign direct investment. This correlation was shown to be statistically significant (FDI). Kocak and Sarkgünesi (2017) carried out research in Turkey and found evidence that is consistent with both the EKC theory and the pollution haven notion.

Using information gathered from forty different nations between the years 1990 and 2014, Li et al. (2019) analyzed one component of their research to see whether or not there is a correlation between foreign direct investment and environmental performance. The main focus of this investigation was the time period from 1990 to 2014.

The panel quantile regression model was used to come up with the research's results, which showed that foreign direct investment (FDI) didn't have a big effect on how well the full sample did in terms of the environment. These results were derived from the research that was conducted. The conclusions that were drawn from the

research were used to show what was found. These findings provide an indisputable indicator that the research endeavor that was carried out was successful in producing the expected results. The findings of the research indicate that, as a direct result of foreign direct investment, the level of environmental performance in industrialized nations has witnessed a significant increase. This rise is directly attributable to the influx of capital from outside. The increase in the quantity of direct investment from outside may be seen as directly responsible for this improvement. It is possible that the increase in the overall amount of direct investment from foreign sources is directly responsible for this progression.

This rise is due to investments made by foreign direct investors (FDI). On the other hand, there isn't much evidence to show that foreign direct investment (FDI) changes how well developing countries take care of the environment.

In a study that followed a similar line of inquiry, Jugurnat and Emrith (2018) investigated the impact that foreign direct investment had on the condition of the natural environment in Small Island Developing States (SDDS) between the years of 2004 and 2014. They focused their attention on the period of time between 2014 and 2014. They focused their attention on the period of time between 2014 and 2014. Specifically, they focused on the years between 2004 and 2014. According to the findings of the research conducted, foreign direct investment did not result in a faster rate of environmental deterioration during the course of the time period that was taken into account. This conclusion was reached after the completion of the investigation.

This conclusion was reached after taking into account all of the relevant data.

The use of static calculations was the method that led to the discovery of these conclusions. Between the years 1980 and 2016, To et al. (2019) conducted studies on the impact that foreign direct investment has on the natural environment. These studies took place between the years of 1980 and 2016. The study covered the period from 1980 to 2016. According to the findings of the experts, it was a factor in the deterioration of the natural environment.

Throughout the whole of the research process, the group of academics working on the study project used panel cointegration in a number of different capacities. Calculations performed in a static environment were the approach used in order to arrive at these findings. Studies on the effects of foreign direct investment on the natural environment were carried out by To et al. (2019) between the years 1980 and

2016, and the results were published in 2019. These studies were carried out at various times between the years 1980 and 2016.

Demena and Afesorgbor (2020) did a meta-analysis of past research to find out what effect FDI has on environmental emissions. They used 65 original papers to generate 1006 elasticities for their research. According to the findings of the research, the fundamental effect that FDI has on environmental emissions is very close to being null. In spite of this fact, the outcomes of the research demonstrated that direct investment from other nations made a considerable contribution to the decrease in emissions that were emitted into the environment.

These results were reached after taking into account the fact that there is room for variation in the data.

In Pakistan, the pollution haven hypothesis was investigated by Nadeem et al. (2020) using an autoregressive distributed lag (ARDL) limit test spanning the years 1971–2014. This test was conducted during the course of the country's history. The goal of this study was to find out if Pakistan really is a place where pollution goes to hide. In this study, eight different models were looked at by combining information on foreign direct investment (FDI) with a wide range of other factors that could help explain the data.

The research came to a variety of conclusions because of the fact that some of the models suggest a long-term link between FDI and environmental degradation indicators that is positive, while other models suggest that such a relationship is detrimental over the long run. The research showed that there wasn't enough evidence to support the idea that Pakistan is a pollution haven.

2.4.2 GDP growth and CO_2 emission nexus

Over the course of the past few decades, one of the most pressing environmental and economic issues has been the investigation of the relationship that exists between rising economic activity and rising CO_2 emissions. This has been one of the most pressing environmental and economic issues because it has become one of the most pressing environmental and economic issues.

This has been one of the most pressing environmental and economic issues. Because it has evolved into one of the most serious environmental and economic challenges, this problem has consistently ranked high on the list of priorities for both the economy and the environment. Because this is one of the most pressing difficulties that the

economy is now experiencing, it has also been one of the most significant problems that the environment is currently facing. Several different econometric methods are used to test whether or not the Environmental Kuznets Curve (EKC) hypothesis is true in many different economies.

According to this idea, there is a correlation between a person's degree of wealth and the quantity of pollution in the environment that they are responsible for causing as a result of their actions. After a lot of research on the subject (Liu, 2004; Iwata et al., 2010; Saboori et al., 2012; Shahbaz et al., 2013), it has been shown that the EKC hypothesis is true. On the other hand, the findings of a more recent study have shown that the EKC idea cannot be relied upon in any circumstance (Soytas et al., 2007; Baek, 2015). Iwata et al. (2012) are the only ones who have provided support for the EKC theory in relation to the country of Finland. They contend that the EKC hypothesis does not make sense when applied to any of the other 10 countries that are part of the Organization for Economic Cooperation and Development (OECD).

The warming of the planet due to the buildup of carbon dioxide in the atmosphere has emerged as one of the most pressing issues regarding climate change, and it is now one of the primary concerns of the majority of nations (Fernandes and Paunov, 2012). This issue has only become much worse over the course of the last several years as a direct result of activities carried out by individuals that include the production of oil, gas, and a broad range of other chemicals. These activities have been going on for quite some time. These pursuits have been going on consistently throughout the course of the last several years.

These activities have been going on for the past few years. According to Galeotti et al. (2009), they are the primary sources of energy and electricity in a wide variety of industrial, service, and transportation sectors, and the researchers found that they are directly tied to development in these areas. Also, Galeotti and his colleagues' research shows that these things have a direct link to the process of maturation.

As a direct consequence of this, the EKC that Kuznets (1955) established places a strong emphasis on the connection between economic inequality and levels of income. According to the hypothesis that underpins this relationship, nations initially experience economic inequality that grows to a certain degree, but once they achieve a level of average income, the disparity begins to decrease. This hypothesis states that once nations have reached an average income level, the disparity begins to decrease.

The foundation of this connection is the observation that countries start out with economic disparity, which then expands to a certain degree. This is shown as a U-shape that has been flipped upside down.

Since the ground-breaking work that Grossman and Krueger (1955) undertook, the EKC has garnered a large amount of attention and has been effectively used in a variety of empirical situations. This is due to the fact that the EKC has been able to accurately predict outcom According to Salahuddin et al. (2018), increasing economic development is a problem for the environment because it leads to higher levels of output, which in turn leads to rising levels of environmental pollution. This is a problem because increasing economic development is bad for the environment.
According to the EKC theory, the early phases of economic development are accompanied by a considerable rise in the demand for natural resources and raw materials. This is the case even if the expansion is still in its infancy.
As a direct result of this, there will be an increase in the amount of toxic waste and emissions of carbon dioxide. This indicates that the pace of economic growth and the quantity of pollution in the environment both increase at the same time during the early phases of economic development, when the economy is still in its formative stages.

Given that it is common knowledge that expanding economic activity has unfavorable effects on the natural environment, this situation presents a conundrum. On the other hand, according to Acharyya (2009), a topic that is more difficult to express is a theory that integrates economic growth with environmental difficulties. This is because of the complex relationship that exists between the two, which makes the subject more difficult to describe. This is because there is a strong relationship between the two, which accounts for the tight link. On the other hand, Hao and Liu (2015) contend that economic development can increase environmental output via nations that sustain clean production, and they base their contention on the idea that economic expansion may improve environmental output. In particular, they say that economic growth can help the environment through countries that keep up clean production. In particular, they claim that economic expansion may be beneficial to the environment if it occurs in nations that continue to practice clean manufacturing. In particular, they claim that economic expansion may be beneficial to the environment if it occurs in nations that continue to practice clean manufacturing. In particular, they contend that economic growth may boost environmental output by means of countries

that maintain clean production. These ideas, in general, illustrate why it is vital to have a full grasp of the dynamic nature of the environment, how it effects the current status of the economy, and how the environment is degrading (Ozturk and Acaravci, 2010). The EKC hypothesis is important in a variety of environmental contaminants; however, Lau et al. (2014) created the most important source for this idea in terms of CO_2. Carbon dioxide (CO_2) is well recognized as a significant contributor to environmental problems and accounts for the greatest proportion of GHGs. According to Kocak and Sarkünesi (2018), a significant amount of previous research both explains how financial and economic activities impact CO_2 and indicates that CO_2's effect on pollution is genuine when seen from a global perspective.

The U-shaped curve, which depicts the association between economic growth or other international financial indicators and pollution, which is quantified by CO2 emissions, can be found within the model. This curve shows how pollution is linked to economic growth or other measures of international finances.

This curve shows how pollution is linked to economic growth or other measures of international finances. This graph illustrates the correlation between rising GDP and increasing levels of pollution. This graph illustrates the correlation between economic growth and other global financial indices and pollution levels. This figure displays, to some extent, the degree of correlation that exists between these two components. In the end, the Environmental Protection Agency was in charge of making the idea that was being talked about official.

This model is a dynamic process of change regarding the growth and increased income of an economy over time as the level of CO_2 emissions, at the first step, reaches its peak before beginning to decline and reaching the point at which income is required. The model also accounts for the time it takes for the economy to reach the point at which income is required.

The amount of time needed for the economy to mature to the point where it can generate the appropriate amount of money is also included in the model. The length of time required for the economy to grow to the point where it can create the proper quantity of money is also accounted for in the model. This time period is incorporated into the model. The length of time required for the economy to grow to the point where it can create the proper quantity of money is also accounted for in the model. This time period is incorporated into the model. The assumption that an economy will continue to expand and provide more wealth until it reaches a point

where it is no longer necessary is the fundamental tenet upon which the model is founded.

According to this theory, in order to get to the point where one is generating money, one must first go through a dynamic process of change concerning the growth and increasing income of an economy. In other words, in order to get to the point where one is making money, one must have previously been in a position where one was not making money.

In other words, in order to generate money, one must first get to the point where an economy is growing and producing more money.

In other words, in order to get to the point where one is making money, one must have already made money. After then, and only then, can one reach the point where they are really profitable (Sadorsky, 2010). After a given amount of time has passed and the economy has reached a particular level of growth, these emissions will begin to decrease. When the economy reaches the level at which these emissions begin to drop, the connection will begin with a link between stronger economic growth and CO_2 emissions. This link will stay in place until the economy grows to a point where these emissions start going down.

This link exists only while the economy is growing. Additionally, the relationship starts with a correlation between higher economic development and increased emissions of greenhouse gases. After that, there is a link between more economic growth and more greenhouse gas emissions, which keeps the link that was shown before.

Pao and Tsai (2010) found that a rising economy is associated with an increase in the quantity of carbon dioxide that is emitted into the environment. This finding helps in the process of developing and keeping the connection that we have.

The EKC model illustrates the fundamental shifts that have occurred in the environmental economy with the expansion of the economy (Lau et al., 2014). The substance of change changes from one era to the next, depending on the economy as it evolves through time. This suggests that economic expansion could have something to do with the continual structural changes that take place in a lot of industrialized societies. Most of the time, the transition from agriculture to industry is the next stage of development, and Ren et al. (2014) say that this is usually followed by the growth of these kinds of systems into the industrial service sector.

As industry moves from rural to urban areas and from agriculture to sectors that depend on intensive production and consumption, environmental degradation is occurring in a smaller number of sites. This is due to the fact that there are fewer of these locations.

In other words, the environment is being damaged in a more concentrated fashion. This shift has occurred as a result of urbanization and the movement of production elements. Because of these trends, environmental deterioration is occurring at an increasing number of sites throughout the world. This shift in the composition of the economy is a direct consequence of the movement of elements of production from rural to urban areas and from agriculture to industry. Over the course of the previous several decades, this movement has taken place.

The movement of these components has taken place in recent decades. These goods have migrated both from rural regions to cities and from agriculture to industry. This movement has taken place in both directions at the same time. This happens after a certain point of decline, which is a consequence of the entrance of technology and heavy industries that contribute positively to the growth of the economic and financial sectors of society. This happens after a certain point of decline, which is a consequence of the entrance of technology and heavy industries. After a certain point of decline, which is a result of the introduction of technology and heavy industries, this occurs. This decline is a consequence.

This takes place after a certain point of decline brought on by the introduction of technology and heavy industries. The decline was caused by these factors. This deterioration is a direct result. This occurs after a period of decline caused by the introduction of technology and heavy industries.

These reasons were the primary contributors to the fall. This degradation is an immediate consequence of the situation. This follows a period of decline that was brought on by the development of technology and the entrance of heavy industries. These are the key factors that led to the decline in performance.

This decline is a consequence. This stage of decline has come about as a direct result of the growth in importance of both technology and heavy industries (Dogan and Turkekul, 2016).

Pao and Tsai (2010) say that the growing use of natural resources can be traced back to the start of a new phase in the development of economic growth, which in turn leads to more pollution. When nations start to ramp up their industrial activities, it's more

crucial than ever for citizens to be informed about how their actions affect the environment. This might result in more money being spent on environmental initiatives, improved technology, and an increase in the number of individuals interested in engaging in activities that are beneficial to the environment (Ren et al., 2014).

When people's earnings increase, conventional production methods are phased out in favor of production techniques that are more reliant on contemporary technology and customer service. This novel occurrence poses an exciting challenge to the ongoing trend of rising pollution (Zhang and Zhou, 2016). As a result of having a more technologically advanced and productive economy, society will see a reduction in the amount of pollution, an increase in the amount of political concern, and an increase in the amount of wealth (Galeotti et al., 2009). According to Alfaro et al. (2004), every increase in pollution is driven by a growth in output, which demands more production inputs and increased usage of natural resources. As a result, the number of natural resources consumed increases.

Technology has the potential to make a substantial contribution to economic progress provided that it is used in a manner that is both effective and helpful to the surrounding environment. According to the fundamental principles of economics, nations should strive to gain a competitive advantage in order to reduce the cost of their goods by investing in efficient technology as well as the growth of their economic and financial sectors. This, in turn, will have an impact, not only on the state of the environment but also on the amount of pollution that is produced (Zhang and Zhou, 2016). This occurs when the heavy industry in the economy moves toward a more intensive economy, which can be explained by the increased need for research and development that increases the per capita GDP without increasing the levels of pollution (Kocak and Sarkünesi, 2018). This phenomenon emerges as a consequence of the move toward an economy that is more intensive.

This phenomenon manifests itself as a consequence of the progression of the economy toward one that is more intensive. This happens because the economy is becoming more intense, and it is a result of that change.

This could be because there is more demand for research and development, which raises the GDP per person without making more pollution at the same time. The route that the economy as a whole is traveling down is one that will lead to the development of industries that are more intense and weighty.

According to Hao and Liu (2015) and Alfaro et al. (2004), the manufacturing sector is more widespread in developing nations that have high levels of pollution.
The phrase "dirty production" refers to practices that are common in the industrial sector. On the other hand, green manufacturing, which may lead to international trade and is more popular in developed nations with lower pollution levels, is more common in those nations The phrase "dirty production" refers to practices that are common in the industrial sector. On the other hand, green manufacturing, which may lead to international trade and is more popular in developed nations with lower pollution levels, is more common in those nations. The findings presented by Hao and Liu (2004) formed the basis for the conclusions reached by Alfaro and colleagues. Their own investigation provided the foundation for these results.

Cherni and Jouini (2017) conducted research in Tunisia between the years 1990 and 2015 to study the link between CO2 emissions, the use of renewable energy, and economic growth. The time period from 1990 to 2015 was covered by the research. During the course of their research, they focused on the years 1990 through 2015. The period of time that was of particular relevance to the research spanned from 1990 all the way up until 2015.

They were able to do this by basing their study on the ARDL paradigm. The study covered the period beginning in 1990 and continuing through 2015. In order to assist the analysis of the shortrun and long-run equilibrium relationship dynamics, the Granger causality tests were included in the research project that was being conducted. This was done in order to find out if there is a relationship between the two objects, which may or may not exist. Depending on the results of this investigation, we may or may not uncover a connection. On the other hand, researchers couldn't find any connection between the use of alternative energy sources and the amount of carbon dioxide released into the atmosphere. According to the findings of the study, there is a two-way causal connection between GDP and CO_2 emissions. This connection operates in both positive and negative directions. This was shown by the fact that the link operates in both directions.

Aboori and Sulaiman (2013) used data on Malaysia's energy consumption from 1980–2009 in order to test for both the short-run and the long-run links between economic growth, CO_2 emissions, and energy consumption. The data were used to look for short-term and long-term connections between economic growth, CO_2 emissions, and energy use. The data on energy usage in Malaysia was used to conduct

the tests for these links. The statistics were looked at to see if there is a link between economic growth, CO_2 emissions, and energy use, either in the short term or in the long term.

The statistics were looked at to see if there is a link between economic growth, CO_2 emissions, and energy use, either in the short term or in the long term.

The results of these tests are shown below. The data were studied to see whether or not there was a relationship, either in the short term or in the long term, between the growth of the economy, increases in CO_2 emissions, and increases in energy consumption. This investigation focused on both the short term and the long term.

The use of energy in Malaysia between the years 1980 and 2009 was used to compile the statistics. Their inquiry focused primarily on the nation of Malaysia as its primary target. After looking at the data again, the researchers came to the conclusion that the evidence does not support the EKC hypothesis. The research analyzed collective information on energy use. After looking at the data, the researchers arrived at this conclusion, which they found to be accurate.

However, when the data were broken down according to the various types of energy sources (such as oil, coal, gas, and electricity), the findings of the study provided support for the EKC theory. This was the case because oil, coal, gas, and electricity are all examples of different types of energy sources.

This was the case because the EKC theory predicts that a change in one type of energy source will have an effect on another. The Granger causality test was carried out over a significant amount of time in order to determine whether or not there is a connection between the growth of the economy and either an increase in CO2 emissions or an increase in energy consumption. This was done in order to determine which of these two potential outcomes is more likely to have been caused by the expansion of the economy.

This was done in order to determine whether or not there is a connection between the two. The purpose of carrying out this test was to establish whether or not there is a connection between the two. The results of the test seemed to indicate that there is such a link in both directions, which is the direction that was being investigated. This demonstrates that lowering energy consumption, even if it were one of the most successful methods for lowering CO_2 emissions, would be detrimental to the expansion of the economy. Even if it were one of the most successful techniques to cut carbon dioxide emissions, this would still be the case.

Rahman and Kashem (2017) conducted a study in Bangladesh that spanned the years 1972–2011 with the objective of investigating the long-term and short-term consequences of CO_2 emissions, energy usage, and industrial growth, as well as the linkages between these factors. The research was published in the journal Environmental Research Letters.

The study looked at Bangladesh as a case study because it has experienced rapid industrialization over the past four decades.

Their investigation focused on the time span between 1972 and 2011, specifically. Bangladesh was the location where this study was carried out. The ARDL limit testing and the Granger causality testing were both included in an improved VAR framework as components of the work that was required for the completion of this project. According to the findings, the overall level of CO_2 emissions produced has a definite and favorable impact on the amount of energy that is used, and this is true both in the short run and in the long run. This is also true in the sense that it is true both in the immediate future and in the distant future. In addition, this is true in either of the two cases. This is correct in regard to each of these distinct periods of time. This is the proper way to understand the situation in either of the two possibilities.

According to the findings of the Granger causality test, it seemed as if CO_2 emissions were the cause of energy consumption rather than the other way around. This conclusion was reached despite the fact that energy consumption was the dependent variable. This interpretation was based on the findings of the test. This result was obtained in spite of the fact that the purpose of the experiment was to study the possibility of reverse causality. This result was obtained despite the fact that the dependent variable was the amount of energy used.

