



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

**ANALYZING THE ROLE OF GOLD AND OIL PRICES, FDI, EXCHANGE  
RATE, AND INFLATION ON GDP GROWTH IN GHANA, 1980-2020**

**MSc. THESIS**

**SAM F. LARMIN JR**

**Nicosia**

**December 2022**

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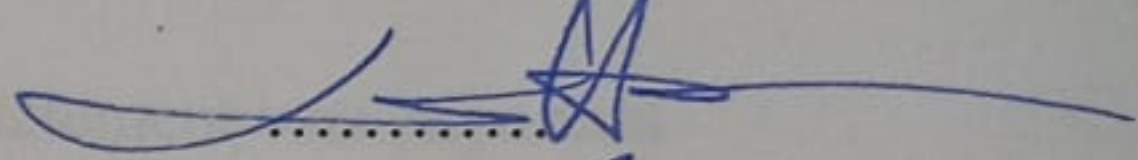
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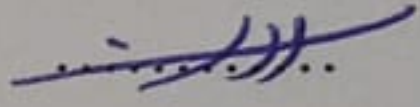
### Approval

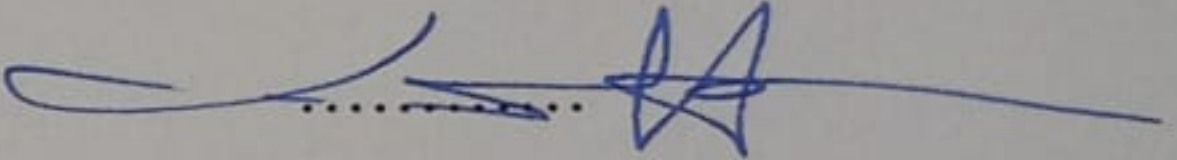
We attest to having read **Sam F. Larimin Jr.**'s thesis, "Analyzing the Role of Gold and Oil Price, FDI, Exchange Rate, and Inflation on GDP Growth in Ghana, 1980-2020." Furthermore, we believe it meets all requirements for a master's thesis for a Master of Sciences degree, including those that pertain to its depth and caliber.

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## **Declaration**

I thus certify that all data, materials, analyses, and conclusions in this thesis were gathered and presented in accordance with the academic standards and moral principles of the Institute of Graduate Studies at Near East University. I further affirm that, in accordance with these guidelines, I have properly attributed and referenced any material and data that is not unique to this work. Making this statement was important in order to adhere to these legislation' obligations and act in an appropriate manner.

SAM F. LARMIN JR

...../...../2022

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## **Abstract**

### **Analyzing The Role Of Gold And Oil Prices, Fdi, Exchange Rate, And Inflation On Gdp Growth In Ghana, 1980-2020**

**SAM F. LARMIN JR**

**Supervisor: Assoc Prof. Dr. Ahmed Samour**

**MSc, Department of Banking and Finance**

**December 2022, 115 pages**

This thesis scrutinized the impact of gold and oil prices, FDI, the exchange rate, and inflation on GDP growth in Ghana, using time series instruments covering the period 1980–2020. GDP growth in this research is used as a surrogate for economic growth. This thesis utilized econometric platforms to examine the variables under study and derive a logical conclusion to offer genuine recommendations. The unit root test was used to test the variable to ascertain if the series is stationary, which is the first step in analyzing the data. The denouement of the unit root examination divulged in this research exhibits that the variables commingle at either  $I(1)$  or  $I(0)$ , which is at levels or the first difference. 1%, 5%, and 10% significance levels were utilized as the standard to estimate the significance level. The ECM model displayed a very high speed of adjustment, as the rate is -0.871189 coefficients. The ARDL-bound short- and long-run test procedures were employed in the research to determine the short- and long-term relationships of the variables; the results presented were heterogeneous. Moreover, serial correlation tests were implemented to test for autocorrelations among the variables. The outcome revealed that there are no serial correlations betwixt the variables. The normality test also pointed out that the variables are uniformly distributed. It was also revealed that the variance of the series is homoskedasticity. Lastly, the Granger causality test exhibited a significant relationship among the variables, but it proved to be unidirectional.

**Key Words:** GDP, FDI, Homoskedacity, Unidirectional, heterogeneous

**Öz****Gana'da Altın ve Petrol Fiyatları, FDI, Döviz Kuru ve Enflasyonun GSYİH****Büyümesindeki Rolünün İncelenmesi, 1980-2020****SAM F. LARMIN JR****Danışman: Assoc Prof. Dr. Ahmed Samour****MSc, Bankacılık ve Finans Bölümü****Ocak 2023, 92 sayfa**

Bu tez, 1980–2020 dönemini kapsayan zaman serisi araçlarını kullanarak altın ve petrol fiyatlarının, DYY'nin, döviz kurunun ve enflasyonun Gana'daki GSYİH büyümesi üzerindeki etkisini inceledi. Bu araştırmadaki GSYİH büyümesi, ekonomik büyümenin vekili olarak kullanılmaktadır. Bu tez, incelenen değişkenleri incelemek ve gerçek öneriler sunmak için mantıklı bir sonuca varmak için ekonometrik platformlardan yararlandı. Verilerin analizinde ilk adım olan serinin durağan olup olmadığını belirlemek için değişkeni test etmek amacıyla birim kök testi kullanılmıştır. Bu araştırmada açıklanan birim kök incelemesinin sonucu, değişkenlerin seviyelerde veya birinci fark olan I (I) veya I (0) noktasında karıştığını göstermektedir. Anlamlılık düzeyini tahmin etmek için standart olarak %1, %5 ve %10 anlamlılık seviyeleri kullanılmıştır. Oran -0,871189 katsayı olduğu için ECM modeli çok yüksek bir ayarlama hızı sergiledi. Araştırmada değişkenlerin kısa ve uzun dönem ilişkilerini belirlemek için ARDL'ye bağlı kısa ve uzun dönem test prosedürleri kullanılmış; sunulan sonuçlar heterojendi. Ayrıca, değişkenler arasındaki otokorelasyonları test etmek için seri korelasyon testleri uygulanmıştır. Sonuç, değişkenler arasında seri korelasyon olmadığını ortaya koydu. Normallik testi ayrıca değişkenlerin düzgün dağıldığına işaret etti. Ayrıca serinin varyansının homo varyans olduğu ortaya çıkmıştır. Son olarak, Granger nedensellik testi, değişkenler arasında anlamlı bir ilişki sergiledi, ancak tek yönlü olduğunu kanıtladı.

**Anahtar Kelimeler:** GSYİH, DYY, Homoskedacity, Tek yönlü, heterojen

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### **List of Abbreviations**

GDP ---Gross Domestic Product  
IN---Inflation  
REX---Real Exchange Rate  
FDI---Foreign Direct Investment  
GP---Gold Price  
OP---Oil Price  
LSM---Large Scale Mining  
GLSS--- Ghana Living Standard Survey  
SSM--- Small Scale Mining  
MEI---Ministry of Economics and Industry  
MC---Mega Corporation  
ETF---Exchange Traded Funds  
OPEC---Organization of Petroleum Exporting Countries  
GNP---Gross National Products  
FPI---FOREIGN Portfolio Investment  
ARDL---Auto Regressive Distributive Lag  
ADF---Augmented Dickey Fuller  
CPI---Consumer Price Index  
WGC---World Gold Council  
SCR---Social Corporate Responsibilities  
IMF---International Monetary Fund  
GFCF--- Gross Fixed Capital Investment

## CHAPTER ONE

### Introduction

As the narratives of natural resources being a blessing or curse continue to intensify, many nations of the universe strive to create genuine economic and development platforms that would engender the ideals of a structural and relative pricing system, as traditional commodities such as gold and oil continue to be in demand because of the significance of their high quality and widespread use. (Demierre et al., 2015) mentioned that natural capitals are of cardinal value to economic empowerment as they contribute to revenue generation, social well-being, and poverty reduction. The historicity of gold's impact on economic advancement dates back centuries, as it played multifunctional roles in our past pricing and economic exercises and continues to have a huge influence in our current era of globalization as a means of trade, price structure, medium of exchange, store of value, etc, that is analogous to money. Gold and oil are holistically known to be important items when measuring "innate capital's" impact with regards to economic expansion and advancement of a country; hence, their potential should never be underestimated, as they are capable of birthing situations that necessitate price examination, policy stratification, strategic framework development and implementation, as well as administrative regulations, etc.

(Van Der Ploeg, 2011) observed that natural resources (oil and gas) are blessings to some nations while they remain a curse to others. Understanding the nexus betwixt economic growth and commodity (ies) pricing is very essential, as the activities encompassing them vary from one country to another, from one region to another, from one setting to another, and so on. Pricing is a fundamental economic tool that can be used to generate genuine revenues, impact foreign direct investment (FDI), control inflations, deflation, currency appreciation, and depreciation, dictate currency exchange facilities, influence the quantity demanded, the and supply of commodities, and has a relationship with utility and consumer psychological behavior, product diversification, products breakeven points, purchasing power parity, interest rate, financial markups, marketer's concepts of service/products profiteering, and the list goes on. Many researchers have studied the relationship between pricing strategies, policies, and practices, but this research will focus exclusively on determining the influence of commodity pricing (Gold and Oil) on economic growth.

The uniqueness of this paper is unquestionable, as the research seeks to unveil, understand, and provide clarity on the link between commodities (gold and oil) pricing, and economic advancement with regards to gold and oil mining and exploration, thereby providing another economic instrument for policymakers, analysts, government agencies, and if possible, future researchers to explore. Currently, volatility in the pricing structure of essential commodities such as oil and gold has caught the attention of world leaders as their role in the present and future advancement of economic endeavors for sustainability is gracing a new height. Currently, serious amendments and reforms are ongoing in underdeveloped and developing countries to address the phrase "natural resource curse."

The foremost loud instruments of the resource curse are the relationship between natural capital and limited economic display, institutional inadequacy, civil strife, ethnic crisis, corruption, etc, as examined by Brunschweiler & Bulte, (2008), and Collier (2014). Despite being colonized and looted by her colonial masters, Africa is a vast land that boasts minerals of all kinds, ranging from gold, oil, tin, copper, iron ore, bauxite, uranium, manganese, platinum, phosphate, limestone, gas, crude, nickel, diamond, aluminum, lithium, and so on. It is estimated that Africa holds 30% of the world's total mineral reserves. Despite the numerous natural capitals Africa possesses, the economic condition of the continent is still discreditable and hazardous. The age-old aspiration of poverty moderation, if not alleviation, is seen by the masses as a mere whisper, due to massive corruption and malpractices across all sectors of their economies.

Ghana, a country in West Africa, is known for the ounces of gold it produces on an annual basis, as the country was previously known as the "gold coast" on the African continent. Al Jazeera (2018) mentioned that Africa has the swiftest foreign direct investment (FDI) rate in the 20<sup>th</sup> century, but it continues to be characterized by struggles to attain its true ability and capacity.

The extraction of gold from Ghana dates back some 1000 years; early merchants named the country "Gold Coast." taking into account mineral assets discovered by Arab and pre-colonial merchants between the 15<sup>th</sup> and 18<sup>th</sup> hundreds in the country. Before being declared a sovereign nation in 1957, Ghana's huge gold reserves ranging from the southern, eastern, and western belts of the nation made the nomenclature "Gold Coast" idealistic. As a result of the abundance of gold minerals,

mining became inexpensive, and sand beds from the river banks were searched, thus removing gold grains.

Even though her economy was agriculturally structured, individuals carried out mini-mining activities in the south and smuggled the minerals out of the nation for personal welfare, as mentioned by (Aryee et al., 2003).

Ghana gold activities and processes are subdivided into two cardinal segments centered on a calibrated extraction model, hence "LSM," or large-scale mining, which requires large funding sources, a substantial number of employees, and advanced technologies (Amponsah-Tawiah, 2011). While Small scale miners (SSM or Artisanal) comprised of individuals chiefly made of natives of the regions, as it does not entail huge spending and large crowds and usually functions with vestigial tools (Akabzaa & Darimani, 2001) (Worlanyo & Jiangfeng, 2021). Large-scale mining gives rise to 95% of the globe's minerals while providing employment opportunities for nearly 2–3 million individuals universally. (Nylandsted Larsen et al., 2009) stated that due to an inauspicious occurrence in the global gold market activities, a situation that brought about a significant decrease in the gold price universally, it also brought about policy revision and regulation in Ghana. This situation instigated an increase in the percentage of gold production and export contribution to Ghana's economic growth. This occurrence increases Ghana's production capacity through the inflow of foreign direct investment.

According to the data from the Ministry of Economic and Industry, mining operations provide 37 percent of the overall exports of the nation, 38.3 percent of the entire corporate tax regime in Ghana, and 27.6 percent of the total income of the government, as reported in the MEI report (2020). In the economy of Ghana, the mining sector is a significant capital asset that is crucial to both macroeconomic and microeconomic activities and growth. This is similar to the situation in the economies of other developing nations. Recently, Ghana has overcome South Africa to become the largest producer of gold on the African continent. As a result, Ghana has cemented its place among the world's top gold-producing countries, as sampled by the Ministry of Economic and Industrial Development (MEI) in the year 2020. Currently, the mining industry accounts for 9.1% of Ghana's gross domestic product (GDP), with gold accounting for 90–96% of all mined resources. Gold is the most valuable of all mined minerals. The mining sector is a key capital asset in the economy of Ghana, just as it is in the economies of all other developing nations. This information is authentic in

terms of both macroeconomic and microeconomic activities and growth. At the moment, mining operations account for 9.1% of the gross domestic product (GDP), and gold, which accounts for about 90–96% of all mined resources, constitutes practically all of those mining activities.

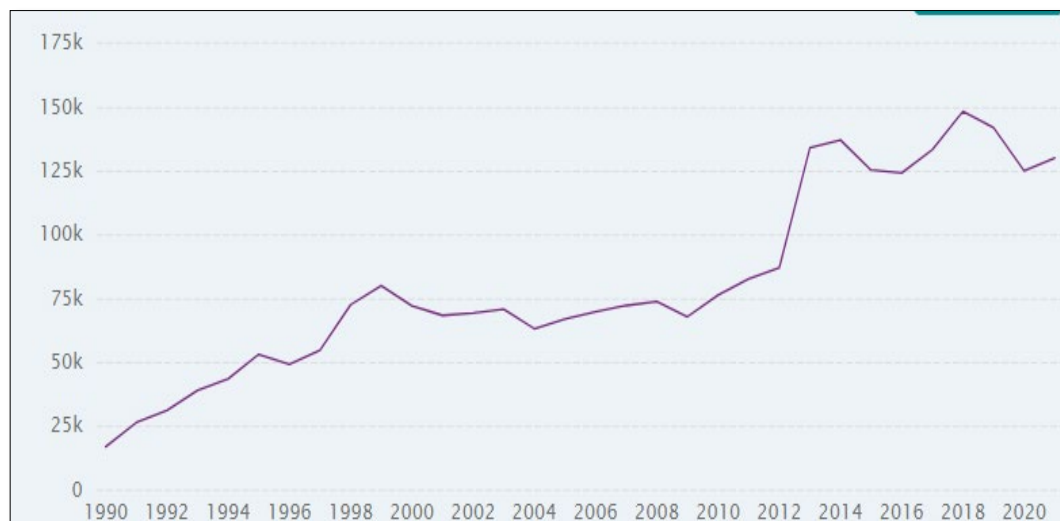
Merchants named the country "Gold Coast," taking into account mineral assets discovered by Arab and pre-colonial merchants between the 15<sup>th</sup> and 18<sup>th</sup> hundreds in the country. Before being declared a sovereign nation in 1957, Ghana's huge gold reserves ranging from the southern, eastern, and western belts of the nation made the nomenclature "Gold Coast" idealistic. As a result of the abundance of gold minerals, mining became inexpensive, and sand beds from the river banks were searched, thus removing gold grains.

(Akudugu et al., 2013) said that about 200,000 people are working illegally in the mining industry, while about 300,000 people are working legally in the MLM (minimum level mining) sector, which includes several types of small-scale mining. The Ghana Living Standard Survey (GLSS report 2017 bib28) said that more than 300,000 Ghanaians work legally in the large-scale mining (LSM) gold mining segment.

Gold has contributed immensely to the economy of Ghana; hence, between 2003 and 2016, gold became a standout export commodity, accounting for about 90 percent of the country's exported minerals, as its total export contribution to GDP was 5%. As the years progress, mining activities in Ghana continue to flourish, thereby paving the way for a momentous increase in foreign direct investment (FDI) and, simultaneously, government revenue. Ghana has been touted for its practice of revenue sharing; hence, the revenue generated from mining minerals is divided, with a portion of the rent going to various communities, as examined by (Standing and Hilson, 2013).

The rent paid for royalties to the Ghanaian government was initially 3%, which was later increased to 5%. The central government receives 80%, 10% is given to the administration of mining oversight, and the rest (10%) goes to district administrative works, as stated by (Gajigo et al., 2012) and (Standing & Hilson 2013), and (Garvin et al. 2013). In recent years, Ghana has overtaken South Africa as the highest gold-producing nation on the African continent. Gold mining was the most vibrant segment of the Ghanaian economy until the official declaration of the discovery of oil in a substantial commercial quantity in 2007.

**Figure 1. Ghana Gold Production and Price of Gold 1990 – 2020**



The unearthing of oil in Ghana stretches far back to the late eighteenth century (1896) (onshore), and drilling started immediately in the same period in the Tano and Keta basins. The extraction process continued until 1957 and 1966, when the country gained independence. The deep-water oil drilling process began in the 1970s and earmarked the beginning of a vast quantity and quality of oil exploration and export activities in Ghana, and the recent block discovery set the country up for expedient GDP growth as well as economic development. The vast oil and natural gas fields unearthed had seen rapid and important growth in the Ghanaian economy until the emergence of the COVID-19 virus. Before COVID-19, the petroleum sector flourished and exports were at a constant level, thereby expanding the pathway for more economic activities (employment opportunities, improved living standards, increased utility facilities, etc.). Ghana has national oil reserves of 600,000,000 barrels that are capable of lasting up to the next twenty years. The Jubilee field was discovered by Tullow Oil and Kosmos Energy in Ghana's western region, and it is anticipated to have 800 billion cubic feet of gasoline and 700 million barrels of oil. The Ghana oil location was swiftly developed, and by December 2010, formal oil mining and production had commenced. With the emergence of new deep-water oil field projects that started drilling in August 2016 and May 2017, Twenneboa, Enyenra, and Ntomme, which are made of literally 10 fields, and the Sankofa, Gye, and Nyame fields combined are predicted to hold 740 million barrels of oil and 1.45 trillion barrels, plus an additional



396 cubic feet of gasoline. Growth, as is well known, comes with a price; hence the mineral resource sector of Ghana has had its fair share.

The advancement of Ghana's deep-water oil corporations has been characterized by a series of challenges, in spite of the undeviating expansion the sectors have witnessed over time. Article 257, Section 6, of the 1992 Ghanaian Constitution gives the exclusive right to the president of the republic to oversee all economic activities covering "mineral rights in natural conditions, beneath the earth's crust, on land, rivers, streams, and water courses through the length and breadth of the nation, to act on behalf of, and with confidence for, the Ghanaian people." With this vested authority, the government sold Jubilee and her partners the rights to extract, explore, develop, and produce a number of blocks in 2004. These partners' companies included Tullow Oil Ghana Hold (35.48%), Kosmos Energy Hold (24.08%), Anadarko (24.08%), GNPC (13.64%), and Petro SA Hold (2.73%). Tullow Oil Ghana, with partners Kosmos (17%), Anadarko (17%), GNPC (15%), and PetroSA (3.82%), is in charge of eleven fields and has a 47.18% ownership share in them. Currently, Jubilee's partners are Tullow Oil Ghana (35.48%), Kosmos Energy (24.08%), Anadarko (24.08%), GNPC (13.64%), and Petro (2.73%). The Sankofa field, commonly known as the offshore Cape Three Points Integrated Oil and Gas Development Project, is controlled by Eni (44.44%), Partners Vitol (35.56%), and GNPC (20%). Oil discovery, which is popularly called "black gold" in Ghana, has of late stretched the economy of the country and caused an inflow of foreign direct investment. As this research seeks to understand the nexus between mining, exploration, and production of natural capital as opposed to economic expansion and development, gold and oil prices, foreign direct investment, the exchange rate, and inflation, are cardinal indicators that will be scrutinized to uniquely understand their impact on the GDP and economic growth of Ghana. Gold and oil prices are inextricably linked because they are so important in the spot market. Consequently, they both represent monetary wealth and financial security, while also functioning as exchange commodities, and can both be used as reserves for a nation.

Ghana, a nation in West Africa widely known for its numerous gold mines that have generated sufficient revenues and provided jobs for its citizens as it is one of the premier producing countries of gold in the world. Ghana plays host to large gold mining in several large mines and small artisanal mining activities carried out by locals

that have continued to expand its revenue base while also aiding in the areas of economic stability and economic growth.

Although current atmospheric conditions for global investment are increasingly turning toward the establishment of renewable energy systems and globalization, fluctuations in the prices of gold and oil have always drawn the focus of international trade as they have the capacity and potential to influence market variables concerning the terrain in which they operate. (Aloui & Ben Aïssa, 2016) scrutinize the correlation between oil prices, exchange rates, and the stock market, and they find that the variables are intertwined and must be viewed from a single angle to steer clear of bias. Since the beginning of civilization and the advancement of the human species, gold has played several roles, from the barter period to the hard currency age. Over the decades' individuals have made several investments in gold, and gold manufacturing products have always yielded the desired results. Investing in gold has displayed advantages such as the fact that it is a tangible asset that does not depend on other commodities, poses a lesser financial risk in terms of return on investment, and is seen as a current asset as it is easy to liquidate.

A decrease in the price of gold does not in any way indicate a devaluation of its wealth, as it is a zero-inflation product. Political will has no impact on the possession of gold, which entails that holding gold does not attract government interest rates and other measures. (Le and Chang, 2012) demonstrated that there is a significant complementary impact between mining reclamation and gold prices. Gold is an asset with high liquidity standards and a recognized standout performer amidst inflation and other market factors; hence, it can be liquidated in any country as well as in any market. The gold price fluctuates at times, but increases in the long run. Recently, the price of gold has tripled over the last decade. Gold, despite being limited in the quantification of the universal stock platform, is difficult to acquire and has a value that is often demanded on the global market. Inflation has an impact on the antam price of gold as mentioned by (S dkk. Nurulhuda, 2019). Simply put, during hyperinflation, investors flock to gold as the value of hard currency falls. When interest terms increase, investors shift to depositing their finances instead of purchasing gold, which does not accumulate interest. (Liu & Tang, 2011) mentioned that mutability in the prices of natural minerals products contributes significantly to the mining sector, as the nexus between universal economic situation and product prices customarily generates heteroscedastic price fluctuation. In the international trade circle, the oil price is a key

item that affects the price of gold. (Standing & Hilson, 2013) (Pierdzioch et al., 2014) state that gold serves various purposes in the global economy and that its connections with macroeconomic, financial, and social parameters are well organized.

Given the importance of gold in our contemporary times, the expertise needed to understand and analyze the investment, as well as the price of gold, is of great significance. Like gold, Oil is a very cardinal commodity that can serve multi-functions. Since the emergence of World War II, oil has been one of the instrumental driving forces behind the universal ideologies of urbanization, industrialization, globalization, and international trade. Oil price past and present unlike gold has been determined by political and market variable, as oil makes up over 40% of the global energy source, which is why it is the leading economic variable of the financial environment. Financial technicians and fiscal enterprises believe that the volatility of the crude oil price is an important instrument of the world economy and the premier logic of the business circle. In countries that have vast oil resources, the volatility of price is determined by events such as the petroleum crisis of the '70s, the Iranian war of 1979, the Iraq and Iran conflict of the 1980s, the gulf war of 1991, the global financial crisis of 2008, and of recent, the Russia and Ukraine crisis of 2022 provides logical ideal for nations economic advancement, international trade and balance of payment system. (Başkaya et al., 2013) mentioned that crises (war, recession, and inflation) in the universal economy give reasons for the fluctuation in the price of oil, thereby directly affecting the macroeconomic policy application and implication, economic advancement, and social warfare of nations and peoples. (Areli Bermudez Delgado et al., 2018) stated that despite the introduction of renewable energy sources and technology, the short-term effect on the oil price is yet to be identified as oil is still very much in demand.

The nexus betwixt oil and gold prices is hard to determine, even though both commodities command high values and are also in high demand. (Balcilar et al., 2019) state that, considering the observed nexus betwixt oil and gold, their various prices are time-bound and don't have applicable conceptual support. (Asad & Dimitrakopoulos, 2013) observed that mining, extraction, exploration, and production activities such as planning, product price prediction, and determination are crucial in finding out whether a deposit, if mined, will produce sufficient financial returns, simply implying that pricing is the focal point of mining activities. The volatility of energy product

prices, such as crude oil, is critical for analysis and macroeconomic variable performance.

Bildirici and Sonustun (2018) mentioned that oil does not single handily alter market variables, as there are commodities such as gold that do affect a nation's economy, as volatility in the price of gold and other products plays important roles in a nation's macroeconomics activities. (Vinet & Zhedanov, 2011) states that as oil is the base of several products initiation, creation, and completion circle of the global population, the petro administration also needs strategic political regulations. (dkk. Nurulhuda, 2019) presented that interest rates negatively affect the price of gold; hence increment in interest rates could have a long-run effect on the price by decreasing price of gold. (Malik & Umar, 2019) scrutinized the nexus betwixt oil and the exchange rate, hence stating that oil price drastically influences the exchange rate. The consequences of oil price shock on the commodities market are determined by the quantity demanded and quantity supply (Mokni, 2020). (Peach & Starbuck, 2011) stated that natural resources (oil and gas) promote economic sustainability, and growth of numerous countries. Oil and Gold are products that have and will always function as elements capable of pushing or driving a nation's economy forward, as the elasticity of their demand cannot be measured and estimated.

### **Statement of the problem**

Gold and oil mining, exploration, exports, and imports are very cardinal processes that are vital to markets, sales, pricing activities, and the economic growth of developing and developed nations, and Ghana is no exception. (Su et al., 2021) mentioned that innate capital such as gold, oil, and other essential minerals perceived as valuable assets possess the potential to play critical roles in the economic expansion of a country. The significance of an economic model, theories and principles, etc., is to point out the nature of non-economic indicators that eventually influence the level at which activities such as productivity in an economy are expanding, and wherefore these expansions can guide the comprehension of the questions of how and why numerous societies expand rapidly and the veracity of their growth, while others crawl economically.

The holistic acknowledgement of important elements prostrating the level of expansion can be sought through the frugality of communities (which pinpoints the rate of resource and capital cumulation), the glide of creativity and transformation

(which pin the level of advanced production), and the increase in population. Before now, these elements were thought of as the criterion of economic expansion models. The issues of economic advancement continue to plague the minds of humans and the entire field of economics. Before the fundamentals and ideology of economics were presented by Adam Smith, the father of contemporary economics, the comparison gap as it relates to economic growth and development betwixt small and large economies was little (Maddison, 2005). As time elapsed the gap between small and large economies has widened, which has placed a burden on more small (under-developed, and developing nations) to research variables of economic significance, in order to estimate the pathway to expansion in order to mitigate the range of disparity. More than just economic advancement, and predominantly economic expansion, this is also a unique section of recent studies for several reasons, such as climate change, CO2 emissions, sustainable development platforms, ecological imbalances, the SDGs, and the list goes on. In spite of the significance and cardinality of solving the issues surrounding the questions above, there exist numerous familiar and unfamiliar arguments that the field has to confront, which have drawn academic processes and could probably remain on this path for the longest foreseeable future. (Simon Kuznet, 1967) mentioned that economic expansion is exceedingly multifarious and multidimensional. As narratives on the economics of the world expand, the United Nations platform of the SDGs and their deliverables have added significance to the sector, thus placing more need on the scrutiny of economic variables in order to synchronize economic values to meet human development standards.

### **Purpose of the study**

Examining the impact of gold and oil prices, foreign direct investment, the exchange rate, and inflation on Ghana's economic development is the goal of this research. When the price of vital commodities (such as gold, oil, and others) increases, the macro-economy functionality of a nation gets affected. Rising prices, known as inflation, influence living standards, the cost of doing business, borrowing, government bonds, mortgages, and all other dimensions of the economy. To fathom the limited level of development and growth that has characterized Ghana, which has influenced borrowing by the government is one cardinal mystery that needs to be solved. Secondly, although not the last, this research focus is to match the level of economic development of the Ghanaian nation with the natural capital being mined

and explored using time series data from 1980 to 2020 from the world development indicator (world bank data bank), along with graphical illustration, variable analysis, growth theories, and empirical presentations of past literature. Additionally, this research will examine the factors responsible for the low level of GDP growth while assessing the role that gold and oil prices, foreign direct investment, exchange rates, and inflation have played in Ghana's economic expansion. Importantly, high-level unemployment (13%), rampant corruption, a lack of stable electricity, poor health facilities, an increasing poverty rate, below-par water and sanitation situations, limited educational facilities, and poor pricing policies and regulations of vital commodities, and basic amenities are the chief ingredients responsible for Ghana's slow economic expansion. Ghana's economic stress due to the COVID-19 pandemic is another crucial factor that deserves scrutiny. Globalization, the driver of our prevailing economic outlook, requires the interaction of countries through trade and trade-related initiatives as a symbol of unification and economic extension. Universal sustainability, the eradication of energy poverty, access to safe and pure drinking water, and the provision of proper hygiene and sanitary conditions, along with other facilities, are the new normals to assess economic expansion and advancement. The pricing policies of essential commodities such as gold and oil continue to be an issue for leaders of developing countries (of which Ghana is a member), as the number of incentives demanded and given to investors, both foreign and local, has caused substantial revenue loss and economic decline. Chang and Lin (2010) mentioned that mega corporations' (MCs) acquired varieties of benefits through trade (international) activities, which include trade growth, employment benefits, incentives for operational equipment, and technology, the flow of international trade intelligence, the constant elevation of corporations, strategic investigation, and analysis, economic advancement, and high taxes. Price volatility measures the upward and downward movement of product prices. As this study aims to understand the impact of gold and oil prices on the expansion and development of the Ghanaian economy, key economic variables such as purchasing power parity, financial development, foreign direct investment, GDP per capita, the real interest rate, the exchange rate, inflation, transfer pricing policies, the standard of living, etc, were reviewed.

exceedingly multifarious and multidimensional. As narratives on the economics of the world expand, the United Nations platform of the SDGs and their deliverables have added significance to the sector, thus placing more need on the scrutiny of economic

variables in order to synchronize economic values to meet human development standards.

### **Gap Analysis**

Having researched several economic indicators and their impact on economic growth across the universal dimensions of academia, thereby encountering numerous research papers on different economic issues in Ghana, there has been little or none that has focused on the impact of gold and oil prices, foreign direct investment, exchange processes, and the inflation rate on the Ghanaian economy. Ghana, as the African continent's leading gold producer and crude oil exporter, has attracted attention for research and analysis of her various economic and natural resource sectors. The goal of this thesis is to address the issues of gold and oil price impact on the economic growth of Ghana, while also observing the role of foreign direct investment, exchange rate, and inflation as they relate to GDP growth.

### **Significance of the Study**

The price of gold and oil, foreign direct investment, the exchange rate, and the impact of inflation on Ghana's economic development will be the main topics of this study. Gold and oil are two of the most important goods that most often show how quickly a country's economy is growing and changing. Crude oil and gold both have an effect on the growth of the Ghanaian economy. However, the volatility of oil prices has a different effect on countries when it comes to exporting and importing oil, which is not the case with gold. Volatility in the price structure of crude oil has to be taken seriously, as it has the potential to influence economic stability, thereby disrupting the macro-economic indicators of both import and export countries. The essentiality of reviewing the importance of gold and oil prices on the economic expansion and advancement of Ghana is crucial, as they are assets that attract huge FDI and inflows of capital while also contributing significantly to export commodities, human capital investment, and the livelihood of ordinary citizens of Ghana. Pricing plays an essential role in an economy as it is a sophisticated economic tool for stability and growth. The findings of this paper will offer prudent recommendations and policies to the Ghanaian government, which could assist in providing a guide and pathway to sustainable economic development. The paper will examine the role of pricing in development and living standards advancement, with a focus on oil and gold.

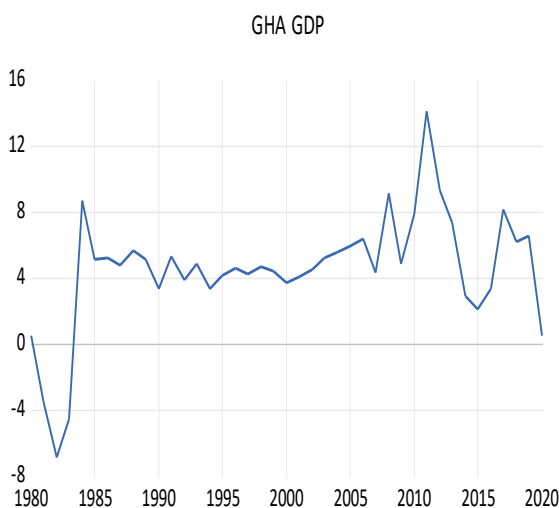
## Research Questions

The solution to the below questions will inform the logic of this query:

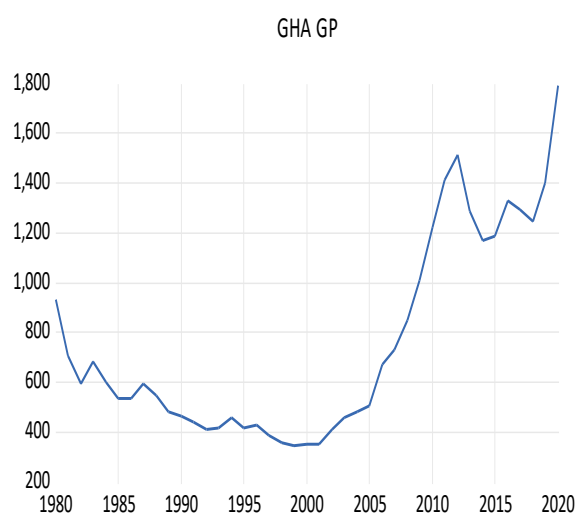
1. Will this study inquiry aim to comprehend the resultant influence of gold and oil prices on GDP in Ghana using time series data from 1980 to 2020 and the autoregressive distributive lag (ARDL) bound testing techniques?
2. What causes the price of gold and oil to go up and down, and what is the Ghanaian government doing to lessen the effect on the country's GDP (gross domestic product) when it comes to importing goods?
3. What is the Ghanaian government doing to fix the problem of low foreign direct investment in the economy, especially in the oil and gold sectors, given that Ghana is the biggest gold producer on the continent and one of the few African countries with oil?
4. Does the rate of exchange have an effect on a variety of economic factors that are relevant to the Ghanaian economy, such as the cost of transportation, mining operations, the cost of living, and the price volatility of commodities in relation to the rising cost of gold and oil?
5. What kind of influence does inflation have on the rate of growth of GDP in the Ghanaian economy?