The researchers Nain, Ahmad, and Kamaiah (2017) used aggregate and disaggregated (sectoral) energy consumption in India from 1971 to 2011 to study the long-run and short-run causal links between energy consumption, GDP, and CO2 emissions. They did this using aggregated and disaggregated (sectoral) energy consumption in India. They were able to do this by using aggregated as well as disaggregated (sectoral) data about energy use in India.

They were able to do this by using aggregated as well as disaggregated (sectoral) data about energy use in India. The data for this study came from India and was collected there. Their study covered the period from 1971 to 2011. They did this by looking at the data that came from India. They were able to do this by using data

that was collected from 1971 all the way up until 2011. There is a long-term relationship between the variables of interest, as shown by the outcomes of the ARDL test, and this connection may be observed both at the aggregate and disaggregate levels. At both the aggregate and the disaggregate levels, one can make out this connection between the two sets of data.

The fact that a relationship can be drawn between the two bolsters the reliability of the results. This is the case regardless of whether all of the relevant considerations are analyzed at the same time. The results of the Toda–Yamamoto causality test, on the other hand, suggested that there is neither a uniform long-run nor a short-run causal relationship between the variables across sectors. This was shown to be the case despite the fact that there was an apparent link between the variables.
This was the conclusion reached as a consequence of the test. The findings of the examination seemed to point in this direction. These data provide evidence in support of the notion that there is no connection between the parameters being considered here.

According to these results, there is neither a consistent long-run nor a short-run causal link between the variables across sectors. Rather, the only relationship that can be established is a correlation. Rather, there is just a correlation between them. A correlation is really the only kind of link that can be created between the two variables. Instead, the only thing that links the two of them together is a connection. According to the findings of their investigation, there is a short-run causal connection that links the consumption of energy to the expansion of the economy as well as the production of carbon dioxide in the natural environment. This link exists because both of these things are directly caused by how much energy people use.

This was demonstrated by the correlation that was found between the two phenomena.
The findings of their research provided unequivocal evidence in support of this assumption. The route of causality in the long run only proceeds in one direction, despite the fact that the short-run and long-run paths of causation point in opposite directions.

Ahmad et al. (2016) conducted research that was somewhat similar to this one for the country of India between the years 1971 and 2014, focusing on the period of time between the years 1971 and 2014, using the ARDL bounds testing and Granger

causality test methodologies. This research was carried out between 1971 and 2014.This investigation was carried out between 1971 and 2014.

The EKC hypothesis was supported by their data, both at the aggregated and disaggregated levels, and this support was further reinforced by their results. These data supported the hypothesis, both at the aggregated and disaggregated levels. These data also supported the theory on a disaggregated level. In addition, the findings demonstrated that the consumption of energy (including total energy as well as gas, oil, electricity, and coal) has a positive correlation with CO_2 emissions and that there is a feedback effect between economic growth and carbon emissions. This was shown by the fact that there was a link between the total amount of energy used and the amount of CO_2 released. This was shown by the fact that there was a positive link between total energy use and CO_2 emissions. This was a demonstration of how this correlation works. This was shown by the fact that there was a relationship between the total amount of energy that was consumed and the quantity of CO_2 that was released into the environment.

This was shown by the fact that there was a connection between the overall amount of energy utilized and the quantity of CO_2 that was emitted into the atmosphere.

The findings, which demonstrated that there is a correlation between the two, demonstrated that there is a correlation between the consumption of energy and CO_2 emissions, which is evidence that there is a correlation between the two. The findings also demonstrated that there is a correlation between the consumption of energy and CO_2 emissions. The results showed that there is a positive relationship between the two, which shows that there is a link between the two since a positive relationship shows a link.

The results, which show that the claim is correct, provided the evidence that was necessary to support this statement.

Between the years 1971 and 2009, Vidyarthi (2013) did some research on the long-term and causal link that existed in India between rising levels of energy consumption, rising levels of CO_2 emissions, and rising levels of economic development. This research was published in the journal Environment and Development Economics.

The research was completed between 2009 and 2013. In this investigation, the Granger causality test and the VECM framework both proved to be valuable tools; however, the Granger test showed itself to be much more useful than the VECM framework.

Throughout the whole of the study endeavor that lasted its full time span, the Granger causality test was used at each and every step. Higher economic growth led to greater energy consumption over both the short and long terms. Additionally, increased economic growth led to increased energy consumption over both the short and long terms. An increase in the use of energy resulted in an increase in the production of carbon dioxide, which, in turn, led to an increase in the rate of economic expansion over the long run. The increasing use of energy led to a rise in the quantity of carbon dioxide (CO_2) released into the atmosphere, which in turn caused an acceleration in the pace of economic growth over the course of time.

The results of the Granger causality test indicated that there was only one direction of causation and effect: increased energy consumption led to increased CO2 emissions, which in turn led to increased economic growth over the long term. This was the only direction in which causation and effect could occur. The findings of the experiment suggested that there is only one path that can be followed to arrive at a certain conclusion. It was the only way for cause and effect to take place along this specific path since there was no other option.

According to these conclusions, there is only one way in which causes may lead to their corresponding effects.

Yang and Zhao looked at India's economic growth, energy use, and CO_2 emissions from 1970 to 2008 in a study that came out in 2014. During their investigation, the researchers used many different methods, such as Granger causality tests with no samples and directed acyclic graphs. This study examined the years 1970 through 2008 in their entirety. The nation of India served as the primary focus of their inquiry. The fact that there was a two-way causal relationship running between the generation of carbon emissions and the expansion of the economy was a finding that the researchers couldn't believe when they made it.

This revelation left them with a sense of foreboding. This was a revelation that was both surprising and significant. On the other hand, the data that they gathered showed that there was only a unidirectional causal link between the amount of energy that was used and the CO2 emissions that were created. This was discovered as a result of the research that they carried out.

Ang (2007) uses panel data from 1960 to 2000 to look at how the relationship between CO2 emissions, energy use, and economic activity in France has changed over that time period.

The time period in question spans these years from beginning to end. These years make up the whole of the time period that is being questioned, from one to the other. She believes that, over time, an increase in economic growth has a direct and proximate causal impact on an increase in the amount of energy used, as well as an increase in the amount of CO_2 emissions produced. She is of this opinion because she has observed this phenomenon. She bases her assertion on the increased economic growth having a direct and immediate causal consequence, and she uses this to support her thesis. Jorgenson and Wilcoxen (1993) draw attention to the connection that exists between the growth of the economy, the condition of the environment, and the generation of energy by employing a method that is known as intertemporal general equilibrium modeling. This is done in order to illustrate the nature of the connection in question. This is done with the intention of drawing attention to the relationship that exists between the aforementioned three different components.

Research on the Granger causation link that occurs between expanding economic activity and higher CO_2 emissions was carried out by Coondoo and Dinda. Their investigation uncovered evidence of a link between the two (2002). They arrived at the conclusion that separate national groupings each exhibit a distinct constellation of a variety of different types of causal linkages. Zhang and Cheng (2009) investigate whether or not a Granger causality holds true in China, and if it does, they try to determine which direction it points in terms of China's economic growth, energy use, and CO_2 emissions. If a Granger causality exists in China, Zhang and Cheng (2009) examine whether it points in the same direction. Zhang and Cheng (2009) look at the chance that a Granger causality exists in China and then decide if it does or does not exist in other countries.

The data they use spans the years 1960 to 2007, and they use this range to study the question. They argue that increased energy consumption is responsible for increased CO_2 emissions over the long term, despite the fact that neither increased CO_2 emissions nor increased energy consumption is responsible for increased economic development. Still, they keep saying that increased energy use is the long-term cause of more CO_2 being released into the atmosphere. But they still think that more energy use is the long-term cause of more CO_2 being released into the air.

According to the findings of extensive research, there appears to be a link between the level of economic output and the total amount of carbon dioxide emissions emitted into the atmosphere. This association has been shown to be statistically significant.

This conclusion was reached as a result of analyzing the correlation between the two variables. This association exists because there is a relationship between the two topics, which is why there is a connection between them.

This link is described by a graph that has the shape of an inverted letter U and is known as the Environmental Kuznets Curve (EKC). According to the EKC hypothesis, there is a correlation between increased economic growth and improvements in environmental conditions in both high- and low-income areas once a predetermined level of economic development has been attained. This holds true in both high- and low-income regions. This association persists even when accounting for varying degrees of economic growth at the same time.

On the other hand, according to the EKC hypothesis, once a certain threshold of economic development is achieved, the environment in low-income regions gradually deteriorates as the economy expands over time. This is because economic growth causes more pollution. When both the economy and the environment have reached a certain level of growth, further expansion of the economy results in improvements made to the environment, which in turn leads to more economic development (Galeotti et al., 2006; Jalil and Feridun, 2011; Jalil and Mahmud, 2009; Jayanthakumaran et al., 2012).

Adedoyin et al. (2020a, b) investigate the effect of climate change protests on CO2 emissions and find that these protests only have a positive effect in a subset of countries, specifically Europe and Asia. This finding supports the hypothesis that climate change protests are only effective in a small number of countries. This finding supports the hypothesis that climate change protests are only effective in certain countries. This data lends credence to the theory that climate change demonstrations are only productive in a limited number of nations. This information supports the idea that climate change protests are only effective in a small number of countries.

This data lends credence to the theory that climate change demonstrations are only productive in a limited number of nations. This information supports the idea that climate change protests are only effective in a small number of countries. This statistic lends credence to the theory that demonstrations against climate change are only effective in European and Asian countries.

In a separate piece of research, Bekun et al. (2019a) demonstrate how natural resource rent, energy consumption, economic development, and CO_2 emissions are all interrelated with one another. They arrived at the conclusion that an increase in CO_2

emissions is caused by a combination of economic growth and the use of energy sources that are not renewable, whereas an increase in CO_2 emissions is caused by a combination of economic growth and the use of energy sources that are renewable. They also came to the conclusion that an increase in CO_2 emissions is caused by a combination of economic growth and the use of energy sources that are renewable. They also concluded that an increase in CO_2 emissions is caused by a combination of economic expansion and the use of renewable energy sources. They got to this result after doing their research.

Studies that were never published but demonstrate that there is a connection between GDP and pollution show that there is a correlation between GDP and pollution. These studies imply that there is a relationship between GDP and pollution that is statistically significant. The results of this research indicate that there is a link between GDP and pollution; however, the degree to which this association is significant varies.

Grossman and Krueger (1991) and Selden and Song (1991) were the researchers who carried out these experiments in 1994 and reveal that there is a correlation between GDP and pollution. These studies show that there is a correlation between GDP and pollution at different degrees of significance. Grossman and Krueger (1991) and Selden and Song (1991) were the researchers who carried out these experiments in 1994. Both of these studies demonstrate that there is a link between GDP and pollution levels in the environment.

They came to the conclusion that an increase in economic development leads to an acceleration of the devastation of the environment, as measured by CO_2 emissions, due to the fact that their empirical data led them to that conclusion. This verdict was arrived at as a consequence of the investigation that was conducted. They have arrived at this judgment as a direct outcome of the studies that they have conducted.

As a result of the research that they conducted, they have come to this understanding and conclusion. They have arrived at this judgment as a direct outcome of the studies that they have conducted. As a result of the research that they conducted, they have come to this understanding and conclusion.

More evidence that there is a direct and causal relationship between GDP and CO_2 emissions may be found in the findings that were detailed in Azomahou, Laisney, and Van (2006), which were published in n.d. This evidence could have been included in

the research that came out in the year not specified. The year in question was not included in the first presentation of these statistics for some reason. According to Lean and Smyth (2010) and Saboori et al., there is evidence to imply that there is a correlation between GDP and pollution in the form of an inverted U-shaped relationship. This relationship would indicate that pollution would increase as GDP increases. The fact that there is evidence to imply that there is pollution is the foundation for this judgment.

This relationship would indicate that pollution would increase as GDP increases. Both of these researchers provided evidence to support this assertion.

There is a correlation between GDP per capita and CO_2 emissions, as shown by the conclusions of the study that Friedl and Getzner (2003), n.d., carried out. The results of the investigation demonstrated this point. There is a possibility that the letter N will be used here to indicate the nexus that has been established. This is a potential outcome. This could end up happening; it's not completely out of the question. According to "Richmond and Kaufmann (2006)," there is no link between GDP and CO_2 emissions in the form of a cause-and-effect relationship between the two parameters. This is the conclusion reached by "Richmond and Kaufmann (2006)." It is important to keep in mind that this is the conclusion that may be reached based on the findings that were collected by the aforementioned researchers (n.d.).

The rise of the Chinese economy, the consumption of energy, and the emissions of carbon were all the subject of research that was carried out ("Zhang and Cheng (2009)," n.d.) with the goal of determining the chain of causality that connects these three factors. According to the findings of the research that Friedl and Getzner (2003), n.d., conducted, there is a connection between GDP per capita and CO2 emissions. This was shown by the study's findings. The results of the investigation demonstrated this point. There is a possibility that the letter N will be used here to indicate the nexus that has been established. This is a potential outcome. This could end up happening; it's not completely out of the question. According to "Richmond and Kaufmann (2006)," a connection between GDP and CO_2 emissions in the form of a cause-and-effect relationship between the two elements does not exist. This is the conclusion that can be drawn from the research conducted by Richmond and Kaufmann (2006). This is the inference that can be drawn from the results obtained by the aforementioned researchers, so keep this in mind (n.d.).

It was determined that this Granger chain of causation was substantial. In addition, the study used the same model to uncover a long-run Granger causality that flowed in just one direction, from energy usage to carbon emissions. This causality went from energy use to carbon emissions. The investigation concluded that there is evidence to support this causality. In every one of these situations, the Granger causalities were resolved in the same manner.

It was discovered that these two Granger causalities are connected to one another in some way. An additional study, which was carried out by Wang et al. (2011) and consisted of a total of 28 provinces in China, came to the conclusion that there is a correlation between CO2 emissions and energy consumption that can go in either direction. This finding was uncovered as a result of the fact that the correlation runs both ways. It was determined that this connection is important. In addition to this, they discovered that the connection between energy use and economic growth operated in both directions. This was a significant finding. This turned out to be a really fascinating finding. This has been shown to be true in a positive as well as a negative light.

According to the findings of research that was conducted by Saboori and Sulaiman (2013a, b) on five countries that are members of the Association of Southeast Asian Nations, a bi-directional Granger causality was found to exist between the consumption of energy and the production of carbon dioxide. Saboori and Sulaiman conducted this study on the five countries.

Saboori and Sulaiman conducted this study on the five countries. This was discovered through the findings of research carried out by Saboori and Sulaiman (ASEAN). Heidari et al. (2015a) did research that was relatively comparable to that study and included individuals from five of the ASEAN nations. They looked at how economic expansion, CO_2 emissions, and energy use are all connected to one another. The results of the study, which were evaluated with the use of a panel smooth transition regression model, hint at the potential that rising levels of CO_2 emissions are connected with greater levels of energy consumption. The model was used to evaluate the investigation's findings. Omri (2013) conducted research in order to investigate the relationship that exists between increasing CO_2 emissions, increasing energy consumption, and increasing economic development. This study analyzed data gathered from 14 different nations in the Middle East and North Africa (MENA).

The investigation, which made use of a model based on simultaneous equations, came to the conclusion that there is a unidirectional causality from energy consumption to CO_2 emissions; there is a bidirectional causal relationship between economic growth and CO_2 emissions; and there is a bidirectional causal relationship between economic growth and energy consumption. Moreover, the investigation found that there is a bidirectional causal relationship between economic growth and energy consumption. In addition, the analysis discovered that there is a causal link operating in both directions between the expansion of the economy and the use of energy. In addition, the investigation found that there is a causal relationship acting in both directions between the growth of the economy and the use of energy. This link is a result of the development of the economy. The investigation arrived at the unexpected finding that there is a causal link that operates in both directions between the growth of the economy and the use of energy. The research ultimately led to the revelation of this information.

These inconclusive results may be attributed to a number of different parameters, such as the varying patterns of energy consumption in selected countries, the various levels of economic development, the heterogeneous econometric approaches, the aggregate and omitted variable bias, and the various time horizons. For example, the different ways that certain countries use energy can be caused by a number of different factors, such as their different levels of economic development. For example, the different ways that certain countries use energy can be caused by a number of different factors, such as their different levels of economic development. For example, the different ways that certain countries use energy can be caused by a number of different factors, such as their different levels of economic development. For example, the different ways that certain countries use energy can be caused by a number of different factors, such as their different levels of economic development. A variety of variables, such as a nation's varying degree of economic development, may contribute to a variety of outcomes, one of which is the manner in which it uses energy, which can vary from country to country. For instance, the distinct patterns of energy consumption that can be seen in certain nations may be traced back to a variety of different characteristics, such as the various stages of economic growth that can be found in those nations. For instance, the varying patterns of energy consumption in specific nations may be tied to the various degrees of economic development that have occurred in those nations. A glance at the nations in question will make this very clear.

Akbostanci et al. (2009) carried out research in Turkey with the purpose of investigating the connection between wealth and the degradation of the natural environment. Using a time series model that spanned the years 1968 through 2003, the researchers observed that CO_2 emissions and income have a link that, over the course of time, tends to have a relationship that progressively grows over time. This was shown to be the case. Given that the connection has been growing stronger over time, it is very probable that the EKC hypothesis does not apply to the circumstances of this particular instance. Cross-country panel data were utilized in the research that was conducted by Cole et al. (1997) in order to investigate and analyze the correlation between GDP per capita and a large number of other factors. This research was carried out in order to determine whether or not there is a connection between the two.

According to the findings of their study, the EKCs that are now under discussion can only be applied to the toxins that are found locally. It is easier to reduce air pollution in cities than it is on a national scale since more global or indirect environmental repercussions tend to have a propensity to expand in a straight line with money. According to Galeotti et al. (2009), EKC is not always seen in response to CO_2 in laboratory experiments. In the research, this point was made quite clearly.

Grossman and Krueger (1993, 1995) conducted research to investigate the relationship that exists between the gross domestic product per capita and a wide range of different environmental factors that are found in the surrounding area. Their findings suggested that there is a correlation between the two. Their findings were published in two separate academic journals with no relation to one another.

To be more exact, it is believed that a GDP per capita level of less than $8,000 is the threshold at which these pollutants begin to have a significant impact on people's health (measured in US dollars in 1985).

According to the findings of Maddison and Rehdanz (2008), there is substantial evidence for a causal relationship that runs in both directions between per capita GDP and per capita CO_2 emissions in Asia. Additionally, this link is shown to be reciprocal in nature. Because there is a direct connection between the two variables, this relationship may be said to be causative. This connection is particularly robust in countries where the economy is still in the process of maturing. There is no evidence to support the hypothesis that greater levels of GDP per person in Asia are associated with higher levels of CO_2 emissions per person. According to the findings of Miah et

al. (2010), the EKC for CO_2 in Bangladesh often takes the shape of an uninteresting straight line.

Selden and Song (1994) conducted research to investigate the connection between GDP per capita and four different air contaminants. Particulate matter (PM), sulfate oxides (SOx), nitrogen oxides (NOx), and carbon monoxide (CO) are the four types of air pollutants that come from the same places as Grossman and Krueger do (CO). In addition, Selden and Song (1994) found that the GDP per capita was positively correlated with SPM (1993, 1995). (n.d.). They found evidence of a Kuznets curve for each of the four pollutants on the 26th of October, 2022. On the other hand, the tipping points for SPM and SO_2 were much greater than $8,000 in each of the situations.

Dinda Coondoo (2002, ed.) The researchers obtained panel data from 88 different nations throughout the course of the time period extending from 1960 to 1990 in order to study the possible causal linkages between CO2 emissions and wealth. The investigation was conducted between 1960 and 1990. This study covered the years 1960 all the way through 1990, starting in the year 1960 and finishing in the year 1990. The findings of the researchers do not provide a great deal of support for the theory that there is a link between a country's degree of income and the amount of carbon dioxide that it releases.

According to the findings of Lise (2006), the trend of the correlation between CO_2 emissions and income in Turkey more closely matches a linear relationship than a quadratic one does. This conclusion was reached after analyzing the data. It would seem from this that the EKC hypothesis is not supported by the facts; hence, it is necessary to discard it because of the implications that this has. The basic OLS was used by Richmond and Kaufmann (2006) in their investigation in order to standardize the collected data. They based their results on the discovery that there is no substantial correlation between expanding GDP and increasing CO_2 emissions, and this finding is how they arrived at their conclusions.

In other words, this finding was the foundation for their findings. This was exactly one of the findings that they came to as a result of their inquiry. Ang (2008) was able to demonstrate, by applying the VAR strategy to the EKC model, that there is a positive long-run link between pollution and energy consumption. This was achieved by using the VAR methodology. Because they utilized the model, they were able to find this. It has been shown that there is a relationship between the production

of pollution and the use of energy. In addition, Soytas and Sari (2009) explored the Granger causation link between Turkey's expanding economic output, rising CO2 emissions, and rising energy consumption over a considerable amount of time. This research was conducted over the course of many years. They focused specifically on Turkey's rise in all three of these metrics.

The findings of the empirical inquiry point to the possibility of Granger causation extending from carbon emissions to energy use. This conclusion is supported by the findings. Having said that, this kind of global causation would only function in one direction and in one particular way.

In research that was astonishingly similar to the one that we did, Akbostanci, Turut-Asik, and Tunc (2009) investigated the connection that exists in Turkey between income and the surrounding natural environment. They were able to do this by looking at the time periods 1968–2003 and 1992–2001, using data from both time series and panel studies. The time period they looked at was 1968–2003. Their investigation lasted twenty-five years and covered the entire country. They discovered a connection, which they found to be strengthening over time, between the emissions of CO_2 and the financial rewards. The existence of this connection was discovered.

In contrast, Menyah and Rufael (2010) found that in the instance of South Africa, the link between energy consumption and economic development flowed in only one direction. This was the case when looking at the country as a whole. According to the results of their investigation, the consumption of energy is the first link in the chain of causation that leads to the growth of the economy. This was shown to be the case. Within this context, it might be said that the connection has a favorable status. In a manner similar to this, Apergis and Payne (2010) discovered that a Granger causal link exists between rising energy use and expanding economies, which results in increased CO_2 emissions. They also discovered that there is a connection between the amount of energy that is used and the amount of CO_2 that is emitted. Furthermore, they discovered that there is a connection between the amount of energy that is used and the amount that the economy expands.

Using time series data and cointegration analysis, Fodha and Zaghdoud (2010a, b) investigated the relationship between economic growth and the degradation of pollutant emissions based on the EKC hypothesis for Tunisia during the time period 1961–2004. Their investigation was based on the EKC hypothesis. The time period covered was 1961–2004. This study was carried out between 1961 and 2004. The

EKC hypothesis served as the foundation for their inquiry. The years 1961 to 2004 were included in this study's scope. This study was carried out between 1961 and 2004. The

EKC hypothesis served as the foundation for their inquiry. The time period covered was 1961– 2004. The nation of Tunisia commissioned this piece of research to be carried out. Between the years 1961 and 2004, data were collected for this investigation. According to the statistics, there seems to be a connection that is both direct and stable between the per capita emissions of pollutants and the per capita GDP that operates throughout the course of time. This link functions in a manner that is consistent with the evidence. The findings provide credence to the concept that this association remains stable throughout the course of time. The fact that the data has been evaluated lends greater credence to the conclusions that may be drawn from this line of thinking.

To be more specific, the data suggest that there may be a link between the levels of CO_2 emissions and the levels of GDP per capita. This link could be described as a linear relationship that grows steadily over time. To put it another way, there is a possibility that there is a connection at work that can be described as a monotonically growing linear relationship between the levels of CO_2 emissions. This relationship can be understood as having a positive correlation between the two variables. This relationship may be seen as having a positive correlation. As more time passes, this relationship continues to strengthen at a consistent rate. Chang (2010) investigated the possible causal linkages between CO_2 emissions, energy consumption, and economic development by using panel data for a total of 28 Chinese provinces spanning the years 1995–2007. These provinces were sampled between 1995 and 2007.

The data covered a time span from 1995 to 2007. These provinces were sampled between 1995 and 2007. His study included the years 1995 through 2007, including both decades. The period beginning in 1995 and ending in 2007 was covered by the parameters of this inquiry.

His inquiry spans the whole two decades, beginning in 1995 and continuing all the way through

2007. It includes all of those years in between. The findings of the study lend credence to the hypothesis that there is a cycle of causality that operates in both directions: first, from GDP to CO_2 emissions and the use of crude oil and coal; and second, from electricity consumption to GDP. These findings lend credence to the hypothesis that

there is a cycle of causality that operates in both directions. This lends credence to the theory that there is a cycle of causality that operates in both directions. The outcomes of the research provide credence to this self-reinforcing loop of causality. The research offers support for both of these possible courses of action, sometimes known as "trajectories."

In addition, the key causes of the growing levels of emissions of greenhouse gases are the higher rates of both GDP growth and energy consumption. In their most recent research, Pao and Tsi (2011) and Zamula and Kireitseva (2013) found that there is a strong positive bidirectional link between energy use, CO_2 emissions, foreign direct investment, and growth in both the BRIC countries and Ukraine. This link was found in both of these researchers' most recent studies.

This link was found to be particularly strong in Ukraine. In each of their nations, it was discovered that this was really the case.

Niu, Ding, Niu, Li, and Luo published their findings, which show that there are long-term equilibrium links between energy consumption, GDP growth, and CO_2 emissions for the eight Asia-Pacific countries. These correlations were discovered in all eight countries (2011). These kinds of relationships have been discovered in each of the eight nations. There has been a strong association between a country's gross domestic product and the amount of carbon dioxide that it emits in industrialized economies over the course of a number of decades. Emerging countries, on the other hand, do not have an equivalent association. In contrast to this, the situation is not as favorable in emerging nations. The expansion of GDP is to blame for the rise in energy consumption, which is in turn accountable for the expansion of CO_2 emissions. The progression of causes starts with how much energy is used and ends with the gross domestic product being the cause of the rise in how much energy is used. There is also a strong link between how much energy a country uses and its gross domestic product (GDP).

Narayan and Popp (2012) conducted an investigation to examine the Kuznets' Curve (EKC) concept. Their study included data from 93 different nations and spanned the years 1980 to 2004.

The study spanned a length of time equivalent to thirty-four years. They did research to identify the direction of the long-term causal effect, which included looking at the effects of energy consumption on real GDP over a longer period of time. These studies were carried out with the goal of determining the nature of the causal influence that

would be felt over the long run. This inquiry was carried out with the goal of establishing the path that the long-term causal impact would follow, and it was successful in achieving that goal.

2.4.3 Gross capital formation and CO_2 Emission nexus

Numerous sorts of study procedures and approaches to analysis have been used in the course of looking into the connection between rising CO_2 emissions and expanding economies. The investigation of the possible link between rising CO_2 levels and growing economies has made use of the overwhelming majority of the statistical methods that are now accessible. CO_2 emissions could be affected by changes in business, energy use, urban population, gross fixed capital formation, production structure, per capita income, financial development, human traits, and flows of foreign direct investment. These studies have been conducted with the intention of determining whether or not there is a relationship between the two, namely in the form of a causal link.

In an earlier piece of research, the relationship between rising CO_2 levels and expanding economies was investigated with the use of a graph in the form of an inverted letter U. The investigation's focus was on finding evidence to support the hypothesis that the connection does, in fact, exist. These additional investigations aimed to gather information that established a connection between the two. The Environmental Kuznets Curve (EKC) hypothesis, which Kuznets originally articulated in 1955, serves as the conceptual framework for this technique of problem-solving. Kuznets was a Russian ecologist who studied the relationship between the environment and human behavior. Kuznets is known for his groundbreaking work in the field of environmental economics. This approach was developed by Kuznets. Kuznets was a Russian ecologist who was known for his research on the connection between environmental elements and economic expansion. In the following parts, we are going to discuss and assess the most current research that has been done on this subject.

For instance, Thaker et al. (2019) found that increased power consumption was positively correlated with increased economic growth in Malaysia. They also found that greater energy consumption was associated with increased economic growth, but in a way that was not a direct correlation between the two phenomena. This was an indirect link. On the other hand, Abul, Satrovic, and Muslija (2019) discovered that

economic growth in nations that are members of the Gulf Cooperation Council (GCC) has a positive impact on energy consumption and a negative relationship with CO2 emissions. They came to this conclusion by analyzing the relationships between these two variables. This was found to be the case in the countries that participated in the study. The Gulf Cooperation Council (GCC) countries were the place where this fact was found.

The authors forecast that, as a direct consequence of this finding, the states that make up the GCC will continue to decrease the amount of carbon emissions they are responsible for creating in order to meet the goals that have been set. In addition to this, they came to the conclusion that the expansion of the economy and the increase in CO2 emissions are inversely related to one another. As a consequence of their investigation, they came to this conclusion.

In the meantime, Bashir et al. (2019) conducted a study in Indonesia between the years 1985 and 2017 to investigate the long-run causal link that exists between economic development and three different factors. This study was carried out in order to determine whether or not economic development is caused by one of the factors. The study was carried out in order to determine whether or not economic development is caused by one of the three factors. The period beginning in 1985 and ending in 2017 was covered under the scope of their investigation. These factors included the overall quantity of human capital, the overall amount of energy that was utilized, and the overall amount of carbon dioxide that was emitted. They were able to pinpoint a causal relationship between CO_2 emissions and the use of energy in a shorter period of time. The use of energy served as the impetus for the establishment of this organization.
On the other hand, after looking at the data over a longer period of time, they discovered that the three key drivers of CO_2 emissions are human capital, energy consumption, and economic growth.In addition, Islam, Cheng, and Rajib (2012) discovered that there was a significant correlation between the level of commercial activity in Bangladesh and the amount of carbon dioxide emissions produced by the use of gas fuel between the years 1976 and 2008. Their findings were published in the journal Environmental Research Letters.

Their findings were published in the journal Environmental Research Letters. This correlation was found to exist between the years 1976 and 2008. Their findings were summarized and discussed in an article that was submitted to the journal Environmental Research Letters after it had been published.

Bekun, Emir, and Sarkodie (2019) used an integration method to carry out a study with the same focus on South Africa between the years 1960 and 2016. After taking into consideration three distinct elements, they discovered that there is, in the long run and in equilibrium, a correlation between energy consumption and GDP. Furthermore, they discovered that this association exists in the equilibrium state. After that, these results were sent to the academic journal Energy Policy (labor, capital, and CO_2 emissions), where they were published.

The results of the research reveal that the long-term link exhibits a pattern like a U, which implies that a faster rate of economic growth is related to a lower rate of rise in energy consumption. The authors of the research also discovered that a faster pace of economic growth is related to a lower rate of increase in energy consumption. This was another finding of the study. On the other hand, despite the fact that CO2 emissions and economic development in Kuwait have been discussed in the past in the context of GCC nations, no research has been carried out on this subject using Kuwait as a case study on its own. This is because no research has been carried out on this topic using Kuwait as a case study. This is the component that sets this research apart from other studies that have been carried out on the same topic in the past.

Researchers Howarth et al. (2017), Asif, Sharma, and Adow (2015), Osman, Gachino, and Hoque (2016), Hamrita and Mekdam (2016), Magazzino (2016), Sweidan and Alwaked (2016), and Salahuddin, Gow, and Ozturk (2016) have carried out comprehensive study on the Gulf Cooperation Council (GCC) nations. Asif, Sharma, and Adow (2015); Osman, Gachino, and Hoque (2017); and Howarth et al. (2017) were some of the researchers who published their findings in 2016. On the other side, extra investigation of Turkey's situation has been carried out, such as the following: Korhan and Sadeghieh (2019); Gokmenoglu and Taspinar (2016); Ozturk and Oz (2016); Yildirim and Sakarya (2016); Gokmenoglu, Ozataca, and Eren (2015); Bozkurt and Eren (2015); and Yildirim and Sakarya (2016). Moreover, Gokmenoglu and Taspinar (2016) discovered that.

"The citation for "Akan (2104), in addition to Saatci and Durmul (2013), in addition to Halicioglu (2009)," which does not include a date, At the moment, there is no research that investigates the connection between the total amount of CO_2 emissions, the total amount of gross capital formation, and the total amount of energy consumption with regard to Turkey and Kuwait. This is a task that absolutely must be completed. By offering concrete facts on the topic, this study makes an effort to

address a deficiency in previously conducted research. In order to do this, it employs a time series that is more comprehensive in addition to the approach that was created by Toda and Yamamoto.

Mesagan and Isola (WA 2019) conducted an analysis to determine the impact that capital investment had on the nexus between nonrenewable energy consumption and environmental quality in the BRICS (Brazil, Russia, India, and China) from 1992 to 2014. Their results were written up and presented in a paper that was published in the journal Environmental Research Letters. The following are some of the findings and conclusions of the study: Environmental Kuznets curves reveal a causal connection between increased levels of capital investment and increased levels of carbon emissions. In the studies on carbon emissions, both the fully modified ordinary least squares (FOLS) and the dynamic ordinary least squares (DOLS) modeling approaches were used. In the course of the investigation, both the fully modified ordinary least squares (FOLS) and the dynamic ordinary least squares (DOLS) models were used.

The environmental Kuznets curves show that there is a positive connection between the amount of money spent on capital and the quantity of carbon emissions generated. This correlation is shown by the fact that there is a positive relationship between the two. ii. The study made use of both fully modified ordinary least squares (FOLS) and dynamic ordinary least squares (DOLS) in its analysis. iii. Carbon emissions increase when more energy is utilized, but this trend might perhaps be reversed if investments in capital and the use of electricity obtained from nonrenewable sources combine to accomplish their aims.

These models were used to come to the conclusion that increasing levels of energy consumption and economic development are both factors that contribute to increased levels of carbon emissions, but an increase in capital investment has the opposite effect. This conclusion was reached through the use of these models. The pooled mean group estimator was used by Mesagan et al. (2020) in order to carry out their study on the effect of capital investment on the energy-pollution nexus for SANEM economies between the years 1981 and 2017. The survey included the years 1981 all the way up to 2017. The time span of the investigation extended from 1981 all the way up to 2017. The study's scope dated back to 1981 and extended all the way to 2017.

The following empirical results have been demonstrated to be valid beyond a reasonable doubt because it has been shown that: To begin, research has revealed that the use of energy has a direct and immediate negative influence on the total amount of carbon emissions produced by Algeria, Morocco, and South Africa, as well as by the rest of the world as a whole. This is true both individually and collectively. On the other hand, the long-term repercussions of this on carbon emissions will be beneficial not only for the panel itself but also for the countries of Nigeria and Egypt individually. The panel will also benefit from these effects in a positive way. The outcomes of these conversations will be useful not just to the panel but also to the audience. This is due to the fact that, in the long run, the panel will come out financially ahead as a consequence of this scenario. This is the reason why this is the case. Second, increased investment led to a decrease in carbon emissions in South Africa and Algeria, while it led to an increase in emissions in Nigeria, Egypt, and Morocco.

The decrease in the panel's short-term and long-term carbon emissions may be attributed to an interaction that took place between the use of energy and the investment of capital. As a direct result of the interaction between the two elements, this was an unavoidable end result.

CHAPTER III

3.0 Methodology

3.1 INTRODUCTION

In this part of the research, a more in-depth discussion is held on the various strategies, methods, and procedures that were used in order to collect the data that was required for the study. These strategies, methods, and procedures were used in order to collect the data that was required for the study. Several techniques, approaches, and processes were used to get the data that was needed for the research. In order to collect the information required for the study, a variety of methods, strategies, and procedures were put into play. There were a lot of different ways, methods, and processes used to get the information needed for the research. A wide range of approaches, tactics, and processes were used throughout the course of the research project's data collection in order to compile the necessary information. To get the information that was needed for the research, a lot of different plans, strategies, and methods were used. To get all the information needed for the research, many different methods, strategies, and processes were used.

These were carried out in order to achieve the goals that had been set for the study. These strategies, approaches, and procedures were used in order to get the information that was required for the task at hand. This section analysed and describes how several statistical techniques were used during the course of the study to evaluate the data that was gathered. These approaches were used to analyses and evaluate the data that was collected. These actions were carried out in order to ascertain whether or not the data in question was pertinent to the investigation that was currently being carried out. During the course of the study, a large quantity of information in several forms was obtained, and this data is going to be examined in a variety of different ways.

3.2 Data

The majority of research projects, in order to arrive at their ultimate conclusions, rely on two distinct kinds of data: theoretical knowledge and data analysis, which is frequently utilized in order to arrive at those conclusions. In other words, the majority of research projects rely on theoretical knowledge and data analysis. The method that was used by the author of this study was identical to the

method that was utilized by the author of the research that was conducted before this one. It is required to consult the World Bank Data Center as a source in order to get quantitative data for a huge number of different elements and components of a variety of different sorts. This data may be found in a variety of different formats. The essential data for the project will be gathered on an annual basis beginning in 1990 and continuing all the way through 2019 for the next 30 years, beginning with the most recent year available in the year 2019. It is planned to collect data beginning in the year 1990 and continuing all the way through 2019. This time range will run till 2019. It is very necessary to conduct a study over a significant amount of time if one wants to get results that are more reliable and accurate. For example, we should look at things like foreign direct investment (FDI), GDP growth, carbon intensity (CI), and CO_2 emissions.

#	*Variables*	*Abbreviation*	*Measurement*	*source*
1	*Carbon emission*	*CO_2*	*(kt) kiloton*	*World Bank*
2	*Economic growth*	*GDP*	*(annual %)*	*World Bank*
3	*Foreign direct investment*	*FDI*	*net inflows (% of GDP)*	*World Bank*
4	*Capital investment*	*CI*	*(% of GDP)*	*World Bank*

The information that was utilized in this inquiry was found by searching the World Development Indicators database, which is available online and may be viewed by anybody. This information was applied to either the independent or dependent variable, depending on which one it applied to. Only a small number of the variables were shown in ways that could not be used in any way to reach the goals of the research. The rest of the variables were shown in ways that could be used to reach the goals of the thesis.

In order to provide an accurate assessment of the current status of the economy, we not only took into account the increase in gross domestic product (GDP), foreign direct investment (FDI), and capital investment, but we also included CO2 emissions as a dependent variable. During the course of the inquiry, we looked at the following facets:

3.3 Variables

CO_2 emission: Carbon Dioxide (CO_2) is the major greenhouse gas that is released as a result of human activity. CO_2 emissions will account for roughly 80% of total greenhouse gas emissions in 2019. The generation of electrical power and transportation are the two principal businesses that are responsible for the bulk of these emissions. Because strategies to decrease emissions of greenhouse gases are so crucial in the battle against climate change, lowering emissions of greenhouse gases will be a significant factor in determining how severe the consequences of climate change will be in the foreseeable future.

In economics, a carbon tax is a term used to describe a policy that proposes the imposition of a standard charge per metric tonne of carbon or carbon dioxide released into the atmosphere with the intention of encouraging the reduction of such emissions. Because the amount of carbon dioxide (CO2) produced by the combustion of fossil fuels like coal, natural gas, and oil is proportional to the amount of carbon that was included in the fuel, a tax on carbon is really a tax on carbon dioxide.

The economic repercussions of putting a price on carbon would be determined by the decisions taken by politicians, but a tax on carbon would have far-reaching implications anyway. The extent to which businesses would be able to switch to fuels with lower levels of carbon emissions in place of fuels with greater levels of carbon emissions, as well as a number of other considerations, would be a determining factor in the sectoral implications. Each socioeconomic level's spending habits and sources of income would have a distinct impact on the economy.