## Graphical Presentation of the Variables:

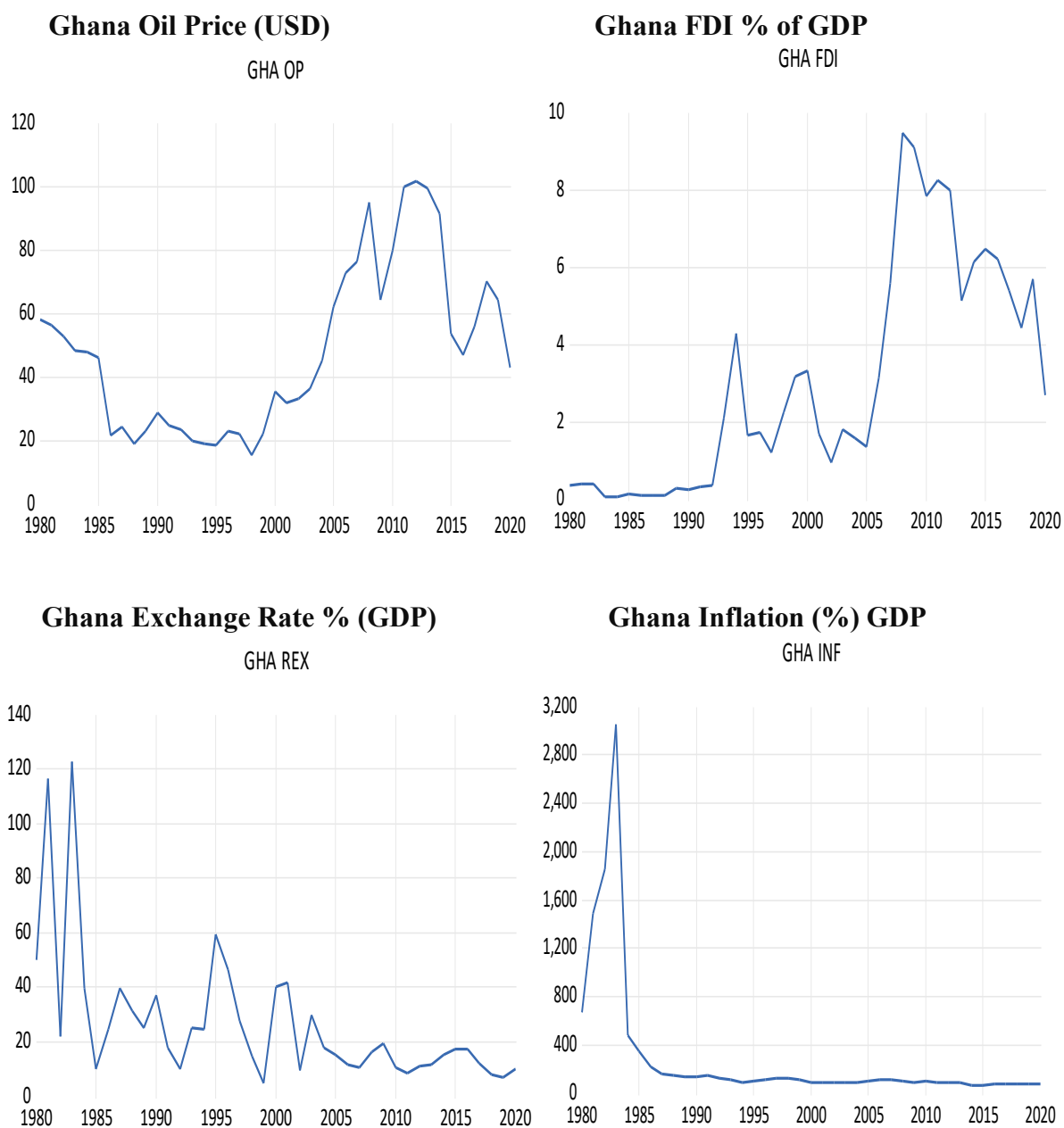
**Ghana Economic growth (Annual % GDP)**



**Ghana Gold Price (usd)**







A thesis hypothesis is a phrase or group of phrases that seeks to forecast the results of your research. It represents provisional answers to the questions your research aims to answer.

This research will seek to address two cardinal issues as follows; for the motivation of this study. H (a) is the Null hypothesis, while H (b) is the alternative hypothesis. If the H (a) is accepted, H (b) will be rejected and if H (a) is rejected H (b) will be accepted.

**Null hypothesis:**

1. The price of gold and oil has no impact on Ghana's overall economic expansion and development.

2. The factors utilized as moderators for Ghana's short-and long-term economic growth are unrelated to the exchange rate.
3. There is no connection between foreign direct investment and Ghana's economic growth.
4. That Ghana'sGDP growth is not affected by inflation.

**Alternative hypothesis:**

1. Gold and oil prices have a significant nexus with economic growth of Ghana.
2. Real exchange rates have a huge impact on the economic expansion of Ghana.
3. Foreign direct investment contributes positively to Ghana economic advancement.
4. Inflation is a pertinent factor with regards to economic growth in Ghana.

**Gold and Oil Price nexus with GDP growth**

For economic expansion and development, many nations rely on numerous indicators; hence, natural capital is a fundamental element. Natural capital (gold, oil, bauxite, timber, manganese, and diamonds) is a key estimator of Ghana's GDP; hence, these resources contribute singularly to the country's economic expansion and development. Ghana is one of the wealthiest countries in West Africa, if not all of Africa, thanks to its abundant natural resources. (Topcu et al. 2020) mentioned that natural capitals are essential sources of a nation's riches or assets, which impact the economy, through the presentation of vital unprocessed materials, food items, energy sources, etc. Gold and oil are cardinal natural assets that have proven to be of immeasurable quality, even during eventual circumstances, such as inflation, war, famine, and other uncertainty, etc. Gold, an economically desired product, is not limited to investment activities but also covers a wide range of sectors (Monetary, electronics, medical, and other tangible innovations), while also serving as a hedge device for wealth during recessions and meeting the demands of exchange-traded funds (ETF). Demand, supply, and other investment factors all influence the price of gold. The current price of gold in 2022, even though it has fallen to some extent, still cannot compare to the level of increase from the 1950s, 1960s, 1970s, and on and on. The gold price is therefore usually affected by the rudimentary principles and fundamentals of supply, demand, investors' attitudes, and also the quantity produced. The World Gold Council (2019) observed that jewelry accounts for basically two quarters (half) of gold demand, which is equivalent to 4,400 metric tons. Since the

formation and demise of the Bretton Woods Agreement (system), and the subsequent formation of the IMF and World Bank groups, central banks in many nations have used gold as a reserve, replacing hard paper currencies and further stabilizing demand; thus, they are regarded as major motivators of gold prices. Erb and Harvey mentioned in their book *"The Golden Dilemma"* that gold has positive price elasticity. The insurmountable quality of gold has earned it a place among economic and development indicators of sustainable growth. Ghana, though it ranked 77 in the world in exports between 2018 and the present, is Africa's highest exporter of gold, which constitutes 30% of total exports. The export of gold from Ghana was at a high rate until the COVID-19 virus emerged. Gold mining in Ghana is a significant industry that constitutes 90% of the country's overall mining industry, and therefore boosts the nation, hence, it contributes to the employment sector, the social environment sector, welfare, the economic advancement of Ghana, etc.

In contrast to gold, oil has policies and guidelines in place that are being implemented across oil-producing and -exporting countries, as well as contractual terms and conditions with time frames. Oil prices are highly influenced by universal economic, political, social, and geopolitical patterns, terms, and treaties. As seen globally, the price of oil has tripled due to the current conflict between Russia and Ukraine, which has and continues to influence economic activities universally. Oil price shocks of the past, such as the 1970s Arab oil embargo, the 1990s first gulf war, the 2007-2009 great recession, the 2008 financial crisis, the COVID-19-2019 pandemic, and of late the Russian and Ukrainian war of 2022, have all had their impact on the volatility of oil prices. OPEC (Organization of Petroleum Exporting Countries), an institution established with the aspiration of mitigating the effect of oil price volatility on countries' economies, has been a key factor in the swinging movements of oil prices. OPEC was formed to systematize and bring uniformity to guidelines among member nations for the purpose of creating a level playing field regarding pricing for petro producers. Nonetheless, OPEC members have used their position to expand their profit base through output adjustment while ignoring global economic conditions and demand. The volatility of the oil price in Ghana has been influenced to some extent by these global issues, as these situations, while limited to individual countries and regions, have an impact on the economies of other countries. Fluctuations in the price of oil have both negative and positive repercussions on economies globally. An increase in the price of oil spells out signs of economic growth for exporting nations,

while a fall in the price of oil decreases the revenue of exporting countries, thereby presenting economic difficulty, whereas an increase in the price of oil signals economic distress for oil importing countries. Oil and gold prices in Ghana do impact the economic efficiency of the country; however, the Ghanaian government cannot be held accountable for price volatility as Ghana, though it explores, does not manufacture petro and petroleum products.

### **Limitations of the Study:**

This research scope of examination is the impact of gold price and oil price on economic expansion in Ghana with regards to variables such as GDP growth, foreign direct investment (inflows), exchange rate, and inflation using time series data from 1980 to 2020. This research thesis is limited in that the variables selected to ascertain the economic growth level of Ghana are just a fraction of the numerous variables. Furthermore, the data used in this study is secondary, meaning that it was detached from a specific data source (the World Bank data bank). This study limitation is genuinely direct and specific, yet not appropriate as its detailed focal point is narrowed down to growth and expansion, while also restricting the methodology to Unit Root, Augmented Dickey Fuller, Granger Causality, Error Correction Models, Breusch-Godfrey serial correlation test, ARDL bound long run test, and ARDL short run test, while presenting econometric structures for the selected economic indicators. This study will not use a sample to determine the findings, as questionnaires will not be given to respondents for sampling. This study will proffer recommendations based on the results obtained from the various testing models, thereby presenting policymakers, technocrats, and future researchers with the opportunity to suckle from the fountain of this source.

### **Explanation of Key Terms:**

**GDP (economic growth):** is the rise in a country's output of economic products and services. It is computed in nominal (inflation-adjusted) or real (inflation-adjusted) terms. Despite the fact that other measures are sometimes employed, gross national product (GNP) and gross domestic product (GDP) are the most often used benchmarks for gauging economic growth in a country. The increase in capital goods and service output indicates economic growth. Furthermore, the rise in the market value of new items and services generated using the GDP indicator is used to quantify

economic growth. Economic growth is often, but not always, followed by general increases in production, which correspond to an increase in total marginal productivity, resulting in an increase in disposable income, encouraging consumers to spend more and improving their quality of life (standard of living). Economic development is characterized by a pattern of physical capital, human capital, natural capital, and technological innovation. A few indices of economic development include the acquisition of physical capital commodities in an economy, the use of capital for production and labor activities, and the upgrading of technological infrastructure.

**Gold price:** the price at which an ounce of gold is transacted on the universal trade platform. Gold's value dates back to when it was used as a means of financial transaction because it has always been a valuable commodity around the world. Gold served many purposes in the past, and it continues to serve many purposes through many mediums, thus prostrating it as an item of value, which has attracted pricing patterns and models. Gold is mostly utilized by investors in situations where inflation exists in order to hedge their resources and funds. Market forces such as supply, demand, investor behavior, quality, satisfaction, etc, are cardinal factors when assessing the macro-economic effect of the gold price scheme. From a free market perspective, producers normally want to charge what they logically perceive to be fair for goods produced and services rendered. Price theory propend that the optimal market price is the position at which the aggregate percentage of materials accessible can be ideally consumed by prospective buyers. The price of gold often increases when there is an economic crisis; it is perceived as a potent strategy for an alternative portfolio.

**Oil Price:** Crude oil happens to be the globe's most sought-after product, as the need and rate of consumption are multifaceted. Since the discovery of oil in 1847 in Azerbaijan, the usefulness of oil and its complementary products has never been underestimated. Oil had limited uses in the early 1800s, such as lamps and kerosene, but the 19th century saw the rebirth of oil, and it was seen as the natural heir to coal and other natural energy sources. The price of oil, like all other economic commodities, is determined by demand and supply factors. Oil's use has made it a highly sought-after commodity. When assessing the price of oil, extraction and manufacturing costs are crucial variables to consider. The universal oil platform is comprised of individuals

known as speculators who place stakes in oil price movements and hedgers who are mitigating risks in the manufacturing and consumption of oil. The status of oil as a towering demand universal global commodity carved the prospect that volatility in price could have a consequential impact on economic expansion.

**Foreign direct investment (FDI):** is the movement of money from one country to another for the purpose of improving finances and infrastructure. In return, foreign investors, firms, corporations, entities, and so on are given the right to own shares in domestic institutions and assets and the ability to use these rights to their advantage. Globalization, the current nomenclature of FDI, engenders the capacity of foreign investors to invest in several platforms on a multi-dimensional scale in numerous nations. FDI is perceived as a stimulant for economic expansion and advancement in the short and long terms. Foreign Direct Investment (FDI), which is also called Foreign Portfolio Investment (FPI), sets the tone for lively foreign exchange platforms and makes it easier to do business with other countries by instrumentalizing and legalizing FDI activities through currency exchange platforms, stock market development, debt instruments, transfer pricing, property mortgages, etc. Nations attract substantial foreign direct investment when their export commodities are cheaper, the investment climate is favorable, and the risk factor is limited.

**Exchange Rate:** The rate displayed on exchange platforms for trading currencies in a variety of domains to facilitate trade, increase investment potential, and improve monetary mobility between countries. The exchange rate is an economic indicator as it assists in determining the economic health and growth potential of countries. The exchange rate is crucial, as most governments analyze the exchange patterns in a free economy to influence economic procedures. Exchange rate volatility is cardinal in analyzing the import and export potentials of a nation and the pricing schemes of both local and international commodities; therefore, it possesses the ability to shape and reshape the BOP of a country in any given period.

**Inflation:** a sustained increase in the general level of prices for commodities (goods and services). Inflation is computed as an annual proportional rise as reported in the CPI consumer price index, which is composed on a monthly basis. Inflation has the potential to alter the consuming abilities of consumers when it rises.

## CHAPTER II

### Literature Review

#### Introduction

Ghana is a country that can be found on the west coast of Africa. It shares borders with three other African nations, including Ivory Coast, Togo, and Burkina Faso. Ghana's population is currently estimated to be 33,475,870 people, and projections for the year 2021 show that this number will rise by 1.96%. The capital of Ghana, Accra, can be found on the southern coast of the nation, in the Gulf of Guinea, which is a portion of the Atlantic Ocean. The overall land area of Ghana is 238,540 kilometers square (KM<sup>2</sup>), with the coastline region accounting for 539 kilometers (KM) of this total. Yam, maize, and beans are considered to be the country's staple foods; nevertheless, sweet potatoes and cocoyam are frequently used in the preparation of its specialty dishes. About ten islands may be found off the coast of Ghana, and the country's average height is about 190 meters above sea level. 58% to 60% of her population calls metropolitan regions and cities home, where they have access to reliable energy and water that is both clean and uncontaminated to drink. For administrative, political, and economic reasons, the landmass of Ghana has been partitioned into a total of 26 sectional regions. Because of the location of the nation in relation to the equator, the climate may be described as tropical. It is estimated that 4,700,000 kilometers of Ghana's land are suitable for agricultural use. When compared to the population density in 2020, which was 137.64 people per square kilometer, Ghana's current population density in 2022 is 140.34 people per square kilometer. This is a minor increase of one percentage point. Prior to the discovery and exploration of oil in 2007, the primary commodities that Ghana exported were cocoa and gold. Oil was only discovered in 2007. Gold and oil are the two most important commercial items that the nation exports, and both of them help to expand the economy. Gold accounts for 95% of Ghana's mining export commodities, which accounts for more than 5% of the country's total GDP. On the other hand, oil contributes for 3.83% of the country's total GDP in 2020 alone, which accounts for 20% of the country's total

GDP. Figure 1.1—

### Map of Ghana



### Theoretical Literature (Theoretical Structure/Framework)

This thesis literature is segmented into two cardinal parts: the theoretical section and the empirical literature. The theoretical literature of this thesis encompasses testing the dependent variable against the independent variables. Also, the theoretical literature will talk about factors that affect economic growth and some financial theories, like the theory of growth, exogenous theory, endogenous theory, spot price theory, and market power theory. The empirical literature in the study will look at past debates and presentations on the GDP (economic growth), FDI, inflation, exchange rate, economic growth, and gold and oil prices.

### Economic growth (GDPg), gold, and oil prices in Ghana:

Due to its vast natural capital and inherent economic situation, the Ghanaian economy has become a topic of discussion and a focus area of research by stakeholders, including local and international institutions, firms, corporations, individuals, governments, and academicians, among others, for the purposes of business, policies, economic analysis, and future endeavor. (Humpe & McMillan, 2020) studied the relationship between macroeconomic indicators and merchandise prices using the G7 nations as a guide while utilizing the PMG panel ARDL co-integration methodology to conduct their analysis. They discovered that volatility in



gold and oil platforms is not good for the real GDP growth of nations, regardless of their position as exporters or importers.

Ghana's GDP for 2019-2020 was 68.34-70.04 billion, representing a significant increase over previous years. After gaining her independence from the United Kingdom in 1957, Ghana's economic might and prospects were similar to those of South Korea. During the republic's early years, the agricultural sector was structured through foreign fund inflows to boost cocoa production for export. As cocoa prices dropped, it had a fatal impact on the Ghanaian economy, a situation that led to the dethroning of the Nkrumah administration in 1966, thus expunging the basics for stability and growth. (Kim & Lin, 2017) propound that the argument concerning natural capital being a blessing or curse for the expansion of the economies of nations has yet to be deciphered.

Due to huge political impermanence, the economic expansion in Ghana has seen high levels of volatility and a limited growth rate commensurate with her natural capital. (Jong-A-Pin, 2009) mentioned that constant political uncertainty is the bedrock for insubstantial economic growth and advancement. Anyemedu (1993) stated that due to inflation of 123%, which hampers agricultural patterns and products such as cocoa, the Ghanaian economy was on a brink of collapse. High inflation is seen as an instrument that limits investment opportunities, contorts the relative prices of commodities, increases capital volatility, and impedes sustainable development platforms. Hence the issues of limited macro-economic outcomes such as a low GDP per capita growth rate, high inflation, and price volatility can be ascribed to political uncertainty.

The 1980s are labeled as the "lost period" on the African continent and Latin America as they were mired by negativity, as examined by (Stanley., 1991). Despite the exploration of crude oil and the mining of gold, two major commodities that have been proven to be critical to the social well-being and economic health of any nation in the past, recent leaders have failed to translate those values into economic gains for Ghana. Ghana, having been reliant upon gold and cocoa as her major export commodities until the discovery of oil in 2007, has seen relatively low economic expansion and development commensurate with its natural capital. (Wang, 2021) stated that gold is a pivotal item for value retention, safekeeping, or economic security during inflation, and amidst price and product fluctuation. Gold mining in Ghana has

seen spot extensions in foreign capital investment and development, trade activities, and output. Between 1980 and the early 2000s, manufacturing rose by 700%.