GDP growth: As was said before, one definition of economic growth is a rise in both the amount and quality of the economic commodities and services that society generates. This definition is consistent with what was presented in the previous definition. This term was discussed previously in the lesson.

Everyone's spending has an effect on someone else's income, and the overall quantity of goods and services produced by society is precisely proportionate to the total amount of money that society earns. This conclusion means that average income is proportional to average output. As a result, if a community makes more goods and services, its average income will go up. The gross domestic product (GDP) per capita is a measure of real income that is more comprehensive than survey income. This is because the GDP per capita takes into account the expenditures of the government in addition to the income from the survey. This extremely important statistic has been

constructed after a great deal of deliberation in order to ensure that it is comparable not just over time but also across different nations. As we've already talked about, this makes it a good way to measure the economic differences that exist around the world, as seen.

The combustion of fossil fuels would become more costly as a result of a tax on carbon, which would ultimately result in a rise in the cost of producing products and services that are reliant on those inputs. This would be especially true for things like making energy and getting around that use a lot of carbon, like driving and making energy.

Because coal is one of the power sources that emit the most carbon dioxide, the rate of increase would be largest in regions where coal is the predominant source of energy production. This is because coal is one of the power sources that emit the most carbon dioxide.

This adjustment in costs would cause a shift in consumption patterns, with people and organizations opting more often for products and services with lower carbon footprints as a result. Without taking into account the ways in which the revenues from a carbon tax would be used, such a tax would have a detrimental impact on the economy. A tax of this nature would have a negative impact on the economy if it were implemented without taking into account how the revenues from the tax would be used. But data from European countries that have carbon taxes show that they have had either no effect or a very small effect on the growth of GDP and employment as a whole.

Capital investment: The concept of capital investment is somewhat broad and may be understood in two unique ways, namely: A person on their own, a venture capital firm, or a financial institution are all examples of entities that have the ability to take part in the provision of funds in the form of a financial investment in a business. You have the choice of putting up the money in the form of a loan or trading it for a percentage of the earnings that will be earned in the future. Both of these options are available to you. When used to refer to cash, the word "capital" in this context refers to that cash.

The senior executives of a company have the option of making personal investments in the business in the form of financial capital. They invest their money in assets that will endure for a long time, such as equipment, which will assist the firm in operating more effectively and expanding at a faster pace. The word "capital" refers to movable and immovable property when it is employed in this setting.

In either scenario, the funds necessary for the investment of capital must originate from some other source. A new business may look for financial backing from a variety of different institutions, such as venture capital companies, angel investors, or more conventional banks and financial organizations. When a new business goes public, it gets a lot of money from a lot of different investors.

An established business may choose to borrow money from a financial institution or use its own cash reserves in order to finance capital investment. In order to fund its capital investment, the company may choose to issue bonds or stock shares. There is no maximum or minimum amount of money that may be invested in capital projects; the amount of money that can be placed into these projects is not capped in any way. It can range from less than one hundred thousand dollars in seed financing for a start-up to hundreds of millions of dollars for massive projects undertaken by companies in capital-intensive sectors such as mining, utilities, and infrastructure. A start-up may receive seed financing for less than one hundred thousand dollars. Seed financing is typically provided by angel investors or venture capitalists. A start-up may receive seed financing for less than one hundred thousand dollars. A start-up can receive seed financing for less than one hundred thousand dollars. Less than one hundred thousand dollars might be invested in a start-up business via seed funding.
A seed financing round can cost anywhere from one hundred thousand dollars to more than one hundred million dollars.

Foreign direct investment: It is referred to as "foreign direct investment," or "FDI," when an investor, firm, or government from a different nation purchases an ownership share in a company or project located in a different country. "FDI" is an abbreviation that stands for the phrase "foreign direct investment."

This is a phrase that is used to refer to a decision that a corporation has made to either buy a large portion of a foreign company or to buy the company in its entirety in order to extend its operations into a new region. The purpose of making either of these purchases is to expand the corporation's reach into the new region.

The purpose of making either of these purchases is to expand the corporation's reach into the new region. The expansion of the company's operations into the new area is the goal of any of these potential acquisitions, so keep that in mind. This decision was made in order to expand the corporation's business into a new area. This move was made in order to broaden the company's presence in the market. This course of action

is selected the great majority of the time with the goal of expanding one's horizons and taking in additional geographical areas as part of the experience.

Even though it is not the regular procedure, some people still use this term to refer to an investment that was made in the sole stock of a foreign company. This is despite the fact that it is not standard practice. However, this is not considered to be the norm in any way. According to the findings of research that was carried out by the Organization for Economic Co-operation and Development (OECD), worldwide economic integration cannot exist without the participation of direct investment from other countries. These conclusions can be seen in the report that was produced by the OECD. This is due to the fact that it helps cultivate strong relationships between countries that last for a significant amount of time.

When contemplating foreign direct investment (FDI), companies or governments may typically look for target organizations or projects in open economies that have a skilled labor force as well as above-average growth prospects for the investor. This is because these economies are more likely to attract foreign direct investment. In addition, the vast majority of people place a high value on a government that is only able to exert a minimal amount of control over its subjects.

Foreign direct investment (FDI) typically encompasses more than just capital investment. There is a chance that it will also involve providing management, new technology, and/or equipment.

One of the most important parts of direct investment from outside sources is gaining effective control over a foreign company or, at the very least, a lot of influence over how that company makes decisions.

3.4 Model specification

In order to simulate the value of the dependent variable, the ARDL model takes as its input the value of the lag associated with the independent variable. This value is then used to determine the value of the dependent variable. The value that is now held by the independent variable may also be used to represent the value that is currently held by the variable that is dependent on the value that is currently held by the independent variable.

In addition to the lag value that is innate to the dependent variable itself, this is also taken into consideration. This comes on top of the lag value that was already linked

with the variable that was being depended on. In addition to this, the lag value of the dependent variable itself is also something that is taken into account.

To simulate the consumption function in the UK, Davidson et al. (1978) proposed using the ARDL technique, which from this point forward will be referred to as the DHSY methodology.

In the vast majority of cases, an ARDL model will get started with a very comprehensive and extensive dynamic model. After then, it will start a gradual process of losing mass while simultaneously altering its variables via the implementation of linear and non-linear restrictions (Charemza and Deadman, 1997). The autoregressive distributed lag (ARDL) model is one of the most generic instances that can be found when it comes to dynamic models that are not confined in any manner. This model can be found in the area of econometrics and is one of the most common types of dynamic models. Additionally, it is one of the models with the highest level of complexity. The acronym "ARDL" refers to the autoregressive distributed lag that is described in its full term.

Because of the general-to-specific approach that the ARDL methodology takes, it may be possible to solve a variety of econometric issues, such as misspecification and autocorrelation, and produce a model that is the most appropriate and interpretable of its kind. This is because the ARDL methodology takes a general-to-specific approach. This is because the ARDL technique takes a step-by-step approach, moving from the general to the particular.

$CO_2 = f\ (\beta_0 + \beta_1\ (FDI) + \beta_2\ (CI) + \beta_3\ (GDP) + \mathcal{E}t)$……*1*

Whereas

CO_2 *represents carbon emission*

FDI stands for foreign direct investment

CI is the abbreviation of capital investment

GDP stands for gross domestic product

$\beta 1 \ldots .3$ *is the coefficient of the perimeter and*

ET represents error term

3.5 Descriptive statistics

When doing research, descriptive statistics are helpful tools for elucidating the fundamental components of data. They provide concise descriptions of the sample and the metrics obtained. They are the most important parts of almost any quantitative data

analysis, and they are often used together with basic graphical analysis. It is common practice to differentiate between descriptive statistics and inferential statistics. Statistics that merely explain or reveal what the data is are called descriptive statistics. It is possible, via the use of statistical methods, to draw inferences that go beyond the plain facts. For example, by making use of inferential statistics, one is able to hypothesize about the thoughts of the whole population based on the results of a sample. This is possible because of the relationship between the sample and the general population. In this investigation, we make use of inferential statistics to evaluate the likelihood that a claimed distinction between groups is grounded in reality as opposed to being the result of random chance. This is done to determine the likelihood that a claimed distinction between groups is grounded in reality as opposed to being the result of random chance. Consequently, inferential statistics are used to derive generalizations from data, while descriptive statistics just explain what is occurring inside our data.

3.6 Stationary test

We say that a series is stationary when there is no change in the mean or autocorrelation of the series as a consequence of fluctuations in the length of time that has passed since the beginning of the series. This occurs when we look at the length of time that has passed since the beginning of the series. This is because the amount of time that has elapsed since the first episode of the series has remained the same throughout its entirety. This means that the mean and autocorrelation remain unchanged. It is possible to recognize immobile series by their inability to adjust to the changing conditions brought about by the passage of time (Gujarati and Porter, 2009). We are able to ascertain whether or not the series in question is stationary when we take a look at the relevant series. This allows us to determine whether or not the series is stationary based on whether or not the series is stationary.

In the event that the series under consideration does not exhibit stationary behavior, we are able to reach the conclusion that it does not demonstrate stationary behavior. If a series' mean, covariance, variance, and any other properties do not change over the course of the observation period, then it is possible to draw the conclusion that the series is stationary. This is because it is easier to draw conclusions about stationary series than about non-stationary ones.

To phrase it another way, the television show does not suffer from the passage of time in any manner. The non-stationary character of the series will be preserved in any case, regardless of whether or not the modification is carried out. It is relatively uncommon to hear phrases with basically the same meanings being used interchangeably. Two examples of this are "unit root" and "non-stationary," both of which are highly specific.

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A time series must first be stationaries in order to be utilized for prediction, as is commonly known. It is necessary to have this in order to construct projections for a time series. This holds true for every conceivable kind of time series. The purpose of this thesis was to determine whether or not the variables that were being

investigated were stationary, and in order to do so, the Augmented Dickey-Fuller test and the Philips-Perron test were used. These tests were used in order to determine whether or not the variables that were being investigated were stationary. These tests were done to see if the variables being studied stayed the same over time.

On each of these exams, an updated version may be substituted for the more traditional one. It is highly recommended that a significance level of 5% be utilized as the point of departure when conducting statistical research for the very first time. This recommendation comes from the American Statistical Association. If we take into consideration the following equation in the context of a random walk, we may be able to acquire a general idea of what a non-stationary series would look like:

$$Y\ t = U\ t - 1 + \epsilon t$$

It is essential to take into consideration the fact that the Epsilon variation, sometimes referred to as "epsilon," is a stationary random disturbance term in the context of this particular scenario.

According to the equation that came before it, the value of the forecast for the series y remains the same over the course of time. The equation that came before it makes the hypothesis that the standard deviation of the y-series will grow as more time passes. Because the random walk is a difference stationary series, the initial difference in y is also stationary:

$$Ut = t - Ut - 1 = (1 - L)\ Ut$$

The notation I indicates that a unique stationary series has been integrated at a certain point in time, which is proved by the condition that (d). Both the maximum number of unit roots that can be included in the series and the minimum number of differencing operations that need to be done in order to bring the series to a point of equilibrium are specified by the order of integration. The number of unit roots that can be used in the series is also limited by the order of integration. The series can have no more than three unit roots, and the number of differentiating operations that must be performed in order to get it to a state of equilibrium must be as few as is humanly feasible. Additionally, the order in which integration is carried out has an effect on the maximum number of unit roots that may be included in the series. This maximum number is specified by the sequence. The order in which integration is performed has an effect on the maximum number of unit roots that may be included in the series; as a result, the order in which operations are performed is very essential. This specific maximum number must be observed since the sequence requires it.

The series in question is referred to as the I (1) series since there is only ever going to be a single unit root. This is so because the previously indicated random walk only has one unit root. If, on the other hand, a series remains constant over time, we can conclude that the series in question is I because it is the only one that hasn't changed (0). The conventional approaches to generating findings are inapplicable when working with regressions that include an integrated dependent variable or integrated repressors. Instead, one must resort to other methods. Instead, one needs to make use of other approaches. These are the descriptions that correlate to those in the following list: Before using a data series in a regression, it is crucial to evaluate whether or not the series in question is stable. If the series in question is unstable, the regression will not be accurate. One way to do this is to contrast it to another series that is of a similar kind.

Because of this, the findings will be reliable and accurate. The unit root test is the approach that is most often applied when attempting to determine whether or not a series can be considered stationary. This test is named after the mathematical operation that it is based on. I'd appreciate it if you could explain to me how the data's static nature works to our advantage. When the mean and standard deviation of the data stay the same over time, this is called a stationary distribution (Jeffrey M. Wooldridge, 2013).

When the value of even just one of these variables changes, it becomes immediately clear that there is a unit root hidden deep within the data someplace. This is the case regardless of the variable in question being considered. A contrast between a stationary series and a non-stationary series may be made by noting that after a non-stationary series has come to an end, it will offer data that is erroneous and wrong. This can be stated in a more specific manner by stating that a stationary series will not do this. The data from a stationary series, on the other hand, would stay the same over the course of the study. One technique to do this is to take into account the fact that a stationary series will always provide the same results.

A stationary series, on the other hand, would offer data that is consistent across time. In other words, a stationary series does not exhibit this behavior. On the other hand, in a stationary series, the outcomes will always be the same.

3.7 ADF UNIT ROOT TEST

In order to determine whether or not their theory was accurate, Dickey and Fuller (1979) created and built a computer program to test it. They did this in order to determine whether or not their presumption was correct. The program is able to identify whether or not a certain variable has a unit root and whether or not it follows an a priori random walk. It can also decide whether or not the variable follows an a priori random walk. In addition, the program can figure out if the variable has a unit root or not. The piece of software might also be able to tell if the variable in question has a unit root or not. It's also possible that the program will determine whether or not the variable in question is related to a unit root. This is another possibility. In order to show the test's relevance and utility, Hamilton (1994) presents four distinct scenarios in which the extended Dickey-Fuller test may be used. These scenarios cover a range of possible circumstances. This demonstration's primary focus is to illustrate that the test in question is applicable to real-world scenarios. The foundation upon which the null hypothesis is built is the assumption that there will always be a single unit root at every place along the distribution of the variable in issue. This assumption serves as the basis for the null hypothesis. The hypothesis is built on top of this premise, which acts as its basis. This assumption is correct regardless of the particulars of the circumstances at hand.

The most important distinctions between the two methods are whether or not a drift term is included in the null hypothesis and whether or not a constant term and a temporal trend are included in the regression that is used to build the test statistic in the second strategy. These are the factors that have the greatest impact on the results of the analysis. The most important differences are in these parts of the null hypothesis and the regression that is used in the second method to get the test statistic. These are the factors that determine whether or not a drift term should be included in the null hypothesis, as well as whether or not a constant term and a temporal trend should be included in the regression model that is used to construct the test. Additionally, these are the factors that decide whether or not a drift term should be included in the null hypothesis. Whether or not a drift term is included in the regression model that is used to create the test statistic is another one of the most critical distinctions. This difference is determined by whether the model is utilized to construct the test statistic. This is one of the distinctions that has the potential to have the greatest impact. This is one of the most important differences to consider.

These are the aspects of the situation that have the most significant bearing on the results of the study. The question of whether or not a drift term satisfies these characteristics is what determines whether or not to include the drift term in the null hypothesis. The Dickey-Fuller test is quite comparable to this one; the primary difference between them is that the Dickey-Fuller test is carried out on the model rather than the other way around, as was the case with that previous test.

This is in contrast to the test that came before it, which was the case with that previous test. The Dickey-Fuller exam is quite similar to this one in a lot of respects.

$$yt = t + yt1 + 1yt1 + p1ytp + 1 + t$$

Because the ADF formulation takes into account delays of order p, it is conceptually feasible to make use of it even when dealing with higher-order autoregressive processes. Before the test can be performed on the data, it is essential to calculate the duration of the lag period, which is denoted by the symbol p and occurs between the two occurrences. This is required before the test can be performed on the data.

3.8 The importance of ARDL model

When there is already one vector that cointegrates, Johansen and Juselius's cointegration method from 1990 cannot be used.

No matter if the underlying variables are I (0), I (1), or a combination of both, it is essential to investigate the Autoregressive Distributed Lag (ARDL) approach to cointegration or the bound procedure for a long-run relationship that was proposed by Pesaran and Shin (1995) and Pesaran et al. (1996). This is because it is important to look into the autoregressive distributed lag (ARDL). The autoregressive distributed lag (ARDL) method of cointegration was first conceived of and developed by Pesaran and Shin (1995). Pesaran and colleagues are the ones to thank for the development of both of these approaches to the problem. In their separate studies, Pesaran and Shin (1995) and Pesaran and colleagues (1996) suggested both of these techniques as potential remedies to the problem that was being examined. Pesaran and Shin (1995)

Under these particular circumstances, applying the ARDL methodology to the cointegration issue will lead to the creation of estimates that are not only usable but also consistent with the hypothesis being tested.

In contrast to the cointegration technique that Johansen and Juselius devised, the Autoregressive Distributed Lag (ARDL) solution to cointegration makes it feasible to locate the cointegrating vector. ARDL stands for "autoregressive distributed lag." The

term "autoregressive distributed lag" may be abbreviated as "ARDL." This approach was invented in 1990 using the autoregressive distributed lag (ARDL) algorithm. ARDL stands for "autoregressive distributed lag."

In contrast to the cointegration approach that was established by Johansen and Juselius, a method known as autoregressive distributed lag, or ARDL, short for the cointegrating vector, made this conceivable. This method was developed by ARDL, short for the cointegrating vector (1990). This was made possible using a technique called autoregressive distributed lag, which may be abbreviated to ARDL for short. T To repeat this principle in a different way, each of the underlying variables may be considered a separate connection equation that keeps its validity over the course of time. This statement is true regardless of how much time has passed.

If it is possible to locate a single cointegrating vector, which is also referred to as the underlying equation, then the ARDL model of the cointegrating vector may be reparametrized in such a way that it transforms into an ECM model. If this is the case, then the underlying equation may also be referred to as the underlying equation. If this is the case, then the underlying equation may also be referred to as the underlying equation. If this is the case, then the equation that is under the surface might also be referred to as the equation that lies beneath the surface. The reparametrized result provides insight into both the short-run dynamics of the variables in a single model, which is often referred to as traditional ARDL, and their long-run interconnections. This is a direct consequence of the fact that the reparametrized result was reparametrized.

Re-parameterization is a possibility due to the fact that the ARDL is an equation that represents a dynamic single model and has the same form as the ECM. This similarity makes reparameterization viable. Re-parameterization may now take place as a result of this. A model is said to have a distributed lag if it has a regression function that integrates regressors with an unconstrained lag. In other words, the lag of the regressors in the model is not restricted in any way. This is the one and only criterion that must be satisfied for a model to be classified as having a distributed lag. By first supplying us with the endogenous variable, this method for evaluating cointegration enables us to directly determine whether or not the underlying variables in the model are cointegrated. This is accomplished by testing whether or not the variables are cointegrated after we have been provided with the endogenous variable. On the other hand, you can't use the ARDL technique to look at cointegration when

there are several vectors that cointegrate, because this method doesn't work in those kinds of situations.

The technique proposed by Johansen and Juselius (1990) thus serves as an alternative. The prerequisites for using this strategy and its application are going to be discussed in the following parts.

3.9 ARDL Model equations

$$\Delta Co2t = \beta 0 + \sum_{i=1}^{p} \gamma 1 \Delta CO2t{-}i + \sum_{i=0}^{q1} \beta 1\ \Delta FDIt{-}i + \sum_{i=0}^{q2} \beta 2 \Delta CIt{-}i + \sum_{i=0}^{q3} \beta 3 \Delta GDPt{-}i + \varepsilon t \quad \ldots\ldots .2$$

3.10 ECT Model equation

$$\mathrm{CO2}_t = \alpha_0 + \sum_{i=0}^{q} \Delta\beta_1\, InCO2_{t-k} + \sum_{i=0}^{p} \Delta\beta_2\, InFDI_{t-k} + \sum_{i=0}^{p} \Delta\beta_3\, InCI_{t-k} + \sum_{i=0}^{p} \Delta\beta_4 InGDP_{t-k} + \lambda ECM_{t-1} + \varepsilon_t \ldots\ldots .3$$

3.11 The ARDL Bound Test

The autoregressive distributed lag (ARDL) bounds testing method was used in this study to find out if there is a link between the growth of Sri Lanka's tourism industry and the growth of the country's economy as a whole. Pesaran and Shin (1999) were the ones who first presented the ARDL modelling technique, and Pesaran, Shin, and Smith were the ones who went on to expand upon it (2001). This technique makes use of an estimate of what is known as an unrestricted error correction model, or UECM for short. UECMs offers a variety of features that set them apart from the more typical forms of cointegration techniques, and these benefits are what make them unique.

First, it may be used for studies that only have a small number of participants (Pesaran et al., 2001). As a consequence of this, doing limit testing will be an appropriate method for the present inquiry.

Second, it estimates both the short-run and long-run components of the model at the same time. This allows it to circumvent the problems that are caused by the insufficient number of variables and the autocorrelation that exists in the data. This is

how it circumvents the problems that have been raised. Third, it takes into consideration aspects of the model that are relevant to both the short-term and long-term views at the same time. Thirdly, it provides a single estimate that simultaneously tackles both the short-run and the long-run aspects of the problem, which is an advantage that is unique to this technique and makes it stand out from other similar approaches. Thirdly, when testing the null hypothesis that there is no cointegration connection between the variables that are being looked at, the standard Wald or F-statistics that are used in the limits test have a distribution that is not standard. This makes it hard to figure out if there is a link between the variables or not. This is due to the fact that the limits test, which is used to determine whether or not there is a link, makes use of these data to determine the outcome. It is necessary to make use of particular data in order to carry out the boundary test. Whether the underlying variables are integrated at the I(0) level, the I(1) level, or the fractional level, this is always the case; it does not matter which level is employed; it is always true.

This is the case regardless of whether the boundary test uses the more common Wald statistic or the F statistic. Both of these statistics provide the same results. Fourth, making use of this tactic often results in the production of unbiased estimates of the long-run model in addition to a valid tstatistic, despite the fact that some of the regressors may be endogenous. This is a significant advantage of the approach (Harris and Sollis 2003). It was discovered by Pesaran and Inder (1993 and 1997), as well as by Pesaran and Pesaran (1997), that incorporating dynamics into a research project has the potential to reduce the impact of endogeny bias. This brings us to our fifth and final challenge, which is the question of whether or not it is possible to estimate the short-run parameters of the model at the same time as the long-run parameters of the model. Specifically, the question asks, "Is it feasible to estimate the short-run parameters of the model at the same time as the longrun parameters of the model?" Sixth, once the appropriate modifications have been made to the ordering of the lags in the ARDL model, we will be able to estimate the cointegration relationship by employing a straightforward ordinary least square (OLS) technique. This will be possible once the ARDL model has been updated to reflect the correct ordering of the lanes. This will be possible once we have made the correct modifications to the ordering of the lanes. When we have finished making the necessary alterations to the sequence in which the lanes are arranged, we will be able to do this. After the appropriate alterations have been made, it will be able to accomplish this after the

delays in the ARDL model have been corrected. This will take place after the appropriate adjustments have been made.

3.12 Residual Diagnostic

Although it is commendable that so much applied empirical research has been done on the factors that influence tourist demand, the majority of this research suffers from a common deficiency: it does not make use of statistical diagnostic testing. The standard stochastic specification for econometric models requires that the error terms have a normal distribution with a mean of 0, a constant variance, and be serially correlated. This is in addition to the fact that the error terms must have a constant variance. This is due to the fact that it is presumed that the mistaken words would not be related to one another in any way. Additionally, the typical stochastic specification also requires that the variance be constant. Diagnostic tests are used to validate the models' auxiliary assumptions. A statistical model is considered legitimate if it does not break any of its fundamental model assumptions. This ensures that the actual distributions of common test statistics do not diverge from those that are predicted by the model. If this is not the case, then the conclusions drawn from the data will be flawed, and the statistical validity of any testing of economic theory will be called into question. In light of this, the econometric literature has come to a general agreement: the final econometric model must be put through rigorous statistical testing in order to be statistically acceptable.

Diagnostic tests come in a variety of shapes and sizes, each serving a specific purpose. The majority of diagnostic tests in econometric software applications have only been accessible since the 1980s (Lim, 1997b). As a result, research before the 1980s did not provide any diagnostic tests, with the exception of the Durbin and Watson (1950) test, which checks for first-order autocorrelation. Diagnostic tests, serial correlation tests, normality tests, and heteroscedasticity tests are all available.

3.13 Granger causality

The Granger causality methodology was used so that researchers could investigate the structural dynamics of the causal relationships that already existed between the various variables. The Granger causality test is a statistical hypothesis test that evaluates whether or not one time series can be used for accurate forecasting of another time series. The purpose of this test is to determine whether or not one time

series can be used to correctly forecast another time series. This test's goal is to establish whether or not there is a connection between the two time series by comparing their behavior. If the value of the probability is less than any threshold, then the hypothesis is regarded as incorrect at that level. [Case in point:] [Case in point: The traditional Granger causality test requires the testing of the null hypotheses that FDI does not cause CO_2 and vice versa, that GDP does not influence CO_2, that CI does not cause FDI, and, finally, that CI does not cause REER. This is because the conventional Granger causality test assumes that these relationships do not exist. The purpose of this exercise is to discover whether or not these theories are correct. The objective of this activity is to determine whether or not these hypotheses are valid. This may be accomplished by running the two regression models that are described in the paragraphs that follow:

$$\Delta InCO2_t = \lambda_0 + \sum_{i=1}^{m} \lambda 1i\ \Delta In\ CO2_{t-i} + \sum_{i=1}^{n} \lambda 2i \Delta FDI_{t-i} + \sum_{t=1}^{p} \lambda 3i \Delta GDP_{t-i} + \sum_{i=1}^{q} \lambda 4i \Delta InCI_{t-i} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .4$$

$$\Delta InFDI_t = \lambda_0 + \sum_{i=1}^{m} \lambda 1i\ \Delta In\ FDI_{t-i} + \sum_{i=1}^{n} \lambda 2i \Delta CO2_{t-i} + \sum_{t=1}^{p} \lambda 3i \Delta GDP_{t-i} + \sum_{i=1}^{q} \lambda 4i \Delta InCI_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 5$$

3.14 Stability tests

In the domains of statistics and econometrics, Brown et al. were the first group to publish the CUSUM and CUSUMSQ tests. These tests are used to detect whether or not parameters have remained stable over time (1975). These tests, which are based on having a look at scaled recursive residuals, offer a number of benefits, the most notable of which is that it is not essential to know in advance exactly when the predicted structural break will take place. These tests have a lot of advantages. In spite of this, the major objective of these inspections was not to develop a formal testing system; rather, they were intended to act as a diagnostic tool with the purpose of discovering previously undetected structural problems in the structure. The in question building was the one in question. The findings of these inspections were then factored together to arrive at a conclusion on whether or not the structure could safely

house people. As an illustration of this, the authors of the paper that Brown et al. authored state in the introduction that their tests are "designed to bring out departures from constancy in a graphic way rather than parameterizing specific types of departure in advance and then making formal significance tests that are strong against these particular alternatives." Even though this wasn't the primary focus of the CUSUM family of tests, they are now often used in official contexts to ensure that the parameters being utilized are consistent with one another. The body of research that is currently available suggests that these methods are now understood more commonly as formal statistical tests for parameter constancy rather than the kind of investigative tool that Brown and his colleagues had in mind when they developed them. This is in contrast to the kind of investigative tool that Brown and his colleagues had in mind when they developed these methods. In contrast to the sort of investigation tool that Brown and his colleagues had in mind when they established these approaches, this is not the kind of investigative tool that they had in mind at all. In contrast to the sort of investigation tool that Brown and his colleagues had in mind when they established these approaches, this is not the kind of investigative tool that they had in mind at all. This form of investigation tool is not at all what Brown and his colleagues had in mind when they developed these techniques, in contrast to the kind of investigative tool that they had in mind when they established these ways.

If the results of these tests show that they are helpful, then this may not necessarily be something that should be considered a terrible thing to happen. On the other hand, the question of whether they are capable of rejecting a false null hypothesis will arise frequently; however, there hasn't been a lot of systematic research done on this. McCabe and Harrison (1980) use the Monte Carlo method to investigate and assess the similarities and differences between the tests for one-time changes in parameter values and the tests for random walk parameters. They accomplish this by comparing and contrasting the two sets of tests. They place a higher focus on comparing how well the recursive and ordinary least squares (OLS) residuals perform in relation to one another than they do on the power of any given test. This is because OLS and recursive residuals are both used in this analysis. When Ploberger and Kramer (1990) evaluate the strengths of tests for detecting a one-time change in the parameters of a linear regression model, they find that the CUSUM test is more powerful than the CUSUMSQ test. Specifically, they find that the CUSUM test is able to detect a one-time change in the parameters of a linear regression model. In particular, they come

to the conclusion that the CUSUM test is able to recognize a one-time shift in the parameters of a linear regression model. In particular, they reach the realization that the CUSUM test is able to identify a one-time shift in the parameters of a linear regression model. This is the result that they reach. They come to the conclusion, in particular, that the CUSUM test is able to determine whether or not there has been a one-time shift in the parameters of a linear regression model. This is the conclusion they reach. In particular, they find that the CUSUM test is able to assess whether the parameters of a linear regression model move only once or numerous times. This is one of the many applications that this test has.

According to Deng and Perron (2008), a corrected version of the CUSUMSQ test is superior because it circumvents the issue in which the test's limit distribution is affected by the kind of error process included in the regression model. In other words, the problem is that the type of error process included in the regression model affects the limit distribution of the test. In other words, the issue is that the test's limit distribution is affected by the kind of error process included in the regression model. To put it another way, the problem is that the sort of error process that is accounted for in the regression model has an effect on the limit distribution of the test. To put it another way, the issue is that the kind of error process that is accounted for in the regression model has an influence on the limit distribution of the test. This is a concern since it may lead to inaccurate results. It is likely that carrying out the test will eliminate the need for further investigation into this matter.

CHAPTER IV

4.0 RESULTS AND DISCUSSIONS

4.1 Introduction

In the last chapter, the ARDL model was looked at as a possible way to answer the question of how CO_2, FDI, gross capital formation, and GDP all relate to each other. As a consequence, this chapter will be broken down into many pieces. The next part shows how GDP has affected CO_2 emissions and how that effect has been understood, while the following section summarizes the study results. The first section of this article digs further into data analysis strategies. The second portion investigates and in the third part, we look at and talk about the idea of co-integration. This comes after we looked at the stationary test of a data set and talked about that analysis in the second part. At the end of this part, we will have a look at the findings of stability testing, as well as the data, diagnostic tests, and regression analysis that were performed. Even so, the presentation was good enough to meet the goals of the study, and E-Views 12 was used without any problems to test the presentation.

Table 4.1 Descriptive statistics

	CO_2	**CI**	**FDI**	**GDP**
Mean	8.576114	10.92458	2.235920	6.847630
Medium	8.554125	0.000000	2.052579	8.725182
Maximum	9.817930	40.67127	5.576213	13.57260
Minimum	7.326466	0.000000	0.000000	-8.672480
Std Dev.	0.699754	17.02785	1.865168	5.897678
Skewness	0.193504	0.893841	0.313675	-1.212883
Kuntosis	2.061527	1.828909	1.757981	3.649856

Jarque-Be ra	1.288133	5.709075	2.420221	7.88321
Probility	0.525153	0.057582	0.298164	0.019416
Sum	257.2834	327.7373	67.07759	205.4289
Sum Sq. De v.	14.20003	8408.478	100.8867	1008.696
Observation	30	30	30	30

The results of descriptive statistics show that the mean value of carbon emissions is 8.576, making it the second highest in this category; the mean value of foreign direct investment (FDI) is very low in this category; and the mean values for GDP and capital investment are, respectively, 6.847630 and 10.92458. However, not all of the variables have a normal distribution; for example, CO_2 and GDP do not have a normal distribution. The variables do, however, have excellent skewness.

4.2 Stationary test

A stationary series is one in which changes in the length of time that has passed since the series' start have no impact on its mean or autocorrelation. The inability of stationary series to adapt to changes in the passage of time may be used to identify them (Gujarati and Porter, 2009). By taking a look at the series in question, we are able to determine whether or not it is stationary, depending on whether or not the series in question is stationary. If the series under consideration is not stationary, then we can draw the conclusion that the entire thing is not stationary. If the mean, covariance, and variance of a series, along with any other component of the series, do not vary throughout the course of time, it is feasible that one may refer to the series as being stationary. To put it another way, the television program is not negatively impacted

by the passage of time in any way. No matter what happens with the proposed change, the show will still be emotional and interesting.

It is quite rare to hear terms with essentially identical meanings, such as "unit root" and "nonstationary," being used interchangeably. A time series must first be stationaries in order to be utilized for prediction, as is commonly known. It is necessary to have this in order to construct projections for a time series. This is true for each and any time series that may possibly be conceived of. The purpose of this thesis was to determine whether or not the variables that were being investigated were stationary, and in order to do so, the Augmented Dickey-Fuller test and the Philips-Perron test were used. These tests were used in order to determine whether or not the variables that were being investigated were stationary.

4.3 ADF UNIT ROOT TEST

Table 4.2 UNIT ROOT TEST - ADF TEST

Vari ıbles	*Level*	*1st different*	*Order*
CO_2	*0.9862*	*0.0001****	*I (1)*
GDP	*0.0115*	*-0-****	*I (1)*
FDI	*0.2424*	*0.0002****	*I (1)*
GCF	*0.6837*	*0.0041****	*I (1)*

*Note: Schwarz info criterion, significant level 1%*5%** 10****

ADF tests were used to determine whether or not the variables were stationary at both the level and the first difference before the unit root test was carried out. By doing a unit root analysis on the data, it is feasible that we will be able to identify whether or not the levels of CO2 and economic growth are connected with one another. The fact that none of the probabilities are higher than 5% seems to imply that all of the variables are stable at the initial difference, which has a significance level of 1%. This

conclusion is drawn from the data. This is because none of the probabilities are lower than 1%. When a regression is run on these variables, there is no indication that the results will be misleading, and the probability values of CO_2, FDI, GDP, and GCF at their first differences are less than 5%, which suggests that the variables are also stable. Because of this, it is agreed that the competing hypothesis, which says that a unit root can be found, is true.

According to the findings, none of the variables are stationary at the level, as evidenced by each probability being greater than 0.05. This non-stationarity was found to exist. In spite of this, the results of the table show that the t-statistic is more than the necessary threshold of 5 percent and that there is a probability of a first difference that is less than 0.05 percent. It is possible to say that stationarity exists at the first difference. Another theory that has been debunked is the idea that there is no unit root.

4.4 ARDL Bound Test

TABLE 4.3 ARDL BOUND TEST

Model	*Lag.*	*F-Statistic*	*Decision*
CO_2, GDP, FDI, GCF	*(2, 4, 4,1)*	*10.10271****	*Co-Integration Exist*
Bond Critical Value			
		I (0)	*I (1)*
Sign.	*10%*	*2.2*	*3.09*
	5%	*2.56*	*3.49*
	2.5%	*2.88*	*3.87*
	1%	*3.29*	*4.37*

***at 1percent level of significance **at 5percent level of significance *at 10percent level of significance Source: Akaike info criterion (AIC) Pesaran et al. suggest the critical value bounds (2001)

The ARDL method was used to create the bound test, which was used to see if the data set being looked at showed co-integration. It is not possible to reject the null hypothesis using F-statistics that are lower than the lower limit (critical values for I) when employing such statistics; this would need an extremely large sample size (0). The assumption that there is no co-integration should be rejected as a null hypothesis if the statistic is higher than the upper limit I. (1). Because of this, it is difficult to

know how to react to a number, even if it demonstrates that it is within the allowed range.

With the assistance of the F statistic (6.232613), we are able to reach the conclusion that the independent variables and the dependent variable have a long-term statistically significant correlation that is statistically significant at the 1%, 5%, and 10% levels of significance, respectively. This conclusion is supported by the fact that the correlation is statistically significant at all three levels. The fact that the association is statistically significant at all three levels lends credence to the finding that this conclusion is correct. The discovery that this conclusion is true is given further weight by the fact that the correlation is statistically significant at all three levels of analysis. The discovery that this conclusion is true is given further weight by the fact that the correlation is statistically significant at all three levels of analysis. The fact that the connection is statistically significant at each of the three levels of analysis adds to the body of evidence supporting the proposition that this conclusion is accurate. As a consequence of this, we are in a position to reach the conclusion that the null hypothesis, which asserts that there is no co-integration and, as a consequence, ought to be rejected as a result of this, is flawed and ought to be rejected rather than accepted. This is because, as a consequence of this, we are in a position to reach the conclusion that the null hypothesis asserts that there is no co-integration, and as this is due to the fact that we are capable of coming to this decision.

4.5 ARDL Long-run

TABLE 4.4 ARDL LONG RUN

Variables	***Coefficient***	***Prob.***
FDI	*1040.280*	*0.0465***
GCF	*621.99*	*0.0094****
GDP	*-295.99*	*0.2042*
CO_2	*7574.786*	*0.0202***

Long-Run ARDL

According to the information that is shown in the table that is located at the very top of the page, there is a link between rising CO2 emissions and the expansion of the economy that may be described as "negative" or "long-run." You can get this information by clicking here.

According to the findings of the statistical analysis, there is a significant connection between the two variables. The level of significance for this relationship is 1%, and the positive coefficient for this relationship is -0.02.

This demonstrates that releasing carbon dioxide (CO_2) into the atmosphere will not, over the course of time, be beneficial to the expansion of the economy. Even though economic growth is expected to keep picking up speed in the coming years, this will cause it to drop by -0.02 percent over time.

This would appear to show that CO_2 is more of a complement to economic expansion than it is a replacement for it over the long term. Because of this discovery, the null hypothesis has been demonstrated to be invalid, and we can assert that the level of carbon dioxide in the atmosphere has a significant inverse correlation with the expansion of economic activity over the course of time.

The likelihood of the output of government capital being zero is 0.007, which shows that the discovery is statistically significant at a level of significance that is equal to or higher than 5%. In addition, this proves that the coefficient has a positive value, as shown by the result of the computation, which is 0.04. This demonstrates that the coefficient has a positive value.

4.6 ARDL SHORT RUN

TABLE 4.5 ARDL SHORT RUN

Variables	***Coeffic ent***	***Std.error***	***t.statistic***	***Prob.***
GDP	*-0.0017 08*	*0.0001545*	*-1.105617*	*0.3112*
FDI	*0.03933*	*0.006094*	*6.453977*	*0.0007****
CI	*0.00500 8*	*0.000954*	*5.248911*	*0.0019****
ECM (-1)	*-0.1610 54*	*0.022349*	*-7.206833 3*	*0.0004****

*Note ****represent significance at ***1% and **5% 10%*respectively Source: ECM*

According to the findings, the GDP has a probability of just 0.108 of having an effect on CO_2, which is statistically insignificant at a level of 10%.

If there is a reduction in the amount of CO_2 in the atmosphere, the GDP coefficient will rise by 0.001 percentage points. This leads us to the conclusion that there is a substantial relationship between the variables in the near term, and as a result of this, the null hypothesis should be rejected because of the significance of the link between the variables. This is because there is a substantial relationship between the variables in the near term. The idea that came before this one has a direct bearing on this one, thus this is a direct result of that.