Due to short-term interference, the gold price dropped at the end of the century, and the sector recommenced on an upward trend further on. Between 2000 to 2010 the gold price rose from around \$300/oz to approximately \$1400/oz, a period that lasted up until 2011 in which gold price recorded a high of \$1900/oz at the time. World Gold Council in 2010 mentioned that the gold industries in Ghana profited from the trade immensely, as the level of production increased by 6 million oz in 2007, and then .8 million oz in 2008. In 2008, the production size increased to 3.12 million ounces, with gold generating a staggering income of \$600 million, which was higher than the previous year. Between 2005 and 2009, gold accounted for 95% of Ghana's GDP, amounting to 5.8%. Ghana was ranked 9<sup>th</sup> in the world in gold production in 2009, producing 3.9% of the universal gold, ascending from 2.6% five years earlier. Unexpected swaps in the prices of natural facilities or different unearthings of natural facilities are concretely intertwined with resource wealth (Moradbeigi & Law, 2016). Ghana is simultaneously championing the process of gold in West Africa, and is being closely followed by Guinea, the Ivory Coast, Mali, Burkina Faso, Mali, and Mauritania. Ghana, despite the historicity of gold mining spanning back centuries and the ranked position labeled by the WGC, is still impoverished and malnourished, and faces issues such as poor SCR (social corporate responsibility), Galamsey (illegal mining), poor infrastructure development, environmental externalities, etc. In spite of the creation of new mining acts (703) and other amended regulations, the mining industry in Ghana is perceived from an enclave position, as the minerals extracted do not go through any economic process in the local market, but rather are exported to other developed countries for processing and value addition, which attracts much higher profits. (Nylandsted Larsen et al., 2009) mention that enclave mining was responsible for the Ghanaian economy not benefiting from its mining sectors as the linkage between artisanal miners and large-scale miners did not exist. (Hilson, 2002) mentioned that Ghana's acquisition of independence was the turning point that sparked the phase of collapse in the booming gold sector. (Arruda et al., 2019) explained that Brazil, an oil exporting nation with growth potential, has experienced a very shabby growth outcome due to growth volatility. The 1980s were perceived as the era of reform, policy revitalization, development, and strategic framework structure, thus constituting a disavowal of previous policies with stringent measures that oversaw

strong state involvement in the sector, culminating in growth potential and advancement in the mining sector.

Oil, a precious commodity, has undoubtedly proven to impact economic growth and expansions of nations due to its numerous functions (energy, transportation, heating, cooking, etc.), which cut across all sectors of the economy. The measure of oil price impact on economic expansion can be viewed from the angles of export and import perspectives, as they both affect the economic variables of a country in diverse manners and forms. Oil price volatility cannot be overlooked, as it has the propensity to alter the qualitative performance of economic indicators in a country. A rise in the price of oil can adequately elevate the revenues for oil exporting nations due to the high profit accumulated from sales of exported oil, thereby boosting their economies, as mentioned by (E. O. Akpan, 2009). While an increase in the price of oil in an importing country could cause an economic meltdown, increase inflation, decrease FDI, cause currency volatility, and so on. Ghana is currently a significant actor in the African oil industry. During her early days of exploration, Ghana was drilling 66,000–70,000 barrels of crude oil per day. As new oil fields are discovered, the most recent number of barrels of crude oil produced as of 2020 is 173,000 barrels of oil. Oil production expectancy is projected to increase to 500,000 barrels of crude oil per day in 2024, according to the Ghana Ministry of Energy. The price of petroleum commodities in Ghana has seen an elevation since the turn of 2022, which is greatly linked to the Ukraine and Russia crises as Russia is one of the leading oil-producing nations in the world. Ghana's gasoline price rose from 6.9 Ghana cedis to 12 Ghana cedis.

Despite the elevation in the price level, utilization and supply of oil materials have not dropped. The oil industry assists Ghana's economic expansion process. Contributions range from local to international trade, globalization, and foreign direct investment (FDI), revenues, and gross domestic product (GDP). In 2020 alone, crude oil contributed 3.83% of the 20% of Ghana's total goods exported that generated over 14 billion U.S. dollars in revenue. Ghana can attribute oil price volatility to phenomenal global forces, a situation that not only devastates the Ghanaian economy but also the global economy. (Van Der Ploeg, 2011) prophesies that towering volatility in natural assets transcends to greater volatility of output per capita expansion in resource-reliance nations, blaming the "resource curse" as the root of volatility. In microeconomic and macroeconomic frames, business elements are vividly related to

gold and oil prices. Because recent events have validated previous opinions, perceptions, and concepts generated by previous oil shocks, financial crises, and wars between oil exporting countries, it is true that political uncertainty, supply and demand, and investor attitudes are the key pillars of gold and oil prices. (Gylfason & Zoega (2021) mentioned that a huge reliance on natural capital limits the expansion of fiscal structures, which could harm national savings and investment, including FDI.

Numerous studies have been conducted using similar variables, but none that I am aware of has studied the impact of the selected regressand and regressor on Ghana's economic expansion and development, presenting me with a clear gap that needs to be filled.

### **Factors Affecting Gold and Oil Prices**

The estimation of gold and oil as it relates to the short- and long-term impacts of economic growth is heterogeneous, as prime factors such as demand, supply, investor behavior, production cost, and uncertainty are the drivers. (Samour et al., 2022) state that the price of oil should not be used as a safe haven against the uncertainty of the stock market in South Africa. It was also indicated that gold is a secure investment instrument that should be utilized as a factor of protection in case of danger. Indicators that have swallowed the area of economic development include things like foreign direct investment, the real exchange rate, inflation, the price of gold and oil, and GDP growth. These things are labeled as factors that have devoured the sector. The ARDL pattern was used to research the South African stock market. The results showed that although oil prices have a favorable impact on the equity stock market in South Africa, gold prices have a negative impact on the country's equity stock market (Samour et al., 2022).

### **Economic growth (GDPg) and foreign direct investment in Ghana**

The phrase "foreign direct investment," or FDI, is used to refer to the transfer of wealth by the use of corporate capital, the buying and selling of stocks and bonds, and other financial activities from one country or region of the world to another. It also encompasses the trade of raw resources, the founding of new businesses, and the dissemination of cutting-edge ideas. Foreign direct investment (FDI) is essential for assisting developing nations to join platforms for global trade and development because it makes it possible to transfer the required resources, money, and skills. Due to exports of goods like gold and crude oil, foreign direct investment (FDI) is a very

important source of inflow for Ghana's economy. Ghana has been able to obtain crucial development resources, improved human capital infrastructural progress, considerable cash for company and international trade activities, and knowledge for economic empowerment thanks to improved and effective FDI regulations. (Antwi et al., 2019) did research on FDI along with numerous factors, including data that range from 1980 to 2010, which included details from IMF data sources. They used the ordinary least square regression with verified inspection (statistics and tables). The results show that there is a connection between foreign investment in Ghana and the studied variables (GDP, GDPg, GNI, MVA, GDPc, and TRA). Direct foreign investment is a major factor in the growth of global trade and globalization, particularly in Asia and Africa, where many countries are classified as developing or undeveloped.

FDI inflows to Ghana since independence have not ceased, though the level of FDI inflows has decreased at certain points in time. Furthermore, the necessity of external capital to augment local capital is crucial for developing economies to address the crisis of the discrepancy between capital platforms of economically developed and emerging nations. Since the nation has faced some degree of political instability as a result of the staging of many military coups during the first republic, the Ghanaian economy has been afflicted by high levels of volatility in terms of FDI (inflows). Using information from 28 countries, (Herzer et al., 2008) investigated the consequences of FDI in developing nations. The findings demonstrated that there is no significant relationship between FDI and economic expansion. For the purpose of determining how FDI affects economic growth, FDI inflow contains multivariate data on functional and developmental aspects. Researchers examined the relationship between FDI and economic advancement in Ghana and found a bidirectional nexus using data from 1970 to 2007 and a number of statistical and mathematical variables, as well as the same methodology used by Johansen and Juselius in 1990. (Antwi et al. 2013) confirmed that the vector autoregressive, Johansen co-integration, and ordinary least square methods adequately captured the impact of the relationship between FDI and economic development in Ghana. The outcomes of the ongoing academic discussion on foreign direct investment and Ghana's economic development model have been conflicting, with the majority of researchers holding that FDI has a markedly favorable relationship with economic growth.

### **Economic Growth (GDPg) and Exchange Rate in Ghana**

The real effective exchange rate (REX) is the total value of a country's currencies in relation to, or against, indices of several major trading partners' currencies. The strength of a nation's currency is reliant upon key economic factors in the balance of payment (BoP) system, which focuses on cardinal variables such as, imports, exports, and consumers' behavior. Import and export, known universally as economic indicators, set the tone of a country's currency exchange potential, they have the ability to dictate the mobility of a nation's currency, thereby altering both local and foreign direct investments. On the other hand, consumers tend to influence the exchange rate in that taste, scale of preference, and income, being factors of supply and demand, alter the purchasing power of consumers in a free market system.

The ability of exchange rates to influence economic growth is a critical issue in the economic debate circle. Recent research has revealed a mixed literature on the subject; however, the recent trend of global events has demonstrated to some extent that exchange rates and economic expansion are related. (J.O et al., 2014) observed through a study conducted on the influence of exchange rates on economic advancement that exchange rates have a slight but positive correlation with economic growth. As the significance of exchange processes has become cardinal to a nation's economic health, governments such as the Ghanaian government, through their central banks, dictate the flow of daily and monthly rates, by subscribing to a fixed exchange rate. (Duygu, 2014) examined the impact of exchange rates on production facilities, examining key sectors and special characteristics, and discovered that declines in the real exchange rate are abridging for emerging economies, while also mentioning that exchange rate fluctuation has no significant impact on economies. (J.O et al., 2014) mentioned that there is a positive relationship between exchange rates and economic expansion, while also stating that a fixed exchange rate process stimulates economic growth. Be it fixed or variable, the exchange rate of a nation in the 21<sup>st</sup> century is known to play a crucial role in determining economic indicators' functionality.

### **Economic Growth (GDPg) and Inflation in Ghana**

Inflation is the fluctuation in the general price level of goods and services both imported and produced in a local environment within a specified period of time, usually a year. Inflation is a very important economic tool as it has the potential to

limit the purchasing power of citizens. Inflation can be classified into several categories pending the situation and gravity, as it has the propensity to increase tangible assets value and decrease consumers spending. The thoughts on inflation having an impact on economic growth can be viewed from different perspectives, of which the Keynesian and classical models are integral parts. The Keynesians believed that the prior saving theory should not exist, and therefore it is not significant to invest, and it does not impact economic growth, while also postulating that a low interest rate is necessary for economic growth. The classical school holds an adverse view to that of the Keynesians, emphasizing that investment arises as a result of savings and that income distribution should determine the growth of a nation. Inflationary processes are determined by nations, in particular, as the sources of inflation vary from country to country. (Dornbusch et al., 1990) stated that locality plays a key role in the determination of inflations and the forms of inflations. ie in Mexico, 20% per year is seen as a high inflation period, in Argentina inflation is recognized at 6% per week, etc. High inflation has many organized features, ranging from high deficits, termination of a currency, elevating wage density, and price amendment. The Ghanaian inflation literature is finite despite drawing interest from several researchers, policymakers, and academicians. The current inflation rate in Ghana as of 2020 stood at 9.8%, a figure that signifies a 2.74% increase from the previous year. Between 1965 and present, it has moved from -8.4% to 122.9%. Ghana inflation for stands 10.0% in 2021. The overall inflation rate for Ghana on an annual basis is 27.5%. Averagely, the price increase from 1965 to present is 29, 510,543.17 cedis in 2022, meaning that a material that cost 100 Ghana cedis in 1965 is now being sold for 29, 510,543.17. Inflation in Ghana experiences frequent fluctuations as some key consumption commodities are imported. (Rutayisire, 2015) stated that central banks, technicians, policymakers, and trade analysts have consented to maintaining a low inflation rate, while attaining high economic growth and development. (Coban et al., 2019) conducted a study on the nexus betwixt economic growth, FDI, and inflation in Ghana, where it is discovered that there is a multi-variation link between the variables. Inflation universally cannot be extinguished, but rather nations tend to limit their effects in order moderate the living conditions of her citizens.

## **Growth Theories**

Due to multi-complexity in the field of economics and finance, and as nations try to decipher their economic hurdles, economists and financial analysts have drawn up strategic framework compositions in which they can try to understand the many issues faced by countries of the globe. Due to cultural, ethnic, geographical, religious and several other individualistic and institutional arrangements, the proposed theories will not impact every country from the same perspective. These theories are formulated not as a direct solution to the universal economic dilemma, but rather they are recommended gestures that are assumed to tackle various economic issues.

### **Economic Growth and the Endogenous Growth Theory**

Endogenous theory came into focus in the late 19<sup>th</sup> century (1980) as an option for neoclassical growth theory, and was postulated by economist Paul Romer (Nobel Prize in Economics 2018). Romer tried to manifest that technological switch is not just a result of unconventional scientific occurrence. Endogenous growth theory is an economic postulation that contests that economic expansion is precipitated through a pattern as a unmediated outcome of inner measures. It investigates whether the aperture in wealth between developed and emerging nations would persist if material capitals such as infrastructure were subjected to diminishing returns. Endogenous theory further presented that advancement of a country's human development will expand to maximum economic benefits if the ideal of technological innovation and effective and efficient mode of manufacturing and consumption. Economists supporting this school of thought believe that investing in human assets in collaboration with enhanced innovative materials has the potential to improve manufacturing activities, thereby fostering genuine economic growth. They persuade and encourage governments and firms to cultivate this methodology and offer incentives to individuals and institutions to promote creativity and engender research and development financing as well as intellectual property rights. Economists who practice endogenous doctrines provide that governments will increase growth rates if they can create market rivalries and aid businesses through product stimulation and innovation. Moreover, they suppose that investing in private firms is ideal for technological advancement and human capacity development, thereby generating an end product of adequate revenue generation. Validation consistent with verifiable proof and biasness of assumption that is not unified are issues that arise whenever the endogenous theory arises.



### **Economic Growth and the Exogenous Theory**

Exogenous growth theory is a cardinal article of the neoclassical economic theory, which postulates that economic expansion is characterized by technological advancement that is independent of economic factors. The exogenous growth model proposes that production activities, coupled with diminishing returns on assets, savings, and technological indicators, are proponents of economic growth. Exogenous growth argues that economic expansion emanates from variables that exist outside of the economy. The key takeaway is that economic opulence is principally ascertained by external and self-reliant indicators as opposed to internal and affinity forces.

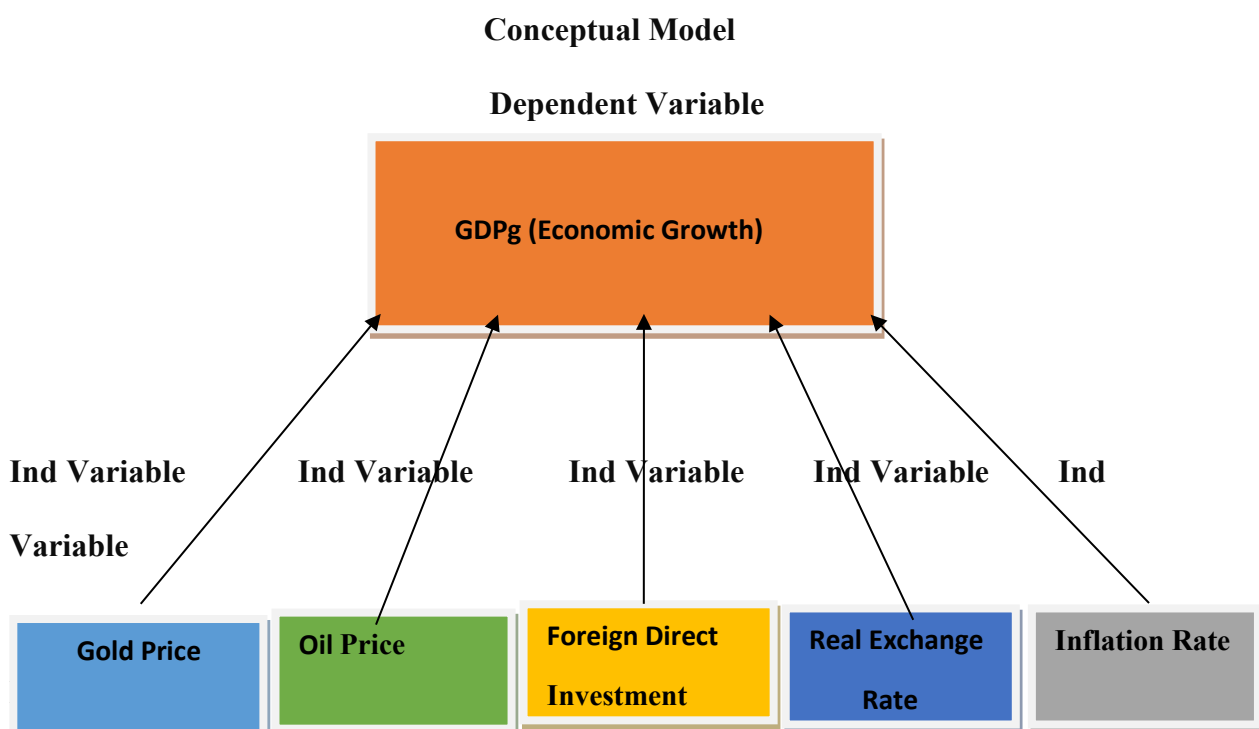
### **Economic Growth (GDPg) and Spot Price**

The spot price is the recent price of a commodity, security, currency, or asset at the market venue for urgent carriage. In terms of considering exchange rates, the prices of securities and commodities function in a uniform pattern in the global economy, even though they are guided by time and place. Spot prices are mostly mentioned with regards to commodities futures prices, such as contract terms with respect to expected swaps in supply and demand, a risk-free rate of return for the owner of the product, transportation fare, and storage in line with the maturity date of the contract. Spot price has significant value in consideration of the huge first-hand market, as it is in constant flux, as well as current buy and sell activities. Spot prices are used to predict future prices and are correlated with future prices. The impact of spot prices on current economic expansion and long-term growth cannot be estimated as they are both variables of an economic nature.