The chance of direct investment from other countries is 0.0007, and a level of 5% is required for it to meet the criteria for statistical significance. It is impossible to dispute the statistical significance of this finding when one considers that the probability of the establishment of government capital is 0.0019. We do not believe that the null hypothesis should be accepted since the data that we have imply that there is a short-term link between the variables and that this relationship may be either positive or negative. Instead, we believe that it ought to be dismissed as inappropriate. The FDI result is consistent with the findings of Pazienza (2019), who investigates the magnitude and sign of the impact foreign direct investment (FDI) inflows in the manufacturing sector of OECD countries have on the environment, specifically the amount of CO_2 produced by sectoral fuel combustion. Using data gathered from different international agencies for those nations from 1989 to 2016, an equation model is constructed to take into consideration the methodology, scale, and cumulative impacts of FDI on CO_2 and is then analyzed using the panel data approach. The positive connections discovered for all of these impacts would suggest that FDI has a negative impact on the environment. However, the very low magnitude of the estimated coefficients and the observation that the negative impact of FDI on CO_2 decreases as the scale of its inflow increases lead to a reconsideration of those arguments against the implementation of international investment policies in the sector due to the generally assumed environmental implications. This positive environmental spillover may be explained by referring to FDI as a driving force of technological innovation and, as a result, a means of implementing more environmentally friendly and cleaner production practices. The results are consistent among estimators and resistant to a variety of alternative specifications and extra covariates.

4.7 Residual Diagnostic test result

TABLE 4.6 RESIDUAL DIAGNOSTIC TEST

Name of the Test	*The Null Hypothesis result*	*Statistics value*	*Probability*
Serial Correlation Test	*There is no serial correlation at up to two lags.*	*0.5046*	*0.5143*
Jarque-Bera (JB) Examination	*Normally, residuals are normally dispersed. at 5% level*	*0.2705*	*0.8734*
White (CH-sq) Test	*No conditional heteroskedasticity at 5%*	*0.7050*	*0.5253*

According to the data that was obtained, the residuals do not exhibit any serial correlation, as well as any conditional heteroskedasticity, and they follow a normal distribution. In practice, a normal distribution may be shown to be followed by the residuals. The model does not give support for either the alternative hypothesis or the null hypothesis when it comes to the issue of whether or not there is a serial correlation. Rather, it only provides support for the null hypothesis. A probability of *0.5143* is much more likely than the number that is predicted, which is 0.05. Because of this, we are led to believe that this model does not come equipped with any serial connections. The essential null hypothesis in this scenario at a level of confidence of 5% is that there is no heteroskedasticity at all. The fact that the probability value of *0.5253* is higher than the threshold of 0.05 percent demonstrates that the problem is one that requires more immediate attention as a consequence of the findings of the residual diagnostic test. The threshold for the test was set at 0.05 percent. There will be no indication of heteroskedasticity in the data produced by the model until we get to the conclusion that the null hypothesis should be rejected with a probability of 5%. If, on the other hand, we come to the conclusion that there is a 10% possibility that

the null hypothesis should be rejected, then we will have unquestionable evidence that the model has heteroskedasticity.

According to the alternative hypothesis, the likelihood that residuals follow a normal distribution is less than 0.05 percent. This is because the null hypothesis states that residuals follow a normal distribution. Because this assertion cannot be refuted, the null hypothesis must be accepted as accurate. Despite the fact that the percentage in question is not zero, this is true regardless of the situation. The alternative hypothesis that residuals are not normally distributed or occur less than 5% of the time is not supported by our findings since we discovered that residuals are normally distributed with a probability of *0.8734*.

Table 4.7 Granger causality

Pairwise Granger Causality Tests

Date: 12/12/2022

Sample: 1 30

Lags: 2

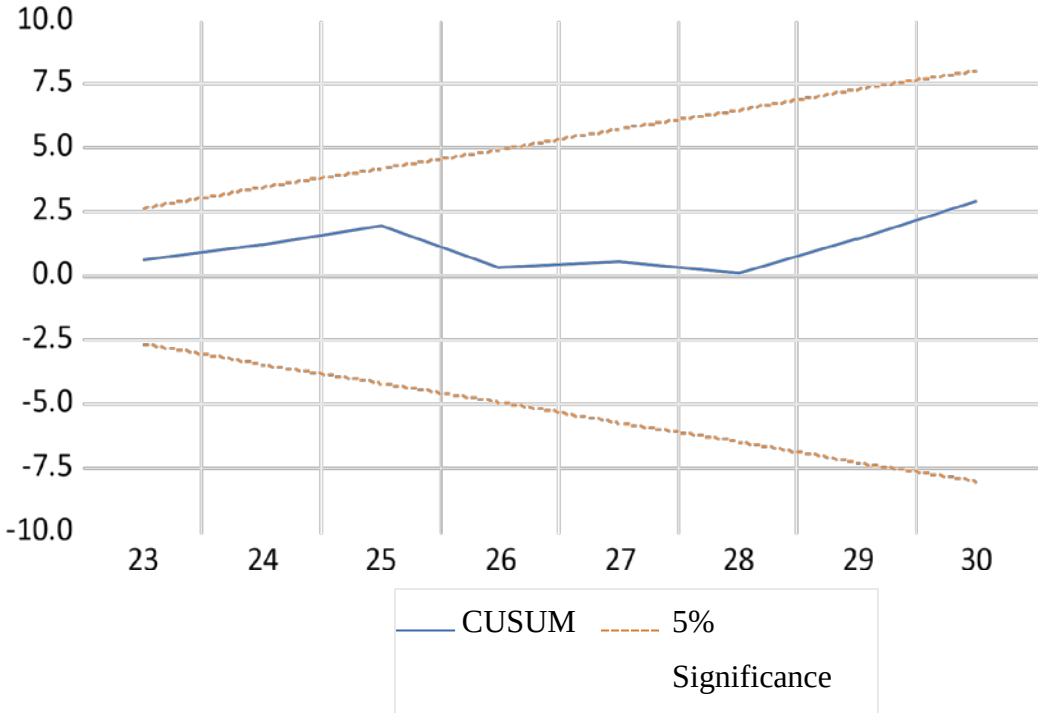
Null Hypothesis	Obs	F- Statistic	Prob
FDI does not Granger Cause CO_2	28	0.26040	0.7730
CO_2 does not Granger Cause FDI	28	0.51897	0.6017
GDP does not Granger Cause CO_2	28	1.73516	0.1987
CO_2 does not Granger Cause GDP	28	3.61645	0.0431**
CI does not Granger Cause CO_2	28	0.57339	0.5715
CO_2 does not Granger Cause CI	28	1.10795	0.3472
GDP does not Granger Cause FDI	28	0.47753	0.6262
FDI does not Granger Cause GDP	28	0.28765	0.7527
CI does not Granger Cause FDI	28	1.33300	0.2833
FDI does not Granger Cause CI	28	0.29318	0.6968
CI does not Granger Cause GDP	28	0.29318	0.7486
GDP does not Granger Cause CI	28	0.68022	0.5164

The conventional Granger causality test requires the testing of the null hypotheses that FDI does not cause CO_2 and vice versa, that GDP does not influence CO2,that CI does not cause FDI, and finally that CI does not cause REER. These hypotheses are tested by comparing them to the true relationships between the variables. This is because the

null hypotheses cannot be proven to be true without first proving that they are not. The purpose of this exercise is to discover whether or not these theories are correct. The objective of this activity is to determine whether or not these hypotheses are valid. The only thing that can be shown is that there is a chain of causation between the two variables that only goes in one direction. Both of these things are regarded as GDP and CO_2 emissions do not lead to considerable levels of GDP growth, and major levels of GDP growth do not lead to long-term CO_2 emissions.

4.8 CUSUM AND CUSUM OF SQUARE

FIGURE 4.1 CUSUM TEST

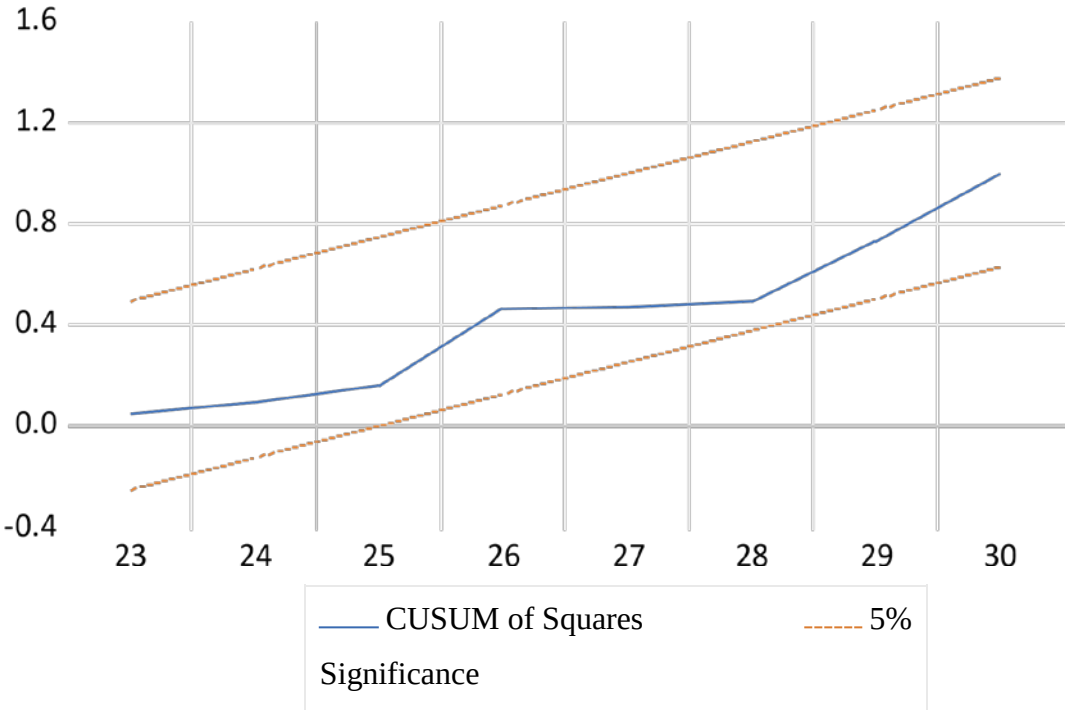


On the other hand, a hypothesis of this sort is not included in the alternative hypothesis, despite the fact that there is a null hypothesis that states that the parameters are the same. The assumption behind the null hypothesis is that there will be no change in any of the error correction coefficients used in the error correction model within a confidence range that takes into account a margin of error of 5%. Bahmani, Oskooee, and Ng (2002) If one of the lines is broken, then it is possible to draw the conclusion that the null hypothesis of consistent coefficients cannot be maintained at a level of significance of 5%. This would be the case if the significance level was set at five percent. This is due to the fact that the degree of significance is derived from the chance that the null hypothesis will be validated in actual experimentation. This is due to the fact that the null hypothesis is based on the assumption that the coefficients will

stay the same throughout the course of time. If you want the exchange rate coefficient to stay the same throughout the course of time, the plot of CUSUM and CUSUMQ data has to stay within the fundamental boundaries shown in the graphic on the right. The graphic on the right provides a visual representation of these limits.

The results of the trials show that the red line determines the boundaries within which the blue line may be discovered, and so the blue line is restricted to those constraints. As can be seen in the figure, we choose to take the position that the residual variances are stable rather than unstable so that we may gain an advantage. As a result of this, we are in a position to unequivocally assert that the null hypothesis is correct, while the alternative hypothesis is incorrect. On the other hand, the residual variance remains constant, which runs counter to what we ought to anticipate based on the facts presented here.

FIGURE 4.2 CUSUM SQUARE



Looking at the table with the stability graphs, it is evident. The graphs give valuable information looking at demonstrates this. The dependability of the parameters is shown by the fact that the plots are contained within the permissible region, and the fact that the variance estimates are contained within the 5% significance level also demonstrates this. This exemplifies the model's capacity to provide accurate results (ECM).

The assumption that the values of the parameters do not vary over time is known as the null hypothesis. On the other hand, the alternative hypothesis does not provide credence to the notion that the parameters remain constant during the whole experiment. The results of the test show that the blue line must always stay inside the borders of the red line. This limits the line's ability to move in a big way. We have decided to assume that the residual variances are stable rather than unstable; therefore, we have decided to go with the null hypothesis rather than the alternative hypothesis. This decision was made because we would want to presume that the null hypothesis is correct. Everything would be much better than it is now. Furthermore, we may conclude that the residual variance is stable as opposed to unstable. Last but not least, the cumulative sum of recursive residuals (CUSUM) and the cumulative sums of squares (CUSUMQ) were used to validate the long-term stability of the ARDL model's long-term coefficient with the short-term dynamics of the CO_2 and economic growth variables. This was done in order to determine whether or not the coefficient is stable over the long term.

This was done in order to determine whether or not the coefficient is stable over the long term. This was done in order to determine whether or not the coefficient is stable over the long term. Both of these methods were used in order to validate the model's long-term coefficient. These two methods were put to use in order to determine whether or not the ARDL model's long-term coefficient is stable over a long period. This was done so that a comparison could be made between the short-term dynamics of the variables and the long-term stability of the long-term coefficient. The purpose behind this comparison was to determine which of these two types of dynamics is more stable over time. This comparison was carried out with the intention of finding out which of these two forms of dynamics is more stable throughout the course of time. To put it another way, this was done in order to make the process of creating the comparison easier. The assumption that underpins the process of formulating the null hypothesis is that none of the error correction coefficients that are a part of the error correction model will shift within a 95% confidence range that has a 5% margin of error. This is the assumption that underpins the formulation of the null hypothesis. This is what is known as the null hypothesis. The null hypothesis of consistent coefficients can no longer be maintained if it is shown that any of the lines have been crossed at a level of significance of 5% or higher. This would be the scenario that unfolds if it is found that any of the lines have been crossed. In order for

the exchange rate coefficient to maintain its stability over time, the plot of CUSUM and CUSUMQ data must remain contained within the critical bounds shown in the right figure.

CHAPTER V

5.0 Summary, Conclusion, and Recommendations

5.1 Introduction

This chapter will give more information about the executive summary of this thesis. This part of the thesis will have all the details about the thesis. The second part is the conclusion. This part will have the thesis's conclusion statement. The last part of this chapter will list suggestions for the government of Ethiopia to follow.

5.2 Summary

Foreign direct investment, sometimes known as FDI, is a kind of investment that may be made by companies based in other countries. There is a prevalent perception in policy circles that FDI can boost economic development and productivity in host nations. This idea is supported by a substantial body of academic research. According to this theory, the production of positive externalities can be facilitated by foreign direct investment (FDI) in a number of different ways. These include, but are not limited to, the provision of direct financial financing, the adoption of foreign technology and know-how, and the production of positive externalities. Batten and Vo's (2009) research shows that foreign direct investment (FDI) helps stimulate economic growth by transferring technology, creating spillover effects, increasing productivity, and transferring new management practices and skills. A recent study that was carried out by Fernandes and Paunov (2012) indicates that foreign direct investment (FDI) has a favorable influence on both the rate of innovation and the pace at which industrial productivity is achieved. According to Hermes and Lensink (2003), foreign direct investment is an essential component in many aspects of the economy that contribute to its growth and development.

In order to attract foreign investment and because the government is thinking about changing its policies about investments, it is giving investors things like tax breaks, free or cheap land on a lease basis, duty-free imports of capital goods, and tax breaks on exports. These are just some of the investor incentives that are currently being offered by the government. As the government thinks about changes to its investment policies, it is offering these incentives to investors.

These are just some of the incentives that the government is offering investors. The government has also put a lot of money into building the country's infrastructure, such as its power grid, highways, and communication networks, in order to attract investors.

This study will use data from 1990 to 2019 to look at how CO_2 emissions in Ethiopia changed because of changes in economic growth and direct foreign investment. The time span covered by the data will be from 1990 to 2019. The time period beginning in 1992 and ending in 2012 will be included in the scope of study for this time series data. According to the results of the ARDL bound test, there is some evidence to support the idea that CO_2 emissions, economic growth, and foreign direct investment are all related. The examination of the correlation that exists between the three variables led to the discovery of these findings.

ADF tests were used to determine whether or not the variables were stationary at both the level and the first difference before the unit root test was carried out. By doing a unit root analysis on the data, it is feasible that we will be able to identify whether or not the levels of CO_2 and economic growth are connected with one another. The fact that none of the probabilities are higher than 5% seems to imply that all of the variables are stable at the initial difference, which has a significance level of 1%. This conclusion is drawn from the data. This is because none of the probabilities are lower than 1%. When a regression is run on these variables, there is no indication that the results will be misleading, and the probability values of CO_2, FDI, GDP, and GCF at their first differences are less than 5%, which suggests that the variables are also stable. Because of this, it is agreed that the competing hypothesis, which says that a unit root can be found, is true.

According to the findings, none of the variables are stationary at the level, as evidenced by each probability being greater than 0.05. This non-stationarity was found to exist. In spite of this, the results of the table show that the t-statistic is more than the necessary threshold of 5 percent and that there is a probability of a first difference that is less than 0.05 percent. It is possible to say that stationarity exists at the first difference. Another theory that has been debunked is the idea that there is no unit root.

The ARDL method was used to create the bound test, which was used to see if the data set being looked at showed co-integration. It is not possible to reject the null hypothesis using F-statistics that are lower than the lower limit (critical values for I) when employing such statistics; this would need an extremely large sample size (0). The assumption that there is no co-integration should be rejected as a null hypothesis if the statistic is higher than the upper limit I. (1). Because of this, it is difficult to know how to react to a number, even if it demonstrates that it is within the allowed range.

With the assistance of the F statistic (6.232613), we are able to reach the conclusion that the independent variables and the dependent variable have a long-term statistically significant correlation that is statistically significant at the 1%, 5%, and 10% levels of significance, respectively. This conclusion is supported by the fact that the correlation is statistically significant at all three levels. The fact that the association is statistically significant at all three levels lends credence to the finding that this conclusion is correct. The discovery that this conclusion is true is given further weight by the fact that the correlation is statistically significant at all three levels of analysis.

The discovery that this conclusion is true is given further weight by the fact that the correlation is statistically significant at all three levels of analysis. The fact that the connection is statistically significant at each of the three levels of analysis adds to the body of evidence supporting the proposition that this conclusion is accurate. As a consequence of this, we are in a position to reach the conclusion that the null hypothesis, which asserts that there is no co-integration and, as a consequence, ought to be rejected as a result of this, is flawed and ought to be rejected rather than accepted. This is because, as a consequence of this, we are in a position to reach the conclusion that the null hypothesis asserts that there is no co-integration, and as this is due to the fact that we are capable of coming to this decision.

According to the information that is shown in the table that is located at the very top of the page, there is a link between rising CO_2 emissions and the expansion of the economy that may be described as "negative" or "long-run." You can get this information by clicking here.

According to the findings of the statistical analysis, there is a significant connection between the two variables. The level of significance for this relationship is 1%, and the positive coefficient for this relationship is -0.02.

This demonstrates that releasing carbon dioxide (CO_2) into the atmosphere will not, over the course of time, be beneficial to the expansion of the economy. Even though economic growth is expected to keep picking up speed in the coming years, this will cause it to drop by -0.02 percent over time.

This would appear to show that CO_2 is more of a complement to economic expansion than it is a replacement for it over the long term. Because of this discovery, the null hypothesis has been demonstrated to be invalid, and we can assert that the level of carbon dioxide in the atmosphere has a significant inverse correlation with the expansion of economic activity over the course of time.

The likelihood of the output of government capital being zero is 0.007, which shows that the discovery is statistically significant at a level of significance that is equal to or higher than 5%. In addition, this proves that the coefficient has a positive value, as shown by the result of the computation, which is 0.04. This demonstrates that the coefficient has a positive value.

According to the findings, the GDP has a probability of just 0.108 of having an effect on CO_2, which is statistically insignificant at a level of 10%.

If there is a reduction in the amount of CO_2 in the atmosphere, the GDP coefficient will rise by 0.001 percentage points. This leads us to the conclusion that there is a substantial relationship between the variables in the near term, and as a result of this, the null hypothesis should be rejected because of the significance of the link between the variables. This is because there is a substantial relationship between the variables in the near term. The idea that came before this one has a direct bearing on this one, thus this is a direct result of that.

The chance of direct investment from other countries is 0.0007, and a level of 5% is required for it to meet the criteria for statistical significance. It is impossible to dispute the statistical significance of this finding when one considers that the probability of the establishment of government capital is 0.0019. We do not believe that the null hypothesis should be accepted since the data that we have imply that there is a short-term link between the variables and that this relationship may be either positive or negative. Instead, we believe that it ought to be dismissed as inappropriate. The FDI result is consistent with the findings of Pazienza (2019), who investigates the magnitude and sign of the impact foreign direct investment (FDI) inflows in the manufacturing sector of OECD countries have on the environment, specifically the amount of CO_2 produced by sectoral fuel combustion. Using data gathered from different international agencies for those nations from 1989 to 2016, an equation model is constructed to take into consideration the methodology, scale, and cumulative impacts of FDI on CO_2 and is then analyzed using the panel data approach. The positive connections discovered for all of these impacts would suggest that FDI has a negative impact on the environment. However, the very low magnitude of the estimated coefficients and the observation that the negative impact of FDI on CO_2 decreases as the scale of its inflow increases lead to a reconsideration of those arguments against the implementation of international investment policies in the sector due to the generally assumed environmental implications. This positive environmental

spillover may be explained by referring to FDI as a driving force of technological innovation and, as a result, a means of implementing more environmentally friendly and cleaner production practices. The results are consistent among estimators and resistant to a variety of alternative specifications and extra covariates.

The conventional Granger causality test requires the testing of the null hypotheses that FDI does not cause CO_2 and vice versa, that GDP does not influence CO_2,that CI does not cause FDI, and finally that CI does not cause REER. These hypotheses are tested by comparing them to the true relationships between the variables. This is because the null hypotheses cannot be proven to be true without first proving that they are not. The purpose of this exercise is to discover whether or not these theories are correct. The objective of this activity is to determine whether or not these hypotheses are valid. The only thing that can be shown is that there is a chain of causation between the two variables that only goes in one direction. Both of these things are regarded as GDP and CO_2 emissions do not lead to considerable levels of GDP growth, and major levels of GDP growth do not lead to long-term CO_2 emissions.

Looking at the table with the stability graphs, it is evident. The graphs give valuable information looking at demonstrates this. The dependability of the parameters is shown by the fact that the plots are contained within the permissible region, and the fact that the variance estimates are contained within the 5% significance level also demonstrates this. This exemplifies the model's capacity to provide accurate results (ECM).

The assumption that the values of the parameters do not vary over time is known as the null hypothesis. On the other hand, the alternative hypothesis does not provide credence to the notion that the parameters remain constant during the whole experiment. The results of the test show that the blue line must always stay inside the borders of the red line. This limits the line's ability to move in a big way. We have decided to assume that the residual variances are stable rather than unstable; therefore, we have decided to go with the null hypothesis rather than the alternative hypothesis. This decision was made because we would want to presume that the null hypothesis is correct. Everything would be much better than it is now. Furthermore, we may conclude that the residual variance is stable as opposed to unstable. Last but not least, the cumulative sum of recursive residuals (CUSUM) and the cumulative sums of squares (CUSUMQ) were used to validate the long-term stability of the ARDL model's long-term coefficient with the short-term dynamics of the CO_2 and economic growth

variables. This was done in order to determine whether or not the coefficient is stable over the long term.

This was done in order to determine whether or not the coefficient is stable over the long term. This was done in order to determine whether or not the coefficient is stable over the long term. Both of these methods were used in order to validate the model's long-term coefficient. These two methods were put to use in order to determine whether or not the ARDL model's long-term coefficient is stable over a long period. This was done so that a comparison could be made between the short-term dynamics of the variables and the long-term stability of the long-term coefficient. The purpose behind this comparison was to determine which of these two types of dynamics is more stable over time. This comparison was carried out with the intention of finding out which of these two forms of dynamics is more stable throughout the course of time. To put it another way, this was done in order to make the process of creating the comparison easier. The assumption that underpins the process of formulating the null hypothesis is that none of the error correction coefficients that are a part of the error correction model will shift within a 95% confidence range that has a 5% margin of error. This is the assumption that underpins the formulation of the null hypothesis. This is what is known as the null hypothesis. The null hypothesis of consistent coefficients can no longer be maintained if it is shown that any of the lines have been crossed at a level of significance of 5% or higher. This would be the scenario that unfolds if it is found that any of the lines have been crossed. In order for the exchange rate coefficient to maintain its stability over time, the plot of CUSUM and CUSUMQ data must remain contained within the critical bounds shown in the right figure.

5.3 Conclusion

According to the information that is shown in the table that is located at the very top of the page, there is a link between rising CO_2 emissions and the expansion of the economy that may be described as "negative" or "long-run." You can get this information by clicking here. According to the findings of the statistical analysis, there is a significant connection between the two variables. The level of significance for this relationship is 1%, and the positive coefficient for this relationship is -0.02. This demonstrates that releasing carbon dioxide (CO_2) into the atmosphere will not, over the course of time, be beneficial to the expansion of the economy. Even though

economic growth is expected to keep picking up speed in the coming years, this will cause it to drop by -0.02 percent over time.

This would appear to show that CO_2 is more of a complement to economic expansion than it is a replacement for it over the long term. Because of this discovery, the null hypothesis has been demonstrated to be invalid, and we can assert that the level of carbon dioxide in the atmosphere has a significant inverse correlation with the expansion of economic activity over the course of time. The likelihood of the output of government capital being zero is 0.007, which shows that the discovery is statistically significant at a level of significance that is equal to or higher than 5%. In addition, this proves that the coefficient has a positive value, as shown by the result of the computation, which is 0.04. This demonstrates that the coefficient has a positive value.

To catch up to the usual sub-Saharan per capita income level, the Ethiopian economy must increase at a faster rate (10 percent) during the next twenty years. Ironically, Ethiopia's gross domestic savings as a proportion of GDP are quite low. Furthermore, according to statistics from 2007 provided by the Ethiopian Economic Association, it is very doubtful that Ethiopia could attain this growth rate by mobilizing its limited domestic resources. Ethiopia's current government knows that local savings aren't enough to pay for the amount of investment needed for development, so it has opened the door to foreign investment in many areas of the economy.

Some of the incentives that the government is offering investors in an effort to entice foreign investment and as part of the government's consideration of policy changes regarding investments include tax holidays, free or inexpensive lease-based supplies of land, duty-free importation of capital goods, and export tax deductions. These are just some of the incentives that the government is offering investors. The government has also put a lot of money into building the country's infrastructure, such as its power grid, highways, and communication networks, in order to attract investors.

5.4 Recommendations

Because of the growth in carbon dioxide (CO_2) emissions in Ethiopia, the government may decide to take immediate action, particularly by establishing a policy that aims to lessen the chance of a significant increase in the problem of carbon dioxide (CO_2) emissions in Ethiopia in the future. To prevent the depletion of non-renewable energy sources, the government could recommend to the public the

adoption of environmentally friendly technology and to enterprises that they reduce their energy use or switch to other sources of power.

According to the low-carbon development theory, the business cycle serves to contribute to a decrease in the amount of inefficiency that may be found in the energy sector. This is one of the hypotheses that underlie the theory. According to its results, the low-carbon development theory receives further support from our research. It is the duty of each region to stimulate research and development of environmentally friendly energy sources in order to enhance the overall quality of the energy mix and make it less harmful.

One way that this may be done is through promoting the use of energy sources that are less harmful to the environment. It would be beneficial for governments to consider modifying their regulations in a manner that would promote the use of cleaner energy sources while also preserving the natural environment in order to make this process work more efficiently.

After that, we present a number of different possibilities, each of which may involve a different set of strategies for the government of Ethiopia to take into consideration in order to maintain the ecological balance within the country. This is done in order to ensure that ecological equilibrium is maintained in Ethiopia. The accumulation of empirical evidence suggests that it is necessary to carry out a number of actions related to energy, such as the promotion of renewable sources, more efficient processes, and regulations that make the implementation of foreign clean industry in host countries more desirable. These are some of the examples of what are known as "energy-related actions."

Among the other possible actions that should be taken, these include: These are some of the tasks that have to be completed as soon as possible. In order to attain greater ecological effectiveness, responsible governmental organizations need to concentrate on increasing the capacity of their current capitalization facilities. In order to realize the objective of increased ecological efficiency, this step absolutely must be taken. They need to increase technical efforts to reduce the scale effect and promote technology that creates less pollution; as an alternative, Ethiopian authorities may fight for stricter environmental regulations and clean renewable energy sources. The scale effect is a problem because it causes pollution on a larger scale. The scale effect is problematic since it results in a greater amount of pollution being produced. These

activities would have a better chance of being successful if they were undertaken (e.g., wind or solar).

Then, it might be better to reorganize systems and institutions for protecting the environment than to stop FDI and globalization activities that hurt the environment.

Empirical studies give policymakers the data they need to figure out how the changing foreign direct investment landscape affects investment, the growth of assets, and the set of regulated elements. While growth rates of FDI degrade environmental quality, capital creation may lower CO_2 emissions. Although the research has some limitations, such as the use of aggregate FDI statistics, disaggregated data may give additional specifics. Furthermore, what sort of capital creation is necessary for environmental improvements? Further study on these questions may provide policymakers with additional specifics about the best options.

References

Abbas Khan, K., Zaman, K., Shoukry, A. M., Sharkawy, A., Gani, S., Ahmad, J., ... & Hishan, S. S. (2019). Natural disasters and economic losses: controlling external migration, energy and environmental resources, water demand, and financial development for global prosperity. *Environmental Science and Pollution Research*, *26*(14), 14287-14299.

Abbas, S., Kousar, S., & Pervaiz, A. (2021). Effects of energy consumption and ecological footprint on CO2 emissions: an empirical evidence from Pakistan. *Environment, Development and Sustainability*, *23*(9), 13364-13381.

Adedoyin, F., Ozturk, I., Abubakar, I., Kumeka, T., Folarin, O., & Bekun, F. V. (2020). Structural breaks in CO2 emissions: are they caused by climate change protests or other factors?. *Journal of environmental management*, *266*, 110628.

Adugna, R. (2022). Economic growth and environmental degradation in Ethiopia: An Environmental Kuznets Curve Hypothesisanalysis approach.

Agboola, M. O., & Bekun, F. V. (2019). Does agricultural value added induce environmental degradation? Empirical evidence from an agrarian country. *Environmental Science and Pollution Research*, *26*(27), 27660-27676.

Ahmad, N., Du, L., Lu, J., Wang, J., Li, H. Z., & Hashmi, M. Z. (2017). Modelling the CO2 emissions and economic growth in Croatia: is there any environmental Kuznets curve?. *Energy*, *123*, 164-172.

Akbostancı, E., Türüt-Aşık, S., & Tunç, G. İ. (2009). The relationship between income and environment in Turkey: is there an environmental Kuznets curve?. *Energy policy*, *37*(3), 861-867.

Alshubiri, F., & Elheddad, M. (2019). Foreign finance, economic growth and CO2 emissions

Nexus in OECD countries. *International Journal of Climate Change Strategies and Management*, *12*(2), 161-181

Álvarez-Herránz, A., Balsalobre, D., Cantos, J. M., & Shahbaz, M. (2017). Energy innovations-

GHG emissions nexus: fresh empirical evidence from OECD countries. *Energy Policy*, *101*, 90100.

Ang, J. B. (2007). CO2 emissions, energy consumption, and output in France. *Energy policy*, *35*(10), 4772-4778.

Apergis, N., & Ozturk, I. (2015). Testing environmental Kuznets curve hypothesis in Asian countries. *Ecological indicators*, *52*, 16-22.

Appiah, M. O. (2018). Investigating the multivariate Granger causality between energy consumption, economic growth and CO2 emissions in Ghana. *Energy Policy*, *112*, 198-208.

Aroufi, N., & Hajilary, N. (2022). The impacts of economic growth, foreign direct investments, and gas consumption on the environmental Kuznets curve hypothesis CO2 emission in Iran. *Environmental Science and Pollution Research*, *29*(56), 85350-85363.

Aslam, B., Hu, J., Shahab, S., Ahmad, A., Saleem, M., Shah, S. S. A., & Hassan, M. (2021). The nexus of industrialization, GDP per capita and CO2 emission in China. *Environmental Technology & Innovation*, *23*, 101674.

Awosusi, A. A., Mata, M. N., Ahmed, Z., Coelho, M. F., Altuntaş, M., Martins, J., & Martins, J. N. (2022). How do renewable energy, economic growth and natural resources rent affect environmental sustainability in a globalized economy? Evidence from Colombia based on the gradual shift causality approach. How do renewable energy, economic growth and natural resources rent affect environmental sustainability in a globalized economy? Evidence from Colombia based on the gradual shift causality approach.

Batten, J. A., & Vo, X. V. (2009). An analysis of the relationship between foreign direct investment and economic growth. *Applied Economics*, *41*(13), 1621-1641.

Balli, E., Sigeze, C., Ugur, M. S., & Çatık, A. N. (2021). The relationship between FDI, CO_2 emissions, and energy consumption in Asia-Pacific economic cooperation

countries. *Environmental Science and Pollution Research*, 1-18.

Balsalobre-Lorente, D., Driha, O. M., Bekun, F. V., Sinha, A., & Adedoyin, F. F. (2020). Consequences of COVID-19 on the social isolation of the Chinese economy: accounting for the role of reduction in carbon emissions. *Air Quality, Atmosphere & Health*, *13*(12), 1439-1451.

Bekana, D. M. (2016). Does Financial Sector Development Drive Economic Growth in a PostCommunist Economy? Evidence from Ethiopia. *Economic Insights-Trends and*

Challenges, *68*(1), 15-38.

Bermejo Carbonell, J., & Werner, R. A. (2018). Does foreign direct investment generate economic growth? A new empirical approach applied to Spain. *Economic geography*, *94*(4), 425-456.

Bezdek, R. H., Wendling, R. M., & DiPerna, P. (2008). Environmental protection, the economy, and jobs: National and regional analyses. *Journal of Environmental Management*, *86*(1), 63-79.

Blackman, A. (2010). Alternative pollution control policies in developing countries.

Boukhelkhal, A. (2022). Energy use, economic growth and CO2 emissions in Africa: does the environmental Kuznets curve hypothesis exist? New evidence from heterogeneous panel under cross-sectional dependence. *Environment, Development and Sustainability*, *24*(11), 13083-13110.

Broner, F., Bustos, P., & Carvalho, V. M. (2012). *Sources of comparative advantage in polluting industries* (No. w18337). National Bureau of Economic Research.

Bulut, U., Ucler, G., & Inglesi-Lotz, R. (2021). Does the pollution haven hypothesis prevail in Turkey? Empirical evidence from nonlinear smooth transition models. *Environmental Science and Pollution Research*, *28*(29), 38563-38572.

Bu, M., Li, S., & Jiang, L. (2019). Foreign direct investment and energy intensity in China: Firmlevel evidence. *Energy Economics*, *80*, 366-376.

Chandran, V. G. R., & Tang, C. F. (2013). The impacts of transport energy consumption, foreign direct investment and income on CO2 emissions in ASEAN-5 economies. *Renewable and Sustainable Energy Reviews*, *24*, 445-453.

Chen, H., Zhang, X., Wu, R., & Cai, T. (2020). Revisiting the environmental Kuznets curve for city-level CO2 emissions: based on corrected NPP-VIIRS nighttime light data in China. *Journal of Cleaner Production*, *268*, 121575

Cherni, A., & Jouini, S. E. (2017). An ARDL approach to the CO_2 emissions, renewable energy and economic growth nexus: Tunisian evidence. *International Journal of Hydrogen Energy*, *42*(48), 29056-29066.

Chen, W., & Geng, W. (2017). Fossil energy saving and CO_2 emissions reduction performance, and dynamic change in performance considering renewable energy input. *Energy*, *120*, 283-292.

Chowdhury, A., & Mavrotas, G. (2003). Foreign direct investment and growth: what causes what. *Department of Economics, Marquette University, USA, World Institute Development Economic Research/United Nations University*.

Daly, H. E. (2017). Toward some operational principles of sustainable development 1. In *The Economics of Sustainability* (pp. 97-102). Routledge.

Demena, B. A., & Afesorgbor, S. K. (2020). The effect of FDI on environmental emissions: Evidence from a meta-analysis. *Energy Policy*, *138*, 111192.

Denisia, V. (2010). Foreign direct investment theories: An overview of the main FDI theories. *European journal of interdisciplinary studies*, (3).

Dritsaki, C., & Dritsaki, M. (2014). Causal relationship between energy consumption, economic growth and CO2 emissions: A dynamic panel data approach. *International Journal of Energy Economics and Policy*, *4*(2), 125-136.

Ei, X., Mohsin, M., & Zhang, Q. (2022). Role of foreign direct investment and economic growth in renewable energy development. *Renewable Energy*, *192*, 828-837.

Emako, E., Nuru, S., & Menza, M. (2022). The role of foreign direct investment in structural change in Ethiopia. *Cogent Business & Management*, *9*(1), 2154106.

Farooq, F., Chaudhry, I. S., Yusop, Z., & Habibullah, M. S. (2020). How do globalization and foreign direct investment affect environmental quality in OIC member countries?. *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, *14*(2), 551-568.

Febriyanti, A. R., Ratnasari, R. T., & Wardhana, A. K. (2022). The effect of economic growth, agricultural land, and trade openness moderated by population density on deforestation in OIC countries. *Quantitative Economics and Management Studies*, *3*(2), 221-234.

Fernandes, A. M., & Paunov, C. (2012). Foreign direct investment in services and manufacturing productivity: Evidence for Chile. *Journal of Development Economics*, *97*(2), 305-321

Galeotti, M., Manera, M., & Lanza, A, (2009). On the robustness checks of the environment

Kuznets curve hypothesis. Environmental and Resources Economics, 42(4), 551-574

Glasure, Y. U. (2002). Energy and national income in Korea: further evidence on the role of omitted variables. *Energy economics*, *24*(4), 355-365.

Gök, A. (2019). Economic growth and environmental impacts of foreign direct investment in emerging market economies. In *Handbook of Research on Economic and Political Implications of Green Trading and Energy Use* (pp. 107-122). IGI Global

Grossman, G. M., & Krueger, A. B. (1991). Environmental impacts of a North American free trade agreement.

Halicioglu, F. (2009). An econometric study of CO2 emissions, energy consumption, income and foreign trade in Turkey. *Energy policy*, *37*(3), 1156-1164.

Hansen, H., & Rand, J. (2006). On the causal links between FDI and growth in developing countries. *World Economy*, *29*(1), 21-41

Helpman, E. (1992). Endogenous macroeconomic growth theory. *European Economic Review*, *36*(2-3), 237-267.

Hitam, M. B., & Borhan, H. B. (2012). FDI, growth and the environment: impact on quality of life in Malaysia. *Procedia-Social and Behavioral Sciences*, *50*, 333-342.

Howitt, P. (2005). Health, human capital, and economic growth: A Schumpeterian perspective. *Health and economic growth: Findings and policy implications*, *1*, 19-40.

Islam, M., Khan, M. K., Tareque, M., Jehan, N., & Dagar, V. (2021). Impact of globalization, foreign direct investment, and energy consumption on CO2 emissions in Bangladesh: Does institutional quality matter?. *Environmental Science and Pollution Research*, *28*(35), 4885148871.