### **Economic Growth and the Market Power / Pricing Power Theory**

Market power refers to a company's capacity to control the price of a product in the market through the limitation of supply and demand factors. An entity with significant market power has the potential to influence product pricing, leverage its profit margins, and possibly increase barriers to entry for potential newcomers into the market. It serves as a barrier to free-market systems or situations. Institutions that have market power are labeled "price makers," as they alter the price of materials or adjust the product price in the market without relinquishing market shares. Due to globalization, which operates a free market system (perfect or near-perfect), producers have little or no pricing power, and are compelled to accept the price presented by

market factors. In contemporary times and economies, market power is only considered when it is acknowledged by the government. Scarcity is one factor that promotes market power. i.e., uncertainty such as the Corona virus), the arms conflict between Russia and Ukraine, the 2008 Financial Crisis, the Iranian war, etc are a few instances that have affected global trade and caused scarcity, thereby validating the market power theory.



This thesis conceptual model is a diagram which is a graphical representation of the dependent variables and the independent variables. (Elangovan & Rajendran, 2015) mentioned that even though the theoretical and empirical literatures usually deliberate adequately on the research thesis, conceptual frames work present a simple and understandable platform to draw logic from the investigated variables. The independent variables in this thesis are the exchange rate, gold price, oil price, FDI, and inflation rate, whereas the dependent variable in this thesis is the GDP% of growth. This model was created to visually depict the dynamic relationship between the thesis' dependent and independent variables.

## **Empirical Literature**

The nexus between gold and oil pricing, foreign direct, exchange rate and inflation has produced several cardinal mixed empirical literatures making it difficult to draw logical conclusion on the numerous arguments of the variables. For the purpose of this thesis, the empirical literature will encompass empirical findings of previous related research to further assist the audience in having a more vivid understanding of the study under investigation.

(Linnemann, 1977) conducted a research on natural assets and economic growth by analyzing the impact of natural assets on the growth and development of few selected nations (America, Britain, Canada, Australia, India, France, and China), using theoretical literature and empirical findings from various research by sampling significant results presented by numerous researchers to exemplified that economic growth in contemporary times is not a product of physical and human capital alone, but rather there exist a third and powerful force in natural resources. He postulated that natural assets encompass measures by which the ecosystem motivates production and promotes significant facet of human wellbeing. In his studies, he mentioned that natural assets are cardinal to the functionality of modes of producing, consuming, investing, saving, and welfare. Natural resources reflect the flow of essential products and services presently and in the near future. He further mentioned that natural capital is of dyad feature, renewable and non-renewable stature. Non-renewable assets, as examined by Linnemann, comprise fossil fuel and other mineral deposits, whose convalescence is far greater than their consumption scale, while renewable assets, as mentioned by him, are replenishable and can be sustained in the long term somehow. "Barbier 2005—Natural capital is important for sustainable economic development, but increasing economic dependence on the exploitation of natural resources appears to be an obstacle to growth and development in most low- to middle-income economies in the world," according to Linnemann, is a statement that bears citation. In his study, Linnemann also came across the term "resource curse," which stressed that for many countries, natural resources are a burden rather than a benefit. The Linnemann literature also acknowledged the natural wealth stock techniques. ("Resource Ample") and resource chartering or renting ("windfalls" income from natural capital at a specified period) and natural asset reliance (the means by which economies generate extra income separate from capital exploration). Linnemann literature divulged that there is heterogeneity when researching the impact of natural

capital on economic growth and development of nations.

(Van Der Ploeg, 2011), scrutinized the influence of natural assets on the advancement of resource-rich nations to ascertain if the "natural capital curse" is real or a sham. Using data and information from low, middle, and high-income countries, he employs several hypotheses while availing evidence as well as case analysis to substantiate his study. The findings proposed have mixed results, thereby instigating that an innate resource might be a blessing or malediction to a depending on factors such as leadership, corruption, regulatory policies, extraction methodology, environmental impact, economic growth indicators, employment rate, standard of living, resource capacity, export limitations, sector dependence, etc.

(Sadorsky, 1999) mentioned that oil cost volatility is a cardinal thesis to research, as a rise in the price of oil serves as an indicator pertaining to inflationary activities in an economy, a situation capable of derailing economic expansion, reducing foreign direct investment, reducing net credit potentials, promoting debt, and causing price fluctuation in other consumables.

(Agalega & Antwi, 2013) Using 31-year-old (1980–2010) data from Ghanaian statistical agencies, the bank of Ghana investigated the impact of macroeconomic indicators such as inflation, interest rates, and currency rates on economic growth (GDP) in Ghana. The findings imply that there is a positive link between the inflation rate and economic advancement, while there is also a negative correlation betwixt interest rates and economic expansion, indicating that as interest rates rise, economic activities bound to fall and vice versa.

(Klobodu & Adams, 2016) studied how capital influx affected Ghana's economic development from 1970 to 2014 Using the variables under investigation FDI, assistance, and external debt, as well as the auto regressive distributive lag and the unit root test procedures, they concluded that FDI, aid, and external debt have a negative effect on economic growth, engaging for organizational upgrading to the time series data. To maintain that the influence of inflows on African countries is overemphasized, the research via the empirical literature, however, showed that trade; investment, and population growth, have mixed impacts on economic progress.

(George & George, 1993) scrutinized the relationship between financial development and its long term impact on Ghana's economic growth using a principle component analysis test, private sector initiatives, and broad money stock as a percentage of GDP. The study's findings indicate that private sector investment and domestic credit are

beneficial to GDP growth, while broad money stocks produce a negative impact on economic growth. Hence, as estimated by these analyses, the impact of financial development on economic growth depends on the sources and execution.

(Sakyi et al., 2015) investigated foreign direct investment influence in the long term and trade liberty on economic activities in Ghana, estimating them with time series data (1970–2011) surrounding internal economic determinants of growth. Substantiating the renowned Bhagwati speculation, the outcome reflected that the connectedness of FDI and exports has instrumental to Ghana economic development. Estimating the auto-regressive distributive lag, the research nominated directing FDI through export-based initiatives, and export dominating frameworks.

(Giannellis & Koukouritakis, 2019) using times series information 1980-2016, studied the impact of effective exchange mobility rate influence on inner and outer macro-economic indicators of G7 nations. The finding dictates that venture capitalist patrons turn to gold in their bid to escape exchange rate rumbled.

(Jain and Biswal, 2016) did research on the Indian stock market to determine the effect of penalties and taxes imposed by the government on the development of the country's economy, evaluating the impact of imports of gold and oil on the exchange rate of the nation using indicators. The findings of this thesis support gold's creation and preference as a material for investment in the eyes of investors. Additionally, this study identifies the rationale behind India's rotating method for reducing currency rate volatility, using the price of gold and oil as a benchmark.

(Singhal et al., 2019) Using the ARDL bound test co-integration approach and statistical data from 2006 to 2018, examine the erratic linkage betwixt the nexus of the exchange rate, the Mexican stock market, and the prices of gold and oil on a global scale. The results suggest that while oil prices have little impact on the exchange rate and give some guidance to financial and fiscal frameworks regarding the restrictions that crude oil imposes on the stock platform and exchange processes, gold prices have a positive global impact on stock fees in Mexico.

(Balcilar et al., 2019) Using data ranging from 1983 to 2016, as well as rolling and circular granger causality approaches, we examine the link between the price of oil and the price of gold. During the course of the investigation, time, the current price, and the predicted price were all taken into consideration. The results reveal that there is no substantial evidence of a correlation between oil and gold prices, especially when evaluating the function that hedging plays in relation to oil risk using gold.

(Okyere, 2020) examined the relationship between international trade, specifically exports, imports, and economic progress in Ghana. The ARDL model and augmented Dickey-Fuller tests were performed to scrutinize the stationarity of the variables, and the results displayed that there were no impactful consequences on the GDP growth of Ghana, thereby insisting that imports do not alter Ghana's local economic development and that there is a significant relationship between gold exports and domestic economic advancement.

(AMRUTHA et al., 2017) conducted an investigation into what causes inflation in Pakistan. Using the ARDL method, they focused on the fiscal shortfall because long-term estimates show that it has a big positive effect on inflation. They also looked at other indicators and several models. The study shows that the amount of money in circulation has the potential to cause inflation.

(Ayobami, 2019) investigated the consequences of exchange rate volatility on the output of the production sector in Nigeria for the time series 1981–2016. Using the world development variables and statistical inferences from the Central Bank of Nigeria while applying the unit roots and ARDL test sample The findings suggest a long-term relationship among the production sector's value addition, exchange facilities, credit institutions, regulatory bodies, imports, and investment. The outcomes also show a positive relationship, both currently and in the future. Also, the effect of imports on the structure of production facilities is negative and important, both in the short and long term.

(Adabor et al., 2020) Using time series data from 2007 to 2019, they investigated the impact of Ghana's oil and gas income on the country's GDP growth. The statistical analysis for the research was carried out using an ARDL bound testing approach, and the findings revealed that oil capital rent has a negative and cardinal relationship with Ghana's economic development, but gas capital rent has a positive relationship. The research also discovered that FDI and the exchange rate were strongly positively connected with Ghana's economic progress.

(Benjamin Badeji and Olufunsho Abayomi., 2011) investigated the role of FDI, domestic investment (GFCF), the real exchange rate, the real interest rate, and inflation as regressors and regressands (GDP growth), and discovered that FDI is critical to Vietnamese economic growth. However, using ADF testing, the researchers discovered that the indicators at the second difference were stationary and significant

at the 1% level, implying that there is no causal nexus between FDI and economic growth (GDP) in Vietnam.

(Oteng-Abayie et al., 2011) used the ARDL test platform and data spanning the years 1980–2017 to perform research on the relationship between economic growth, foreign direct investment (inflows, external credit facilities, and GFCF), and inflation in Ghana. The research's central postulate suggested an inverse relationship between FDI, inflation, and economic growth. The research demonstrates a multivariate association between inflation and FDI while simultaneously finding a positive interrelationship between FDI and economic growth. Furthermore, the research concluded that there is a unidirectional impact between economic growth and inflow, and that there is no unidirectional effect between economic growth and FDI inflow.

(Semmanda, 2020) scrutinized the factors that sway economic growth in Sub-Saharan Africa using GDP per capita as a growth indicator and population growth, foreign direct investment, corruption, democracy, life expectancy at birth, the expected academic period, and economic liberty as the regressors, using time series information from 2006 to 2017. The outcome suggests that a portion of the selected regressor; i.e., population expansion, and life span, is a cardinal factor of economic expansion and advancement in several nations, while the remaining regressor's influence on economic dividend is inconsiderable.

(Ampadu, 2017) assessed the impacts of exchange rate volatility in Ghana by using the vector autoregressive testing pattern and ordinary least squares techniques to study the short- and long-run effects of exchange processes on statistical data covering 1980–2018. The trend patterns between Ghana's economic expansion and changes in the exchange rate demonstrate linearity. The findings indicate that exchange processes have consequences on the Ghanaian economy anytime the value of the Ghana cedi declines, implying a slowdown in economic expansion.

(Lim & Sek, 2015) Using autoregressive distributed lag and data structure from 1970 to 2011, we investigated the long- and short term nexus between inflation and GDP growth in high- and low-inflation nations. The results indicate that GDP growth and imports of commodities and services have a notable long-run influence on inflation rates in countries with moderate inflation. Also, the results show that financial capital, government spending, and GDP growth all contribute to inflation, which is what drives future inflation in countries with high inflation. In a country with high inflation, neither the regressor nor the regressand have any meaning. However, pecuniary capital,

imported commodities, and services have an important nexus with inflation in low-inflation nations.

(Ali et al., 2022) examined the influence of oil price, gold price, and renewable energy on environmental features in both the short and long turn using autoregressive distributive lag and non-linear ARDL. The out suggested that renewable energy enhanced environmental features in both short and long turn. Moreover, the study displayed that the consternation in oil price give rise to pollution in South Africa. The research also suggests the level of imported oil in South Africa must be minimized to limit CO<sup>2</sup> emissions, proposing the formulation of strategies to maintain the gold platform.

(P. L. Akpan, 2011) scrutinized the foreign exchange market and economic growth using the ordinary least squares testing pattern using time series statistics and various economic indicators of the Nigerian economy: exchange rate, labor, GFCF, technology, and volatility of the exchange rate. The finding dictates that gross domestic investment must be maintained as it points to cardinal economic expansions, while also stating that there is a positive correlation amidst exchange volatility in Nigeria.

(Shitundu & Luvanda, 2000) investigated the consequences of inflation on economic growth in Ghana using the ordinary least squares model (OLS) examination pattern and time series data. It was found that at a level of 5%, the impact was minimal. Additionally, the results suggest a co-integrative nexus between the regressor and the regressor, while also clearly demonstrating the absence of granger causality between the variables.

(Antwi et al., 2021) Employing the ARDL approach and the general autoregressive conditional heteroskedasticity pattern, they examined the effects of FDI (inflows) on economic advancement in Ghana. The study used data from 1980 to 2018 by utilizing data from the World Bank Data Bank's global development indicators. The results show that whereas exchange rate fluctuations have a short-term negative impact on economic development, inflows have a short-term positive influence on economic expansion. Long-term economic growth is also positively correlated with domestic investment and trade liberalization. It is known that FDI slows growth over the long run, and variation in the exchange rate dampens this impact.

(Olorogun, 2021) researched on economic progressed and FDI process in Ghana 1984-2018, using the ARDL test. The findings suggest that Ghana has the potential to attract



FDI (inflows), further instigating the correlations between FDI and economic growth in Ghana is positive.

Research by (Ghosh & Phillips, 1998), (Adrián Risso & Sánchez Carrera, 2009), (Hoang Tien, 2021), (Ndorieimpa et al., 2016), (Khan & Senhadji, 2001), (Hossain, 2005), (George Marbuah, 2010) contribute to the ongoing discussion about the negative linkage between inflation rate and economic advancement. All of these researches have shown a negative correlation between inflation and economic growth, but the evidence for a causal connection between these two macroeconomic measures is less clear. For instance, Sarel (1996) and Bruno and Easterly's (1998) findings only serve to support the idea that economic growth is only adversely impacted at high inflation rates, with Sarel (1996) setting an inflation threshold of 8% at which the adverse effect shows.

## CHAPTER III

### Data and Methodology

#### Introduction

This segment of my thesis will highlight several cardinal approaches, stratagems, or designs pertaining to measures relating to data and other significant information that are utilized to generate the desired outcome. Moreover, it will spell out the testing tools and procedures, thereby presenting various results that will be expressed in graphs and tables and interpreted through the creation of formulas as well as econometric displays. Furthermore, this section will address the variables and data sources utilized in the model specification.

#### Sources and Data Information

In the conduct of research studies, there are procedures that the researchers employ to generate a satisfactory outcome from the specified variables. For the purpose of this research discourse, theoretical presentation and data scrutiny will be implemented. The researcher will follow research policies as enshrined by the academic structure of the Near East University in order to observe the norms and ethics of the institution. The variables used in this research are GDP percent of growth as the regressand and gold and oil prices, FDI, exchange rate, and inflation rate, all of which are percentages of GDP, except gold and oil prices. This study's data came from global development indicators (World Bank; Data Bank), and the time period covered ranged from 1980 to 2020.

#### Variables Assessment

The independent and dependent variables exploited in this study to derive a logical conclusion were extracted from online (World Bank) sources. The variables in this process will be examined using eviews 12, therefore allowing for the underpinning of testing methodology and the presentation of various results.

#### GDP growth (Economic Growth)

The term "gross domestic product," also known as "GDP," entails the total amount of finished products and services produced within the confines of a nation over a given time space (annually). One valuable indicator of a nation's overall economic well-being is its gross domestic product (GDP). Due to its ability to give insight into

the potential and growth level of an economy, the gross domestic product (GDP) is also utilized as an economic indicator. This is because of the information that it delivers. One depiction of GDP is known as "real GDP," which is a macro component that may be used to effectively regulate price changes. The gross domestic product (GDP) of a nation may be determined in a variety of different ways, with consideration given to aspects such as the total number of inhabitants and the annual percentage rate of inflation. GDP takes into account not only businesses in the private and public sectors but also investments and the trade deficit or surplus. When there is a problem with a country's GDP rate, the country's central bank puts in place the steps that are needed to fix it. Although GDP per capita endeavors to present the livelihood of a person, it lacks the characteristics necessary to present accurate and necessary information. GDP also does not determine the actual living standards of a nation's population.

### **Gold Price**

Gold is a highly sought-after metal whose functionality covers many spectrums and whose value cannot be understated. Gold's potential to serve as a utility commodity during periods of normalcy and uncertainty is the tiebreaker and causation of the volatility in its cost. The financier has been trailed by gold, thereby prompting the value and price to increase. Due to the role, it has assumed in the past and currently, gold is universally perceived as an economic commodity. Like the price of most products, the price of gold is sanctioned by economic variables ranging from supply and demand to investor behavior. In the early days, gold was used as a way to buy and sell things, a way to save money, a measure of value during times of speculation, and a safe place for both financiers and financial institutions.

### **Oil Price**

Despite the countless campaigns against oil consumption to reduce it, since it is blamed for being the primary cause of environmental degradation and pollution, the price of oil remains a variable of economic importance to the human race. Market forces are the architects of oil prices in a free market or an open economy (supply and demand). Additional dynamics to consider include drilling and extraction, speculative pressures, disputes and uncertainty, and market power practices. The main driver of oil's demand aspects is its functioning, whereas the main driver of the supply side

recently has been profitability and profit size. The oil price is often determined by what the future market will want. Typically, oil is bought and sold via futures contracts.

### **FDI**

are important and durable investments executed by companies, firms, and institutions, be they government or private, that reside in one nation but are similar entities or enterprises in another nation, with the objective of generating profit or contributing to its economic health. FDI is perceived as a genuine platform for economic expansion and development if directed in the right direction. Foreign direct investment instigates competition in local input facilities, provides human capacity development initiatives and infrastructural advancement, significantly contributes to the domestic revenue base, and also brings about an appreciation of the local currency while presenting a platform for both import and export facilities. FDI can also be referred to as FPI because it also involves the financing of securities, bonds, and other financial portfolios. FDI can be altered by trade freedom, market variables, human assets, GFCF, economic expansion, market capacity, etc. FDI is commonly referred to as a cardinal specified factor that has instigated growth measures throughout the world based on geographical location, climate forces, ethnic termini, and population desires.

### **Exchange Rate**

The exchange rate is the worth of a currency in terms of value acquisition and commercial transactions in relation to the currencies of other nations. Because it may be used to gauge a country's economic health, the exchange rate is an essential part of modern economics. Exchange procedures may be fixed, where the central bank sets the standard for exchange practices nationwide, or they can be considered floating when they are driven by market forces like supply and demand. Important instruments for understanding exchange rate difficulties include imports and exports. It is possible to determine the depreciation and appreciation of a nation's currency via exchange facilities and processes. A country's currency may gain strength by increasing FDI inflows, which are made possible by lowering production costs and restricting export costs, while a country's currency might devalue as a result of imports since few investors are interested in buying the local currency. Cheap exports boost a country's economic base and raise demand for its currency, which causes it to appreciate, while

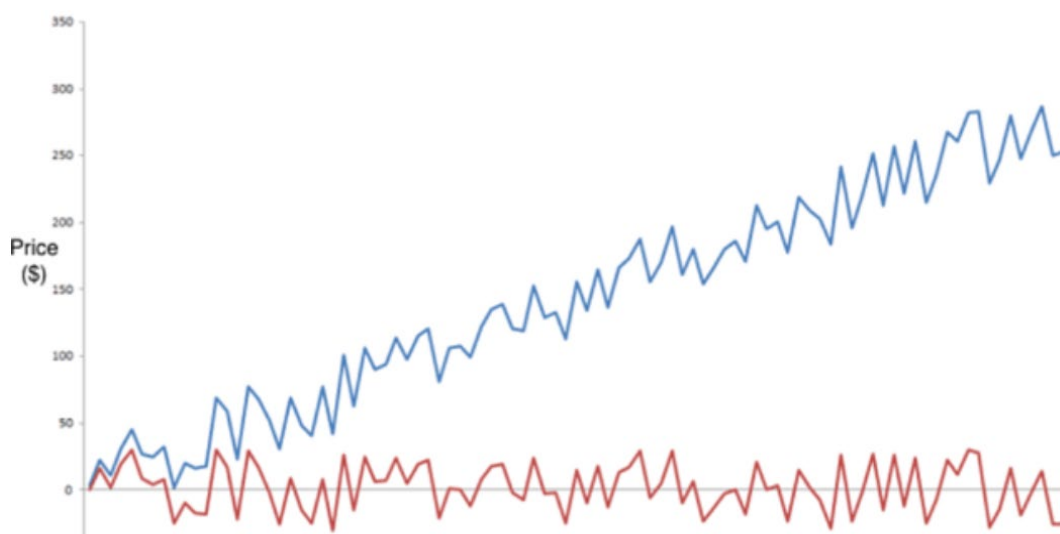
imports lower than demand as businesses buy more foreign currency to satisfy market needs.

### **Inflation**

Inflation is the increase in pricing structures for necessities and services, which may be used to lower the buying power of people or customers in a certain location at a certain time. The CPI (consumer price index), which calculates the fractional alternative in the cost of a collection of goods and services used by households, is the main indicator of inflation. Demand pull, cost push, or inflation expectations may all serve as justifications for inflation. Contractionary money policy, which is done by limiting the amount of financial assets (supply) in an economy by raising interest rates, is one of the monetary gestures or frameworks that central banks use to manage inflation in an economy. By increasing the cost of loan facilities, this policy restricts economic development by lowering consumer and institutional spending. Governments everywhere try to keep inflation at a reasonable level so that they can encourage growth without making it so that the local currency is worth less.

### **Stationary and Non- Stationary**

The stationarity of a time series instrument is crucial to a research project since it indicates the mobility of statistical data. It also indicates that the variance, mean, and covariance of a time series do not change over time, indicating that the series does not capture unit root materials. As it presents the state of the data, the stationarity of a time series instrument dictates which testing model a researcher should employ. Additionally, stationarity implies that the mean of the data is constant, that the standard deviation, or sigma, is also constant over time, and that there is no seasonality in the variables. Lastly, stationarity denotes the absence of seasonality between the variables. If a time series is composed of white noise, then it is stationary. Non-stationary occurs when a time series instrument displays unit root components. In the absence of stationarity, the mean, variance, and covariance of a time series will fluctuate with time. In non-stationary data (time series), it is impossible to detect the trading alarm. Following is an illustration of the graph's stationary and non-stationary samples. The blue curved line indicates non-stationarity due to the observed trend in the series, while the red lines indicate non-stationarity in the variables due to the absence of changes in the component series.



The ARDL autoregressive distributive lag regression examining testing model has been active for years now, however due to its mobility and ability to scrutinize variables of time series information for the availability of long-run relationships between the variables, it has become a domineering instrument in the study of econometric analysis of data. (Pesaran et al., 2001) generated the ARDL autoregressive distributive lag standard, which is the hall mark relative to an econometric model for research studies a series of years after its invention. While it is significant for detecting the presence of long-run nexuses betwixt variables, it has also proven to be quite efficient and genuine for creating short-run and long-run elasticity for a minimum sample level at the same time. (Eric Fosu & Magnus, 2006) mentioned that when the independent variable in the model is  $I(0)$ ,  $I(1)$ , or mutually co-integrated, the use of ARDL is successful. ARDL provides pliability in the mode of integration of the selected variables. This study will utilize the ARDL methodology as the variables under scrutiny are stationary at  $I(0)$  or  $I(1)$ , which signal the order of  $I$ . The below pattern was created to identify and demonstrate the relationship between variables that are interdependent and variables that are independent of one another:

$$\mathbf{GDPg = f(\beta_0 + \beta_1(GP) + \beta_2(OP) + \beta_3(FDI) + \beta_4(REX) + \beta_5(INF) + \epsilon_t - - - 1)}$$

GDPg is gross domestic product growth (% of GDP), GP represents the gold price in the equation, OP reflects the oil price, FDI signals foreign direct investment, REX is for exchange rate, INF is for inflation rate, and  $\epsilon_t$  represents the error term.

**Tabular summary of the selected variables under investigation, year and data sources Table 1.1**

The table below is intended to display a vivid view of the variables utilized in this study as well as present the year under review and the data source:

<b>Variables</b>	<b>Description</b>	<b>Year Under Investigation</b>	<b>Sources</b>
InGDP	Gross domestic products % of of annual growth	1980--2020	WB
InGP	Price at which gold is traded on the world market as weighed on as troy/\$ oz	1980--2020	WB
InOP	Price of a barrel of crude oil utilized as fuel presented here on the scale of brent, \$/bbl(CB)	1980--2020	WB
InFDI	Foreign direct investment of % Total inflow annually	1980--2020	WB
InREX	Real exchange rate index (2010=100)	1980--2020	WB
InINF	Inflation gdp deflator	1980--2020	WB

**Descriptive Statistic**

Data that is a function of a full population or a subset of a population is included in descriptive statistics, which is a sparse example of collegiality. A descriptive statistic assesses variability (spread) and frequency of issuance while being focused on the instrument of the central tendency. The mean, median, and mode, which are used in almost all levels of statistics and mathematics, are part of the descriptive statistics distribution. Presumptive or inferential statistics may help us better grasp the characteristics and nature of a piece of data. Thus, this research will enable the researcher to carry out this investigation using time series data from 1980 to 2020, a 40-year span, and the chosen variables: GDP growth, which is the dependent variable and a measure of economic expansion, and the independent variables, which are the

gold price, oil price, FDI (foreign direct investment), exchange rate, and inflation; Quantitative analysis relies heavily on descriptive statistics since they provide a clear glimpse of the wider picture in a guiding pattern and simplify the indicators for a logical conclusion.

### **Lag Structure Testing**

As mentioned by Eiders (1995), selecting a sufficient lag time is unequivocally cardinal to the average significance of a set of equations. Although this is not always the case, using a model with several delays has the potential to create residuals that are comparable to those generated by a white noise process. As a consequence, when the delay time is long, even if the model is likely to be sparse, the residuals may not be random enough to imitate a white noise process. According to this study, two delays were the perfect amount of time to avoid misunderstandings and the loss of degrees of freedom.

### **Unit Root Test**

A unit root test in statistics and probability is one of an indefinite number of disputable techniques that has the potential to complicate statistical inferences concerning the representation of time series. The unit root test may be used to verify whether the trending data can be distinguished or regressed on the estimating functionality of time before the data can be declared stationary. Stationarity indicates that the statistical components of a time series or the procedure used to generate the series do not move or vary over time. Numerous essential analyses and statistical exams rely on stationarity, making it crucial. In stationarity, components like variance, covariance, and mean do not fluctuate with time, or they are not time-dependent. The unit root method is a method of changing data whose significance is evaluated at the level or first difference. The unit root test evaluates whether a time series is non-stationary and has a unit root. Unless a time series has a unit root, the null hypothesis holds. The alternative hypothesis is true if the time series is steady. In general, the unit root testing method unconditionally concludes that the times series can be tested as  $[Y_t]_{T_{t=1}}$

$$y_t = D_t + Z_t + \varepsilon_t \dots 2$$

Where  $D_t$  is the deterministic element (trend, seasonal component, etc)



$Z_t$  is the stochastic element

$\varepsilon_t$  is the stationary error procedures

### Augmented Dickey Fuller (ADF)

is an improvement on the Dickey-Fuller design, and it is a straightforward statistical testing approach that belongs to a group of testing techniques called the unit root test. The unit root test is used to investigate more substantial pairings of time series on more challenging platforms. Because it examines the null and alternative hypotheses and provides a value (P-Values) in the data, the enhanced dickey-fuller is statistically crucial in research projects. The researcher may determine if the variables are stationary or not using the P-value of the enhanced Dickey-Fuller analysis. The T- and F-statistics were also used by the ADF to check for time series with a unit root. Additionally, the ADF scrutinizes pairings to check for co-integration between two commodity platforms. The ADF is one time series analysis that a researcher should be acquainted with while performing research. The Augmented Dickey-Fuller Formula is as follows:

$$Y_t = c + \beta_t + aY_{t-1} + \phi\Delta Y_{t-1} + \phi\Delta Y_{t-2} + \dots + \phi\rho\Delta Y_{t-p} \dots 3$$

### ARDL Bound Test

The ARDL co-integration econometric methodology was designed in 2001, as stated by (Pesaran et al., 2001). Unfamiliar to conventional co-integration strategies and models, the ARDL has unique components such as: It does not permit that the variable being examined be integrated in a similar order; it is utilized even if the variables involved are integrated in the first order (order one), fractionally integrated, and in order zero. The ARDL is utilized if the dependent variables are not I(0) and the independent variables have a different order of integration. The rules also state that the dependent variables have to be integrated in the order of I (1) even if the independent variables are mixed at I (0) or I (1).

$$\begin{aligned} LNGDP_t = & a_0 + \alpha_1 LNGP_{t-1} + \alpha_2 LNOP_{t-1} + \alpha_3 LNFDI_{t-1} + \\ & \alpha_4 LNREX_{t-1} + \alpha_{t-5} LNINF_{t-1} + \sum_{t=1}^p \phi_{1t} LNGDP_{t-1} + \\ & \sum_{t=1}^p \beta_{2i} LNGP_{t-1} + \sum_{t=1}^p \vartheta_{3i} LNOP_{t-1} + \sum_{t=1}^p \omega_{4i} LNFDI_{t-1} + \\ & \sum_{t=1}^p \mu_{5i} LNREX_{t-1} + \sum_{t=1}^p LNINF_{t-1} + \delta_t \dots \dots \dots 4 \end{aligned}$$

Where  $\ln$  (GDP),  $\ln$  (GP),  $\ln$  (OP),  $\ln$  (FDI),  $\ln$  (INF),  $\ln$  (REX) are the natural logarithms of the variables which they are the first-difference operators,  $p$  is the optimal lag length, GDP growth, GP, OP, FDI, INF, and REX, are the independent variables,  $\varepsilon_t$  is the error term, and  $t$  is the time lag.

### ECM (Error Correctional Model)

An efficient pattern utilized to structure time series data is the error correction model. James Davidson and David F. were early institutional pillars of the ECM in economics. The ECM enables researchers to work with non-stationary data series, separating the long-run and short-run elements of the study. The ECM is dependent upon etiquette, which primes a dual series or more displays equal nexus that dictates both short- and long-term attitudes. The equation of co-integration computes the long run; therefore, the researcher needs to observe stationarity or co-integration before implementing the model. Between -1 and 0 is the point at which the coefficient error correction term should be situated. The minus or negative sign represents the extent or degree of correction. For a single equation of the error correction system, the factors should be between -1 and 0, or the error correction term is eruptive.

$$\Delta GDP_t = \alpha_0 + \sum_{i=0}^p \Delta\beta_1 \ln GDP_{t-k} + \sum_{i=0}^p \Delta\beta_2 \ln GP_{t-k} + \sum_{i=0}^p \Delta\beta_3 \ln OP_{t-k} + \sum_{i=0}^p \Delta\beta_4 \ln FDI_{t-k} + \sum_{i=0}^p \Delta\beta_5 \ln INF_{t-k} + \sum_{i=0}^p \Delta\beta_6 \ln REX_{t-k} + \lambda ECM_{t-1} + \varepsilon_t$$

Where  $\ln$  (GDP),  $\ln$  (GP),  $\ln$  (OP), and  $\ln$  (FDI),  $\ln$  (INF),  $\ln$  (REX) and (ECM) are the natural logarithms of the variables, where as gold price, oil price, foreign direct investment, inflation, real exchange rate are the regressors and ECM error correction models respectively,  $\Delta$  is the first-difference operator, and  $p$  is the ideal lag length,  $t$  is the time interval and  $\varepsilon_t$  is the error term.

### Granger Causality Test

Granger's causality test is a statistical theory test proposed by Clive Granger in 1969. for analyzing time series instruments to determine if one series is useful for predicting another. Granger challenged, arguing that causality in economics may be evaluated for assessing the ability to anticipate the future quality and quantity of a time series by using the past value of another time series.

This study examined the correlation platforms based on ideal data using a Granger causality testing approach, which proved successful. Utilizing empirical data sets to statistically search for linkages may reveal these connections. The notion of causality and the concept of cause and effect have a strong relationship. Below is an econometric display of the ganger causality structure.

$$\begin{aligned} \Delta \ln GDP_t &= \lambda_0 + \sum_{t=1}^M \lambda_{1i} \Delta \ln GDP_{t-1} + \sum_{i=1}^n \lambda_{2i} \Delta \ln GP_{t-1} + \\ &\sum_{t=1}^o \lambda_{3i} \Delta \ln OP_{t-1} + \sum_{t=1}^p \lambda_{4i} \Delta \ln FDI_{t-1} + \sum_{t=1}^q \lambda_{5i} \Delta \ln INF_{t-1} + \\ &\sum_{t=1}^r \lambda_{6i} \Delta \ln REX_{t-1} + \varepsilon_t \text{ --- --- --- } 6 \\ \Delta \ln GP_t &= \lambda_0 + \sum_{i=1}^m \lambda_{1i} \Delta \ln GP_{t-i} + \sum_{t=1}^n \lambda_{2i} \Delta \ln GDP_{t-i} + \sum_{t=1}^o \lambda_{3i} \Delta \ln OP_{t-i} \\ &+ \sum_{t=1}^p \lambda_{4i} \Delta \ln FDI_{t-i} + \sum_{t=1}^q \lambda_{5i} \Delta \ln INF_{t-i} + \sum_{t=1}^r \lambda_{6i} \Delta \ln REX_{t-i} \\ &+ \varepsilon_t \text{ --- --- --- } 7 \end{aligned}$$

### Model Stability and Diagnostic

The accuracy of the model's predictions is checked in this research using an extra diagnostic test. Heteroskedasticity tests include those for autocorrelation, the White test, residual normality, and the series correlation test (which measures correlation). For instance, comparing a dataset's residual values and their values with those expected, then comparing those differences, makes it simple to determine the degree of autocorrelation in the data. As a result, we may rule out the null hypothesis and determine that the model exhibits heteroskedasticity.

### Conclusion:

To sum up this part, we can claim with fairness and accuracy that it was organized in accordance with all the moral and ethical guidelines for study designs. The statistics, which cover the years 1980–2020, were taken directly from the World Development Indicators (World Bank, Data Bank) website. Through the use of a modern econometric, statistical, and forecasting tool (eViews), which offers well-crafted and well-considered materials with a flexible and user-friendly interface, the variables were cross-checked and investigated. Several tests (including the Unit Root,

Augmented Dickey Fuller, Granger Causality, Error Correction Models, Breusch-Godfrey serial correlation test, ARDL bound long run test, and ARDL short run test) were used to examine the data and provide a descriptive statistic. Stationarity was also checked in order to avoid using fictitious data in experiments. Additionally, the link between the variables was determined using the ADRL model, opening up a route for creating tables and developing logical analysis and justification.

## CHAPTER IV

### Findings and Interpretations

#### Introduction

The fourth chapter of this thesis provides a comprehensive explanation of the research's relevant tables and graphs. The descriptive statistic, which displays the dependent and independent variables mean, median, maximum, minimum, standard deviation, skewness, kurtosis, Jarque-Bera probability, cusum, cusum square test, and the number of data observations, is the most important section. It also provides various numerical values assigned to these outcomes. This section will also cover the bound test and the Augmented Dickey-Fuller test, which will be useful in supplying ARDL tests for both short and long runs. The short- and long-run ARDL must be performed to ensure the nexus between these variables if it is determined that there is co-integration between the applicable variables. The Granger causality approach will be used and thoroughly discussed, as it shows the causal relationship between variables and also provides causes and effects, as well as effects and causes within the variables. This part includes a thorough analytical analysis of the regression used, its findings and implications, and, if necessary, policy advice. Last but not least, several diagnostic and stability tests will be carried out, and their results will be clearly disclosed. All those economic indicators might be analyzed and interpreted with the help of E-views.