Jun, Y., Zhong-kui, Y., & Peng-fei, S. (2011). Income distribution, human capital and environmental quality: empirical study in China. *Energy Procedia*, *5*, 1689-1696.

Kastratović, R. (2019). Impact of foreign direct investment on greenhouse gas emissions in agriculture of developing countries. *Australian Journal of Agricultural and Resource Economics*, *63*(3), 620-642.

Khanna, M., & Brouhle, K. (2009). The effectiveness of voluntary environmental initiatives. *Governance for the environment: New perspectives*, 144-182.

Kim, E. J., Siegelman, R. L., Jiang, H. Z., Forse, A. C., Lee, J. H., Martell, J. D., ... & Long, J. R. (2020). Cooperative carbon capture and steam regeneration with tetraamine-appended metal– organic frameworks. *Science*, *369*(6502), 392-396.

Kurtishi-Kastrati, S. (2013). The Effects of Foreign Direct Investments for Host Country's Economy. *European journal of interdisciplinary studies*, *5*(1).

Lee, J. W. (2013). The contribution of foreign direct investment to clean energy use, carbon emissions and economic growth. *Energy policy*, *55*, 483-489.

Li, J. S., Chen, G. Q., Lai, T. M., Ahmad, B., Chen, Z. M., Shao, L., & Ji, X. (2013). Embodied greenhouse gas emission by Macao. *Energy Policy*, *59*, 819-833.

Liu, H. (2022). Wang KT Khudoykulov K, Tai TD, Ngo TQ and Phan TTH (2022) Does Economic Development Impact CO2 Emissions and Energy Efficiency Performance? Fresh Evidences From Europe. Front. *Energy Res*, *10*, 860427.

Liu, X., Wahab, S., Hussain, M., Sun, Y., & Kirikkaleli, D. (2021). China carbon neutrality target: revisiting FDI-trade-innovation nexus with carbon emissions. *Journal of Environmental Management*, *294*, 113043.

Lv, Y., Liu, J., Cheng, J., & Andreoni, V. (2021). The persistent and transient total factor carbon emission performance and its economic determinants: evidence from China's province-level panel data. *Journal of Cleaner Production*, *316*, 128198

Luo, W., & Cheng, J. (2022). Transition to sustainable business models for green economic recovery: role of financial literacy, innovation and environmental sustainability. *Economic Change and Restructuring*, 1-24.

Mahmood, M. T., Shahab, S., & Shahbaz, M. (2022). The relevance of economic freedom for energy, environment, and economic growth in Asia-Pacific region. *Environmental Science and Pollution Research*, *29*(4), 5396-5405.

Mohsin, M., Naseem, S., Sarfraz, M., & Azam, T. (2022). Assessing the effects of fuel energy consumption, foreign direct investment and GDP on CO2 emission: New data science evidence from Europe & Central Asia. *Fuel*, *314*, 123098.

Manderson, E., & Kneller, R. (2012). Environmental regulations, outward FDI and heterogeneous firms: are countries used as pollution havens?. *Environmental and Resource Economics*, *51*(3), 317-352.

Nain, M. Z., Ahmad, W., & Kamaiah, B. (2017). Economic growth, energy consumption and CO2 emissions in India: a disaggregated causal analysis. *International Journal of Sustainable Energy*, *36*(8), 807-824.

Nemet, G. F (2019), How solar energy became cheap: A model for low-carbon innovation. Routledge

Nguyen, M. T. (2013). Impacts of FDI on technology upgrade and employment of Singapore and Malaysia, lesson for Vietnam

Le, T. H. (2022). Connectedness between nonrenewable and renewable energy consumption, economic growth and CO2 emission in Vietnam: New evidence from a wavelet analysis. *Renewable Energy*, *195*, 442-454.

Obuobisa, E. S. (2018). Review of Energy, Environmental Pollution and Economic Development in China. *Canadian Journal of Applied Science and Technology*, *6*(2).

Omri, A. (2013). CO2 emissions, energy consumption and economic growth nexus in MENA countries: Evidence from simultaneous equations models. *Energy economics*, *40*, 657-664.

Ozturk, I., & Al-Mulali, U. (2015). Investigating the validity of the environmental Kuznets curve hypothesis in Cambodia. *Ecological Indicators*, *57*, 324-330.

Pachiyappan, D., Ansari, Y., Alam, M. S., Thoudam, P., Alagirisamy, K., & Manigandan, P. (2021). Short and long-run causal effects of CO2 emissions, energy use, GDP and population growth: evidence from India using the ARDL and VECM approaches. *Energies*, *14*(24), 8333 Pejović, B., Karadžić, V., Dragašević, Z., & Backović, T. (2021). Economic growth, energy consumption and CO2 emissions in the countries of the European Union and the Western Balkans. *Energy Reports*, *7*, 2775-2783.

Piłatowska, M., & Włodarczyk, A. (2017). The environmental Kuznets curve in the CEE countriesthe threshold cointegration approach

Pratama, I. A, & Panjawa, J. L, (2022), Analysis of the effect of gross domestic product, financial development, foreign direct investment, and energy on CO_2 emisssions in Indonesia for the 19902020 period. Journal of Humanities, Social Sciences and Business (JHSSB), 1(4), 189-208

Rahman, M. M., & Alam, K. (2021). Clean energy, population density, urbanization and environmental pollution nexus: Evidence from Bangladesh. *Renewable Energy*, *172*, 1063-1072

Shaari, M. S., Hussain, N. E., Abdullah, H., & Kamil, S. (2014). Relationship among foreign direct investment, economic growth and CO2 emission: a panel data analysis. *International Journal of Energy Economics and Policy*, *4*(4), 706-715

Shahbaz, M., Balsalobre-Lorente, D., & Sinha, A. (2019). Foreign direct Investment–CO2 emissions nexus in Middle East and North African countries: Importance of biomass energy consumption. *Journal of cleaner production*, *217*, 603-614.

Singh, A. K., Issac, J., & Narayanan, K. G. S. (2019). Measurement of environmental sustainability index and its association with socio-economic indicators in selected Asian economies: An empirical investigation. *International Journal of Environment and Sustainable Development*, *18*(1), 57-100.

Stern, D. I. (2017). The environmental Kuznets curve. In *Oxford Research Encyclopedia of Environmental Science*.

Tamene, K. A., & Daba, B. (2020). A Comparative Assessment on the Role of Private Investment in Poverty Reduction in Illubabor and Jimma Zones, Oromiya National Regional State, Ethiopia. *International Journal of Multicultural and Multireligious Understanding*, *7*(2), 552-560.

Tan, F., Wan, H., Jiang, X., & Niu, Z. (2021). The impact of outward foreign direct investment on carbon emission toward china's sustainable development. *Sustainability*, *13*(21), 11605.

Tang, C. F., & Tan, B. W. (2015). The impact of energy consumption, income and foreign direct investment on carbon dioxide emissions in Vietnam. *Energy*, *79*, 447-454.

Tung, R. L. (2007). The human resource challenge to outward foreign direct investment aspirations from emerging economies: The case of China. *The International Journal of Human Resource Management*, *18*(5), 868-889.

Udemba, E. N. (2020). Mediation of foreign direct investment and agriculture towards ecological footprint: a shift from single perspective to a more inclusive perspective for India. *Environmental*

Science and Pollution Research, *27*(21), 26817-26834

Vidyarthi, H. (2013). Energy consumption, carbon emissions and economic growth in India. *World Journal of Science, Technology and Sustainable Development*.

Wan, X. (2010). A literature review on the relationship between foreign direct investment and economic growth. *International Business Research*, *3*(1), 52.

Wang, H., & Wei, W. (2020). Coordinating technological progress and environmental regulation in CO2 mitigation: The optimal levels for OECD countries & emerging economies. *Energy Economics*, *87*, 104510.

Wang, S., Li, Q., Fang, C., & Zhou, C. (2016). The relationship between economic growth, energy consumption, and CO2 emissions: Empirical evidence from China. *Science of the Total Environment*, *542*, 360-371

Xu, Z., Sun, D. W., Zeng, X. A., Liu, D., & Pu, H. (2015). Research developments in methods to reduce the carbon footprint of the food system: a review. *Critical reviews in food science and nutrition*, *55*(9), 12701286.

Zhang, K. H. (2001). How does foreign direct investment affect economic growth in China?. *Economics of transition*, *9*(3), 679-693.

Zhang, X. P., & Cheng, X. M. (2009). Energy consumption, carbon emissions, and economic growth in China. *Ecological economics*, *68*(10), 2706-2712.

Zhou, X., Wilson, C., & Caldecott, B. (2021). The energy transition and changing financing costs.

Zhou, H., Yang, Y., Chen, Y., & Zhu, J. (2018). Data envelopment analysis application in sustainability: The origins, development and future directions. *European Journal of* Operational Research, 264(1), 1-16

Appendix

Test

Deceptive statistic

	IGCO2	CI	FDI	GDP
Mean	8.576114	10.92458	2.235920	6.847630
Median	8.554125	0.000000	2.052579	8.725182
Maximum	9.817930	40.67127	5.576213	13.57260 -
Minimum	7.326466	0.000000	0.000000	8.672480
Std. Dev.	0.699754	17.02785	1.865168	5.897678
Skewness	0.193504	0.893841	0.313675	-1.212883
Kurtosis	2.061527	1.828909	1.757981	3.649856
Jarque-Bera	1.288133	5.709075	2.420221	7.883321
Probability	0.525153	0.057582	0.298164	0.019416
Sum	257.2834	327.7373	67.07759	205.4289
Sum Sq. Dev.	14.20003	8408.478	100.8867	1008.696
Observations	30	30	30	30

Unit root test

Null Hypothesis: IGCO2 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.567249	0.9862
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(IGCO2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic 0.0001		-5.414442	
Test critical values:	1% level	-3.689194	
	5% level -2.971853 10% level -2.625121		

*MacKinnon (1996) one-sided p-values.

ARDL Long Run Form and Bounds Test Dependent Variable: D(IGCO2)
Selected Model: ARDL(4, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 12/28/22 Time: 22:05
Sample: 1 30
Included observations: 26

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.401129	0.591381	2.369247	0.0556
IGCO2(-1)*	-0.161064	0.076877	-2.095071	0.0810
CI(-1)	0.006494	0.002096	3.098051	0.0212
FDI(-1)	0.035708	0.015084	2.367216	0.0557
GDP(-1)	-0.003831	0.007687	-0.498425	0.6359
D(IGCO2(-1))	-0.196752	0.206541	-0.952607	0.3776
D(IGCO2(-2))	-0.132163	0.118341	-1.116800	0.3068
D(IGCO2(-3))	-0.323036	0.141775	-2.278517	0.0629
D(CI)	0.005008	0.002004	2.499149	0.0466
D(CI(-1))	0.001074	0.001663	0.646021	0.5422
D(CI(-2))	-0.001129	0.001711	-0.659564	0.5340
D(CI(-3))	0.002867	0.001561	1.835929	0.1160
D(FDI)	0.039333	0.010518	3.739768	0.0096
D(FDI(-1))	-0.031668	0.014745	-2.147707	0.0753
D(FDI(-2))	-0.038481	0.014558	-2.643345	0.0384
D(FDI(-3))	-0.019416	0.012089	-1.606116	0.1594
D(GDP)	-0.001708	0.002636	-0.647935	0.5410
D(GDP(-1))	0.000652	0.005122	0.127315	0.9029
D(GDP(-2))	-0.003536	0.003841	-0.920542	0.3928
D(GDP(-3))	0.003527	0.002201	1.602605	0.1601

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Tr
end

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CI	0.040318	0.010148	3.972771	0.0073
FDI	0.221699	0.063335	3.500440	0.0128
GDP	-0.023787	0.054217	-0.438729	0.6762
C	8.699215	0.583308	14.91359	0.0000

EC = IGCO2 - (0.0403*CI + 0.2217*FDI -0.0238*GDP + 8.6992)

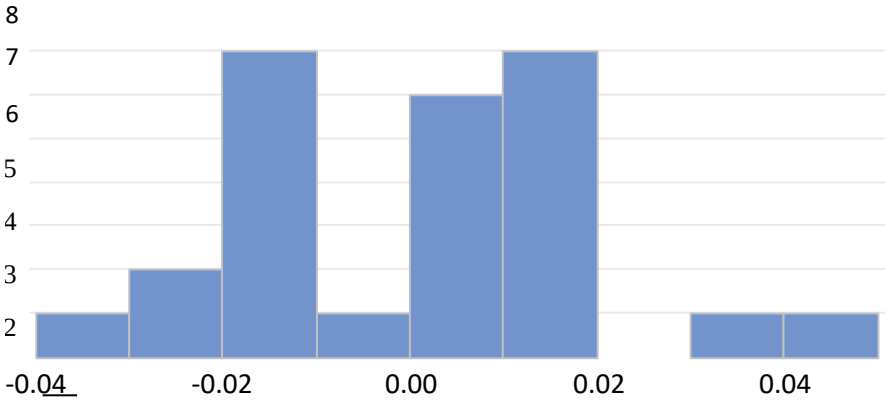
F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
				Asymptotic: n=1000
F-statistic	6.232613	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
Actual Sample Size	26			
			Finite Sample: n=35	
		10%	2.618	3.532
		5%	3.164	4.194
		1%	4.428	5.816
Included observations: 26				

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IGCO2(-1))	-0.196752	0.136346	-1.443040	0.1991
D(IGCO2(-2))	-0.132163	0.065606	-2.014503	0.0906
D(IGCO2(-3))	-0.323036	0.079757	-4.050266	0.0067
D(CI)	0.005008	0.000954	5.248911	0.0019
D(CI(-1))	0.001074	0.000989	1.086590	0.3189
D(CI(-2))	-0.001129	0.001160	-0.973145	0.3681
D(CI(-3))	0.002867	0.001074	2.669545	0.0370
D(FDI)	0.039333	0.006094	6.453977	0.0007
D(FDI(-1))	-0.031668	0.005738	-5.519393	0.0015
D(FDI(-2))	-0.038481	0.006681	-5.760050	0.0012
D(FDI(-3))	-0.019416	0.007011	-2.769402	0.0324
D(GDP)	-0.001708	0.001545	-1.105617	0.3112
D(GDP(-1))	0.000652	0.001585	0.411512	0.6950
D(GDP(-2))	-0.003536	0.001817	-1.945797	0.0996
D(GDP(-3))	0.003527	0.001243	2.836766	0.0297
CointEq(-1)*	-0.161064	0.022349	-7.206833	0.0004

Residual diagnostic



Series: Residuals
Sample 5 30
Observations 26

Mean	-9.05e-16
Median	0.001658
Maximum	0.043124
Minimum	-0.039607
Std. Dev.	0.018706
Skewness	0.248549
Kurtosis	3.051012
Jarque-Bera	0.270517
Probability	0.873490

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.705065	Prob. F(19,6)	0.7411
Obs*R-squared	17.95720	Prob. Chi-Square(19)	0.5253
Scaled explained SS	0.980692	Prob. Chi-Square(19)	1.0000

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

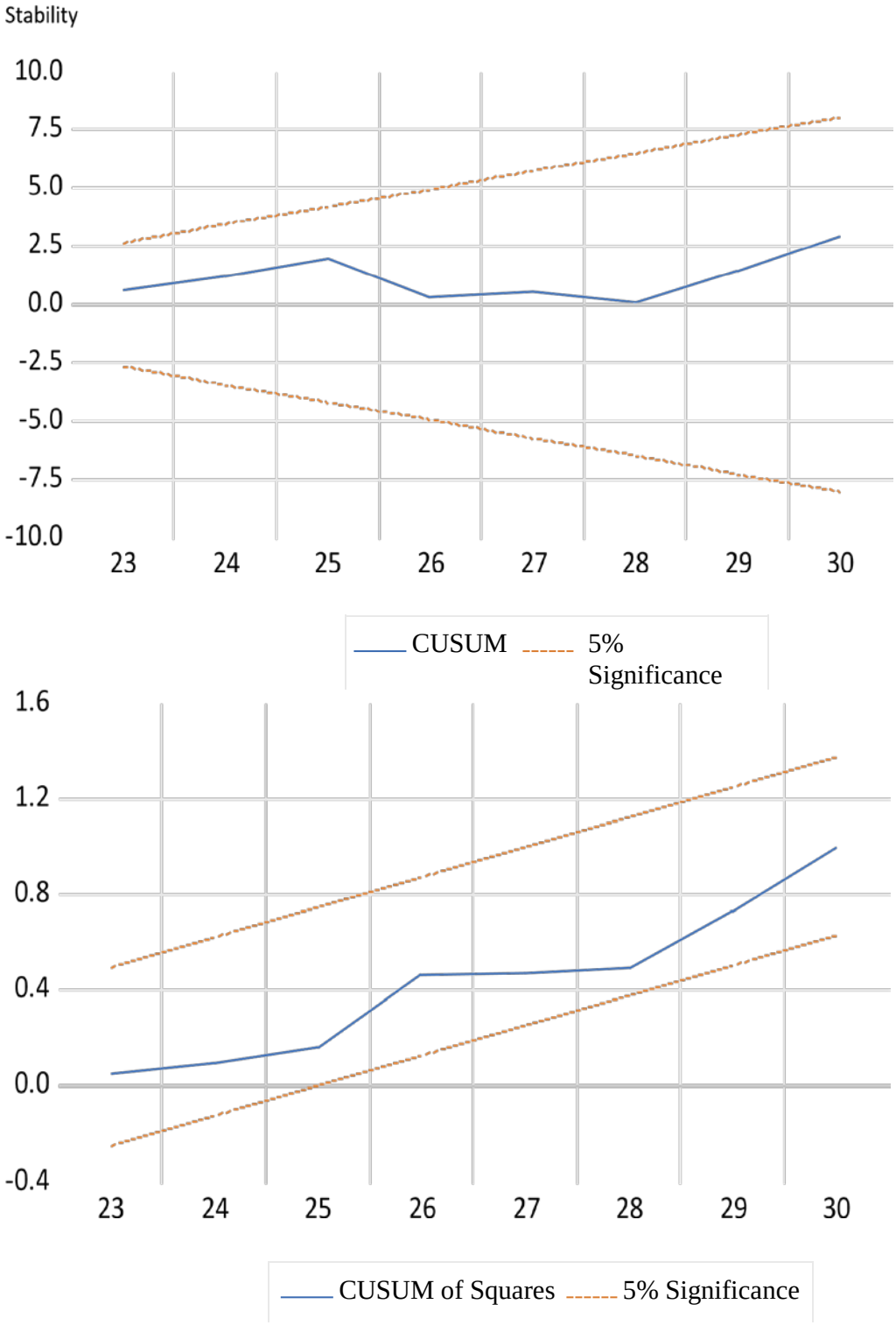
F-statistic	0.504682	Prob. F(2,21)	0.6108
Obs*R-squared	1.329960	Prob. Chi-Square(2)	0.5143

Test Equation:

Granger causality

Pairwise Granger Causality Tests
Date: 12/28/22 Time: 22:10
Sample: 1 30
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CI does not Granger Cause IGCO2	28	0.57339	0.5715
IGCO2 does not Granger Cause CI		1.10795	0.3472
FDI does not Granger Cause IGCO2	28	0.26040	0.7730
IGCO2 does not Granger Cause FDI		0.51897	0.6019
GDP does not Granger Cause IGCO2	28	1.73516	0.1987
IGCO2 does not Granger Cause GDP		3.61645	0.0431
FDI does not Granger Cause CI	28	0.36703	0.6968
CI does not Granger Cause FDI		1.33300	0.2833
GDP does not Granger Cause CI	28	0.68022	0.5164
CI does not Granger Cause GDP		0.29318	0.7486
GDP does not Granger Cause FDI	28	0.47753	0.6263
FDI does not Granger Cause GDP		0.28765	0.7527


Stability
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5% Significance
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