12.

#### Descriptive Statistic

Table1.1

	Ghana GDP growth	Gold Price	Oil Price	Foreign Direct Investme nt	Exchang e Rate	Inflation rate
Mean	4.499379	756.0467	48.03249	3.007463	26.66813	283.4570
Median	4.794899	593.1701	45.78700	1.791715	18.03144	104.3451
Maximu m	14.04712	1788.325	101.6250	9.466664	122.8745	3053.704
Minimu m	-6.923650	345.9034	15.47572	0.045328	4.865398	67.12236
Standar d Dev	3.626380	402.5588	25.90028	2.900010	25.10371	567.6425
Skewne ss	-0.854899	0.874119	0.623068	0.757595	2.565073	3.693556
Kurtosis	5.697696	2.458375	2.316262	2.317016	9.930463	16.55276

Jacque – Bera	17.42666	5.722397	3.451435	4.718878	127.0141	407.0047
Probability	0.000164	0.057200	0.178045	0.094473	0.000000	0.000000
Cusum	184.4745	30997.91	1969.332	123.3060	1093.393	11621.74
Cusum Sq. Dev	526.0251	6482144.	26832.98	336.4022	25207.86	12888718
Observation	41	41	41	41	41	41

**Source: Eviews 12**

In *Table 1.1*, the descriptive instruments of Ghana's GDP growth, foreign direct investment, gold and oil prices, the real exchange rate, and inflation are shown for the period 1980–2020. These statistical tools span the years 1980 through 2020. The research will use forty-one (41) observations for each analyzed indicator. GDP growth, gold price, oil price, foreign direct investment, real exchange rate, and inflation for Ghana are, respectively, 4.499379, 756.0467, 48.03248, 3.007463, 26.66813, and 283.4570. These estimations are not significantly different from one another. The kurtosis and cauda forms of the histogram are examined and measured. Regarding kurtosis, a value of three is referred to as mesokurtile, whilst a value less than three is referred to as platykurtile, and a number larger than three is referred to as leptokurtic. An indicator's skewness is established by its closeness to zero. This is a condition for symmetrical distribution. On the other hand, kurtosis is determined by how near the indicator is to achieving a value of three.

### Stationary Test

Stationarity of a time series instrument is very cardinal when conducting a research study that deals with time series indicators/variables. Stationary testing enables the researcher to detect if the series variance and covariance are constant all through the time. Stationarity is a very significant philosophy in the sphere of time series as it attached immense direction as per how the data is viewed and forecasted. During portending or estimating the future, several time series platforms presumes that each point is self-sufficient and does not rely on each other. Hence, the stationarity of a dataset means that the statistical component of the procedure does not change. However, it doesn't imply that the value for every point has to be the same, but that

the total behavior of the data should not change. The Augmented Dickey-Fuller test amplifies the Dickey-Fuller Test. Hence the error term is likely to be "white noise. The ADF expand their testing inclusive of an extra lag with regards to the dependent variables to abolish the issues of autocorrelations.

**Table 2.1 Augmented Dickey Fuller Unit Root test result**

<i>Variables</i>	<i>Level</i>	<i>1<sup>st</sup> Difference</i>	<i>Order</i>
<i>GDPg</i>	<i>0.4456</i>	<i>0.0000**</i>	<i>I(1)</i>
<i>FDI</i>	<i>0.3252</i>	<i>0.0000**</i>	<i>I(1)</i>
<i>GP</i>	<i>0.9609</i>	<i>0.0021**</i>	<i>I(1)</i>
<i>INF</i>	<i>0.0097***</i>	-----	<i>I(0)</i>
<i>OP</i>	<i>0.3280</i>	<i>0.0000**</i>	<i>I(1)</i>
<i>REX</i>	<i>0.0043***</i>	-----	<i>I(0)</i>

*Source: Automatic lag selection, Akaike Info Criterion*

*Significant: 1%\*\*\*, 5% \*\*, 10% \**

According to the above illustration our outcome of the variables are stationary at both level and first difference. Out of the six indicators four of the indicators are stationary at first difference, hence they are GDP, FDI, GP, and OP with the probability value of *0.0000*, *0.0000*, *0.0021*, and *0.0000* respectively, while the remaining two variables are stationary at level, these variables are INF, and REX, with the probability value (P-Value) of *0.0097* and *0.0043*. Base on the results it implies that the ARDL model is suitable for regression analysis, because our variables are stationary in two orders of integration-I (0), and I(1).

### ARDL Bound Test Result

**Table 3.1 bound test result (ARDL)**

<i>Model</i>	<i>Lag.</i>	<i>F-Statistic</i>	<i>Decision</i>
<i>GDP, GP, OP, FDI, EX, INF</i>	<i>(1, 4, 4, 4, 3, 4)</i>	<i>8.660480***</i>	<i>Co-Integration Exist</i>
<i>Bond Critical Value</i>			
		<i>I (0)</i>	<i>I (1)</i>
<i>Sign.</i>	<i>10%</i>	<i>2.08</i>	<i>3</i>
	<i>5%</i>	<i>2.39</i>	<i>3.38</i>
	<i>2.5%</i>	<i>2.7</i>	<i>3.73</i>
	<i>1%</i>	<i>3.06</i>	<i>4.15</i>

**Source: Model selection Criterion Akaike Info Criterion, coefficient Variance**

**Matrix: Ordinary.**

Table 3.1 shows the results of the limits test, which was used to figure out if the variables were co-integrated. To determine if there is a co-integration amongst the variables in this research as the study tends to understand the relationship between GDP growth, which is the dependent variable, and the independent variables (gold and oil prices, foreign direct investment, the real exchange rate, and inflation), the bound test, which was recently formulated by Pesaran and Shin (1999) and later improved upon in 2001 by Pesaran, Shin, and Smith (2001), is used to scrutinize the indicators. The ARDL bound test doesn't require a limited presumption that every variable under review must be integrated into the same rank. As a result, the ARDL methodology can be used to investigate the existence of an indicator nexus regardless of whether the independent indicators are integrated at order I(1), order I(0), or partially integrated. The projected F statistic value in this study is 8.660480, which is more than the upper bounds at all levels of significance. As a consequence, the null hypothesis of no co-integration is rejected, and a co-integration link is discovered between the variables. The Akaike information criterion is used to figure out the coefficients of the ARDL (1, 4, 3, 4, 4) model after the co-integration relationship between the variables has been found.



*ARDL Short Run Result**Table 4.1 ARDL short-run result*

<i>Variable</i>	<i>Coefficient</i>	<i>Standard error</i>	<i>t-Statistic</i>	<i>Probability</i>
<i>GDP(-1)</i>	<i>1.490544</i>	<i>0.217658</i>	<i>-6.848107</i>	<i>0.0000</i>
<i>GP</i>	<i>0.017075</i>	<i>0.003855</i>	<i>4.429188</i>	<i>0.0002</i>
<i>OP</i>	<i>0.049598</i>	<i>0.024893</i>	<i>1.992477</i>	<i>0.0589</i>
<i>FDI</i>	<i>0.677431</i>	<i>0.200704</i>	<i>3.375281</i>	<i>0.0027</i>
<i>REX</i>	<i>-0.085985</i>	<i>0.028218</i>	<i>-3.047122</i>	<i>0.0111</i>
<i>INF</i>	<i>-0.003823</i>	<i>0.000737</i>	<i>-5.187986</i>	<i>0.0000</i>
<i>ECM</i>	<i>-0.871189</i>	<i>0.111481</i>	<i>-7.814679</i>	<i>0.0000</i>
	<i>R-Square</i>	<i>0.739455</i>		

*Source: E-Views 12*

*Note: \*\*\*, \*\*, \* dictates 1%, 5% and 10% significance level are utilized in this study. The lag length implemented in this research is automatically generated; therefore the Akaike Information criterion is used.*

These study findings follow a careful examination of the chosen economic indicators and the time series instruments (1980-2020) to identify their effect on Ghana's GDP growth in the near term. In this study, economic growth is truly represented by the growth of the GDP growth. The significance of the gold price as per the unit root test in this study is at the 5% level. Table 4.1 in this research provides important, unambiguous evidence that the link between economic growth and gold price in Ghana is positive, in line with the ARDL platform, as the data show that for every 1% increase in gold price, economic growth will increase by 0.01 percent. This analysis agrees with the findings shown in the table above. This study amply demonstrated and fully authenticated the idea that rising gold and associated jewelry prices promote economic growth in countries that produce gold. The findings of (Anuar et al., 2015), (Guan et al., 2021), Chai et al., 2021), (Singhal et al. (2019), and

(Ali et al., 2022) are consistent with this outcome. However, this result is inverse to that of (Morema & Bonga-Bonga., 2020).

The results also show that there is clear evidence that oil prices have a positive influence on economic growth in Ghana, as evidenced by the results shown in the above table, which show that the price of crude oil, if increased by 1% percentage point, will increase economic growth by 0.049 percent in Ghana. This conclusion is backed by studies conducted by (Samour et al., 2022), (Wesseh & Lin, 2018) and others (Aliyu, 2009). As a result, the findings of this study contradict those of (Dramani & Frimpong, 2020); (Bildirici & Sonustun, 2018) and Singhal et al., 2019).

Additionally, the study found that, at a level of 5%, the relationship between foreign direct investments (inflow) and Ghana's economic development is quite favorable. According to the findings, a 1% increase in Ghana's foreign direct investment (FDI) inflow will result in a 0.67 percentage point increase in economic growth. The findings of (Elboiashi., 2011), (Barthel et al., 2011), and (Olorogun., 2021) all strongly support this outcome. The results are in opposition to those proposed by (Klobodu & Adams., 2016), who claimed that both short- and long-term capital inflows—including FDI, assistance, and external debt—have a negative influence on economic development. But in each economy, at any moment, FDI is an identifiable economic indicator.

At a significance level of 5%, the study reveals that the real exchange rate has a strong negative association with economic growth. According to the data, for every 1% increase in the exchange rate, Ghana's economic activity will decrease by -0.085, indicating a decline in economic activity in Ghana. This conclusion is supported by research conducted by (Ozata., 2020), (Ameziane and Benyacoub., 2022), (Barguelli, 2021), and (Ayobami., 2019). (Hatmanu et al., 2020) found that the exchange rate has a positive effect on both short-term and long-term economic growth, which is different from what this study and most other studies have found.

According to the results reported in table 4.1 regarding inflation and economic growth in Ghana, the link between inflation and economic growth in the near run is negative at the 5% significance level. According to the findings, every 1% increase in the inflation rate causes a -0.003 decrease in Ghana's economic indicators. Requiring that, regardless of the apparent level of the inflation rate, there is a trigger-down impact

on economic growth. The findings in this research investigation are supported by K. Antor et al., n.d.) and (Barro, 2013). The links above are attributed to the ARDL results in the short term for the instruments utilized and the period under investigation.

The error correction model (ECM) dictates the speed of adjustment at which the regressand indicators return to equilibrium after converting other variables. Per this research, the results reflect negative -0.871189 coefficients, which estimate that the speed of correction of the variables and time series 1980-2020 is high, while displaying a probability value of significance.

**Table 5.1 ARDL Long Run Bound Test**

Variables	Coefficient	Standard Error	t-statistic	Probability
FDI	0.975057	0.251573	3.875847	0.0026
GP	-0.002825	0.001393	-2.027538	0.0675
INF	0.055215	0.015732	3.509643	0.0049
OP	-0.052111	0.019667	-2.649679	0.0226
REX	-0.208032	0.070141	-2965886	0.0128
C	5.083806	1.748687	2.907214	0.0143

**Note: \*\*\*: \*\*, \* dictates 1%, 5% and 10% significance level are utilized in this study. The lag length implemented in this research is automatically generated; therefore the Akaike Information criterion is used.**

These research results are the result of a rigorous examination of the selected economic variables and time series instruments (1980-2020), a period of 41 years, to determine their long-term effect on Ghana's GDP growth. In this research, GDP growth actually represents the economic growth of the selected economic variables and time series instruments (1980-2020), a period of 41 years, to determine their long-term effect on Ghana's GDP growth. In this research, GDP growth actually represents economic growth. Table 4.1 in this study offers vital, unequivocal evidence that the relationship between economic growth and the foreign direct invest in Ghana is positive, in keeping with the ARDL platform, as the data reveals that for every 1% rise in the foreign direct investment, economic growth increases by 0.975057% percent. This analysis backs up the conclusions in the table above. This research proved and completely backed up the idea that a rise in the FDI helps Ghana's economy grow. (Olorogun, 2021), and (Kumar & Paramanik, 2020) supports the results of this study that Foreign direct investment has positive impact on economic growth in the long term. Contrary to this study

findings and many other results (Antwi et al., 2021) state that FDI has negative influence on economic growth in the long run.

The gold price at 5% significance level, Which is demonstrated by the results presented in *Table 4.1* in this research provides important, unambiguous evidence that the link between economic growth and gold price in Ghana is negative in the long term, in line with the ARDL platform, as the data show that for every 1% increase in gold price, economic growth will decrease by -0.002825 percent. This is an indication that the relationship between gold price and economic growth in the long term is unfavorable. This analysis agrees with the findings shown in the table above. This study amply demonstrated and fully authenticated the idea that rising gold price is associated with and contributes to low economic growth in the long run. The result is supported by studies conducted (Chirwa & Odhiambo, 2020), (Morema & Bonga-Bonga, 2020) and Contrary to the results that this time series presented (Ali et al., 2022) mentioned that gold price has a positive influence on gold price.

According to the results reported in table 4.1 regarding inflation and economic growth in Ghana, the link between inflation and economic growth in the long run is positive at the significance level of 5%. According to the findings, for every 1% increase in inflation rate, the economic indicators will increase by 0.055215 in Ghana in the long term. Requiring that, regardless of the apparent level of the inflation rate, there is a positive trigger down impact on economic growth in the long term in Ghana. This result is supported by study conducted (Karahan & Çolak, 2020), which mentioned that to monetary actions should be taken to curtail inflationary process in the future.

The results also show that there is clear evidence that oil prices has a negative influence on economic growth in Ghana, as evidenced by the results shown in the above table, which show that the price of crude oil if increased by 1% percentage point will decrease economic growth by -0.052111 percent in Ghana. This study results confirms prior results presented by studies conducted by (Dramani & Frimpong, 2020), (Bildirici & Sonustun, 2018) and (Singhal et al., 2019). The findings of this study contradict those of (Samour et al., 2022), (Wesseh & Lin, 2018) and others (Aliyu, 2009).

At a significance level of 5%, the study reveals that the real exchange rate has a strong negative association with economic growth. According to the data, for every 1% increase in exchange rate, Ghana's economic activity will decrease by -0.208032

in the long term, indicating a decline in economic activity in Ghana in the long. This conclusion is supported by research conducted by (Ozata, 2020), (Ameziane & Benyacoub, 2022), (Barguelli, 2021), and (Ayobami, 2019). (Hatmanu et al., 2020) found that the exchange rate has a positive effect on both short-term and long-term economic growth, which is different from what this study and most other studies have found.

**Table 6.1 Granger Causality Test**

<b>Pairwise Granger Causality Test</b>			
<b>Date: 11/07/22</b>			
<b>Time : 05:22</b>			
<b>Sample: 1 41 Lags: 2</b>			
Null Hypothesis:	Obs	F-Statistic	Prob.
GP does not Granger Cause GDP	39	8.45137	0.0010**
GDP does not Granger Cause GP		0.11596	0.8909
FDI does not Granger Cause GDP	39	1.42267	0.2551
GDP does not Granger Cause FDI		0.19127	0.8268
INF does not Granger Cause GDP	39	1.21894	0.3081
GDP does not Granger Cause INF		4.86558	0.0139**
OP does not Granger Cause GDP	39	0.00737	0.9927
GDP does not Granger Cause OP		0.32059	0.7279
REX does not Granger Cause GDP	39	2.64249	0.0858
GDP does not Granger Cause REX		9.96778	0.0004**
FDI does not Granger Cause GP	39	0.65890	0.5239
GP does not Granger Cause FDI		0.34031	0.7139
INF does not Granger Cause GP	39	0.34851	0.7082

GP does not Granger Cause INF		2.61673	0.0877
OP does not Granger Cause GP	39	0.71099	0.7082
GP does not Granger Cause OP		1.98247	0.1533
REX does not Granger Cause GP	39	1.57964	0.2208
GP does not Granger Cause REX		0.91175	0.4114
INF does not Granger Cause FDI	39	0.29713	0.7449
FDI does not Granger Cause INF		0.10928	0.8968
OP does not Granger Cause FDI	39	1.45105	0.2485
FDI does not Granger Cause OP		2.83245	0.0728
REX does not Granger Cause FDI	39	1.16329	0.3246
FDI does not Granger Cause REX		0.63272	0.5373
OP does not Granger Cause INF	39	0.01856	0.9816
INF does not Granger Cause OP		0.08810	0.9159
REX does not Granger Cause INF	39	19.4354	2.E-06
INF does not Granger Cause REX		6.92219	0.0030**
REX does not Granger Cause OP	39	0.18052	0.8356
OP does not Granger Cause REX		0.66266	0.5220

The Granger causality testing models are a statistical hypothesis examination for ascertaining the usefulness of the time series in estimating the future cause and effect occurrence of one variable to another. The null hypothesis of the granger causality models states that there is no causal relationship betwixt the variables. However it mentioned that if the Probability value or P-value is less than 0.05% at any level, the null hypothesis should be discarded, and if the P-Value is more than 0.05% then we presented that there is no nexus, thereby accepting the null hypothesis. These research findings, as per the Granger causality testing models, are presented in **Table 6.1** above, wherefore the discussions are as follows: Based on the results garnered from the examination, we can concur that three explanations can be presented pending the

outcome: If one individual variable affects one variable but the other does not, the nexus is said to be unidirectional; if both individual variables affect each other, the outcome is said to be bidirectional; and finally, if the individual variables do not cause or affect each other in any way, the outcome is said to be afloat. It is vivid that there exists a unidirectional nexus between the variables, as some individual variables affect others, but it is not the other way around. According to the table, GP ganger causal GDP at a significant level of 0.05%, GDP ganger causal INF at a significant level of 0.05%, GDP ganger causal REX at a significant level of 0.05%, and INF ganger causal REX at a significant level of 0.05%. Based on the above explanation, the relationship between the selected indicators is said to be unidirectional.

**Table 7. 1Residual Diagnostic Test**

**Residual Diagnostic test**

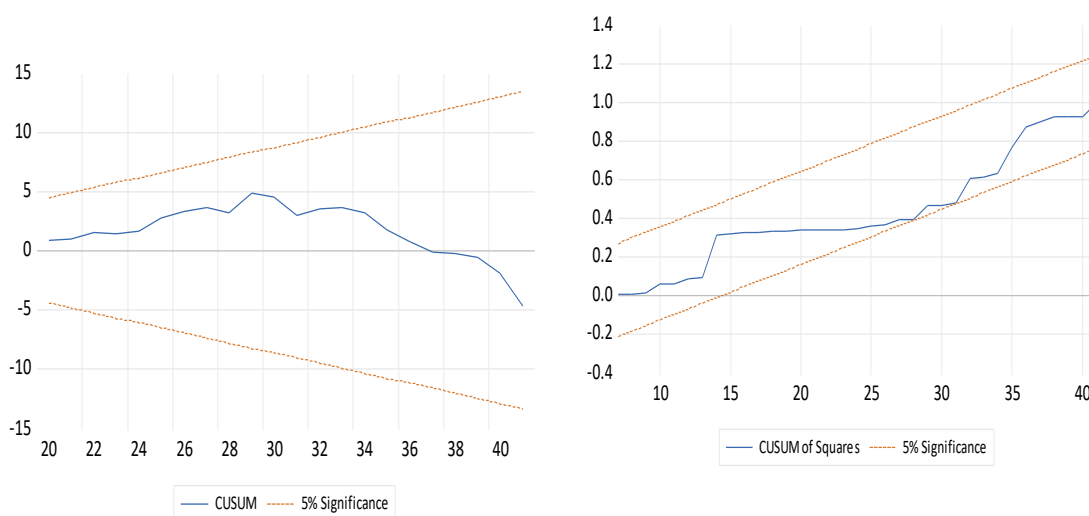
<b>Test</b>	<b>Statistic</b>	<b>interpretation</b>	<b>p value</b>
<b>Serial Correlation</b>	<b>0.128912</b>	<b>No serial Correlation</b>	<b>0.7802</b>
<b>Normality</b>	<b>3.786206</b>	<b>Normality Distribution</b>	<b>0.150604</b>
<b>Heteroskedacity</b>	<b>0.524564</b>	<b>No Heteroskedacity</b>	<b>0.8235</b>

*Source: E-Views 12 Note: \*\*\*, \*\*, and \* reflect 1%, 5% and 10% level of the significance used in this study.*

Table 6.1 displays the findings of the Breusch serial correlations, the Jarque-Bera normalcy test, and the Breusch-Pagan-Godfrey-Heteroskedacity test, as well as their respective comments. The ARDL approach findings demonstrate that the chi-square probability likelihood was utilized to develop a logic or forecast for the Breusch-Godfrey serial correlation and the Breusch-Pagan-Godfrey test. The purpose of these tests was to assess the degree of correlation between two variables. The serial correlation test may be used to establish whether or not the error term's significance is momentarily self-sufficient. If it is discovered that the P-values of the error term are sequentially related, the estimated forecasting will be insufficient. The chi-square test is employed once again to examine this serial correlation process. There is no serial correlation since the 0.7802 result of the Breusch-Godfrey serial correlation LM test is greater than the 5% significance threshold. We will accept the null hypothesis since this implies that the model is valid. Because the results show that there is no serial association, the alternative hypothesis is rejected. The Jarque-Bera normality test is

used to see whether the normality test follows the prescribed pattern. As a result, the P-value of 0.150604 is more than the 5% significance level, showing that our variables are distributed uniformly. We reject the alternative hypothesis, which argues that the residual values are not equally distributed, after accepting the null hypothesis, which asserts that the variables are uniformly distributed. The heteroskedacity test is used to determine if the errors exhibit continuous variation. The heteroskedasticity test findings show that our variance has homoskedasticity rather than heteroskedasticity. The null hypothesis that our data are categorized is accepted in this case.

**Table 8.1 Cusum and Cusum Square**



### Cusum Test

#### Cusum of Square Test

Results of Stability Testing (Dependent Variables: GDP growth as a substitute for Economic Growth). The following are the results of the CUSUM square and CUSUM stability tests of the ARDL model employed in this study: The certainty that the blue line, which represents the parameter of the CUSUM and CUSUM square test, falls within the red at 5% significance, shows that there is data stability. The null hypothesis states that all error correction coefficients in the error correction model stay constant within a 5-percent confidence range (Bahmani, Oskooee, & Ng, 2002).



## CHAPTER V

### Overview, Conclusion, and Discussion

#### Overview

This research thesis examines the influence of gold and oil prices, FDI, the real exchange rate, and the inflation rate on GDP growth (a proxy for economic development) in Ghana, experimenting with time series instruments from 1980 to 2020. This research is split into five (5) chapters, the first of which discusses the history of gold extraction and its influence on economic development, as well as the finding of oil in 2007. Other economic variables included in this research to determine Ghana's economic growth level are FDI, the exchange rate, and the inflation rate. This section includes theoretical and empirical contributions, definitions of essential terms, and research gaps. To enhance the study's introduction, the following items were mentioned: the significance of the investigation, the research questions, the hypotheses, the study's limits, a graphical depiction of the variables, and so on.

The second chapter, the literary portion, gives a full description of the study's premise as well as a discussion of the regressand and regressor, the theoretical and empirical components of the literature, various growth theories, and so on.

The third part of this study, or chapter three, talked about the methodology and the different testing techniques that were used. It also talked about the different results, such as stationarity, serial correlations, normality, heteroskedasticity, Jarque Bera, the ARDL (autoregressive distributive lag) testing methodology, and their general formulas, if they were used. It also talked briefly about how important the testing processes were to the research procedure.

The fourth chapter of this study offers tables and thorough explanations, as well as numerical figures from the various tests conducted to generate the fundamentals for the research process's conclusion and suggestions. Furthermore, the fourth chapter expands on the various tests by providing explanations and detailed interpretations for the examinations carried out. Finally, the fifth and last chapter discusses the study's summary, conclusion, and recommendations.

#### Conclusion

Natural capital (gold and oil) are relevant factors when analyzing the economic development of Ghana; thus, foreign direct investment, the real exchange rate, and the inflation rate have the ability to describe the country's present economic

(near-term) and long-term problems. The traditional economic good known as gold has had a significant impact on Ghana's growth and continues to do so. Thus, according to the results of this study utilizing the ARDL approach, there is a short-term positive connection between the gold price and economic growth but a long-term negative correlation with a 5% significance level. Maintaining that GP and GDP growth are significantly correlated at the 5% level of significance, the results of this analysis show that there is a positive short-term link between oil prices and economic growth but a negative long-term link.

The results of this study also show that foreign direct investment (inflows) has a favorable impact on Ghana's economic development over the long and short term. This outcome serves as a powerful illustration of the need to take foreign money into account when assessing a nation's economic health. Changes in the real exchange rate are an indicator of sluggish or constrained economic development, according to the findings of this research platform. This is supported by the study's results, which show that the real exchange rate is linked to both short-term and long-term economic growth in a bad way.

Another finding from this study is that there is a short-term negative association between the inflation rate and economic growth and a long-term positive relationship, as shown by the findings of the variable tables. Furthermore, this thesis results also dictates that there is a significant relationship among the variables, though it is unidirectional.

### **Recommendation**

Given that the regressand and regressor used in this study are universal indicators or factors of economic health that have a clear impact on the functionality of government as well as the livelihood of the citizenry, the government of the Republic of Ghana should carefully examine the processes surrounding, and leading to these factors and their effects on GDP expansion. The following are a few ideas for policy analysis and adaptation that might help technicians and heads of institutions construct a framework structure for Ghana's economic growth.

1. The Ghanaian government should maintain a careful check on the gold price, as it has had and will likely continue to have a positive influence on the country's economic progress in the short term, while simultaneously taking efforts to prevent any possible long-term negative impacts.

2. Although the oil price has a positive relationship with Ghana's economic growth in the short run, the potential short-term impact of commodities in a country is valued, so governmental actions to limit or eliminate future negative effects may be encouraged. Given that the causes determining oil prices are regarded as uncertain and uncontrolled, it is proposed that the Ghanaian government build a platform to mitigate Ghana's future possible negative impact as a significant oil exporter.

3. Foreign direct investment (FDI) inflows have been shown in this study to be an economic growth tool, and Ghanaian authorities should use it to their advantage because it has the propensity and ability to drive Ghana's economic expansion and improve the livelihood and living standards of the Ghanaian people.

4. The exchange rate is a critical component of the global economy. This is crucial to remember since the role of the exchange rate in the economy is vital for the whole globe (Samea et al., 2014). Therefore, it is the primary means through which traders and nations transfer funds to one another. It facilitates commerce and reduces global distance by facilitating the usage of foreign currencies. Even more so when exchange rate volatility is considerable, the impact of the exchange rate on both micro and macroeconomic parameters varies. To stabilize the economy, the Ghanaian government and micro- and macroeconomic institutions should adopt certain measures to address the currency exchange rate. Short-term and long-term objectives for the currency rate should be included in the framework for policy development.

5. Recent rises in Ghana's inflation rate have made both domestic and foreign investment a nightmare, prompting the government to seek various grants and loan packages from the IMF and World Bank. In any country, eradicating inflation is certainly impossible since the causes that cause it are continually devouring the world. This research study concluded that inflation has a detrimental influence on Ghana's economic development in both the short and long term. In light of this, the researchers advocate for substantial economic changes such as lowering the quantity of money on the market, raising the interest rate on central bank borrowing, and other economic measures to decrease Ghana's inflation rate.

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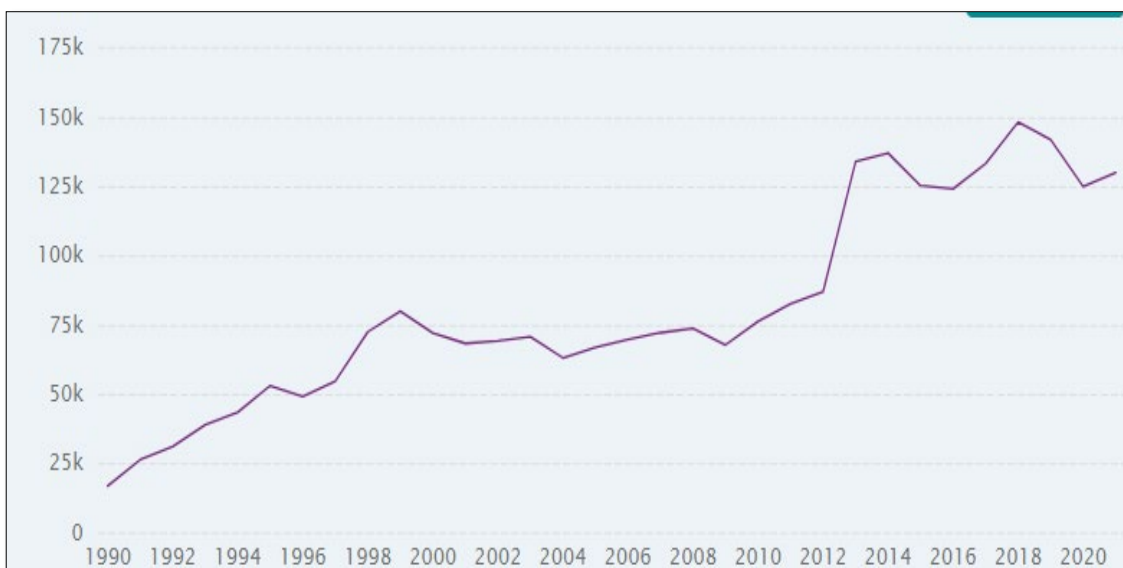
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APPENDICES

Appendix1: Map of Ghana, Gold and Gold Price Map 1990—2020 and Graph Variables graphs

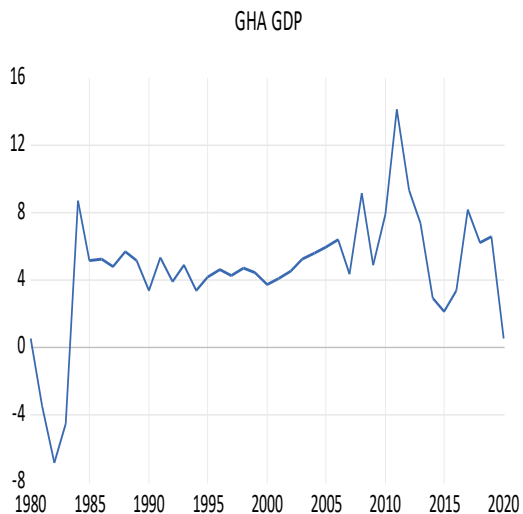


:  
Graphical Illustration of Gold and the Pricing trend of Gold 1990-2020

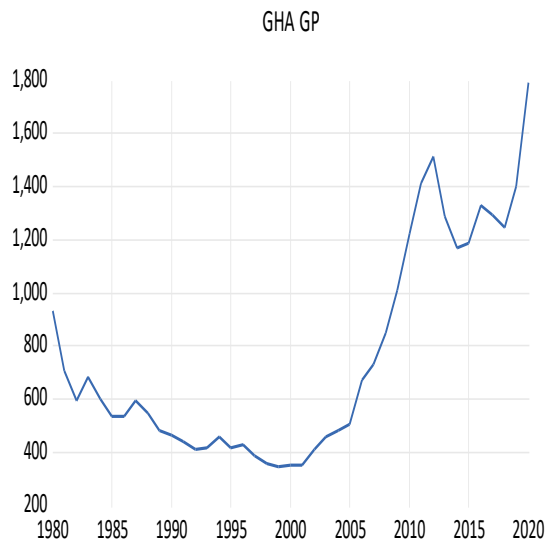


### Appendix 2: The Time series Variable 1980-2020

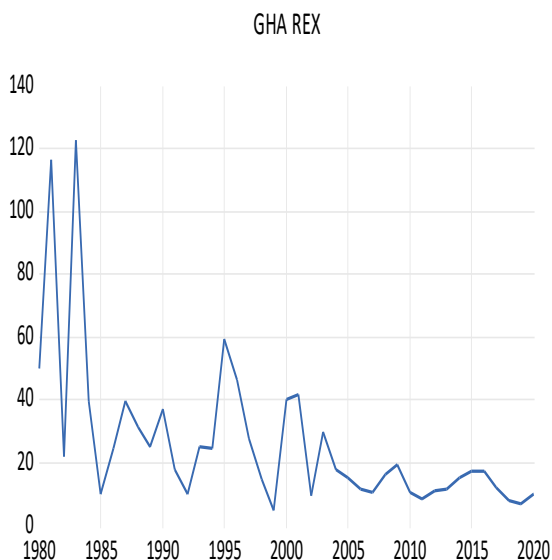
**Ghana Economic growth (Annual % GDP)**



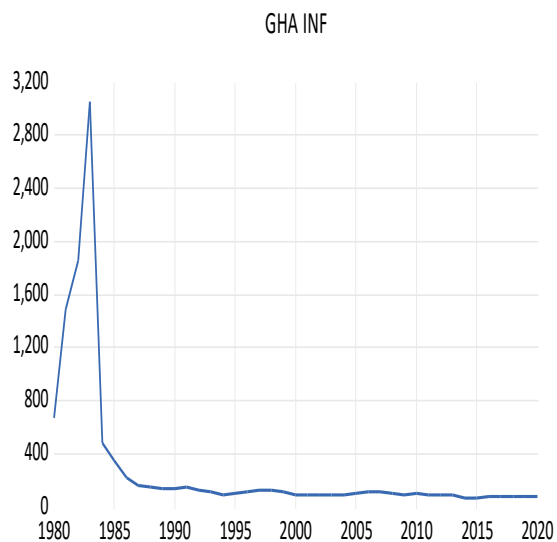
**Ghana Gold Price (usd)**



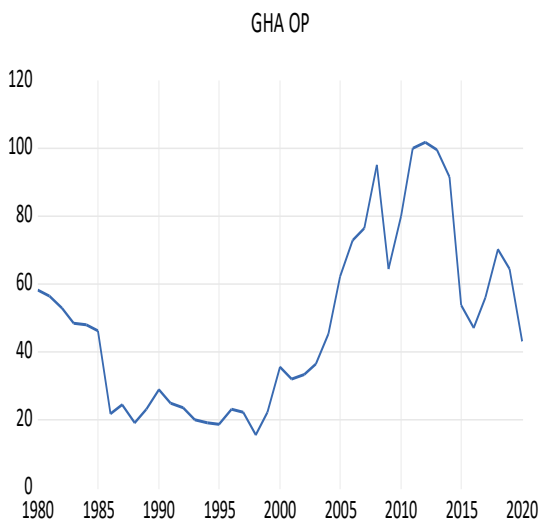
**Ghana Exchange Rate % (GDP)**



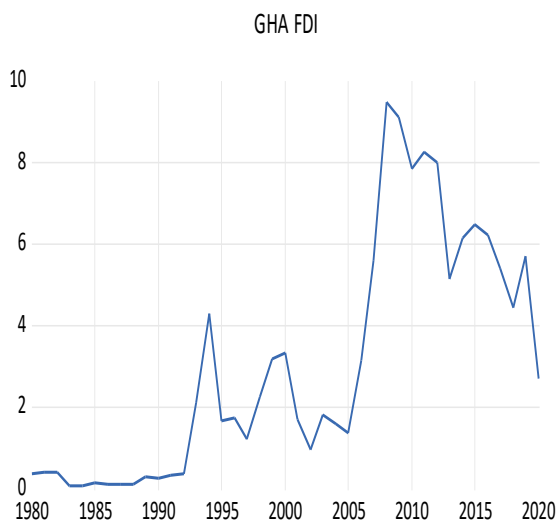
**Ghana Inflation (%) GDP**

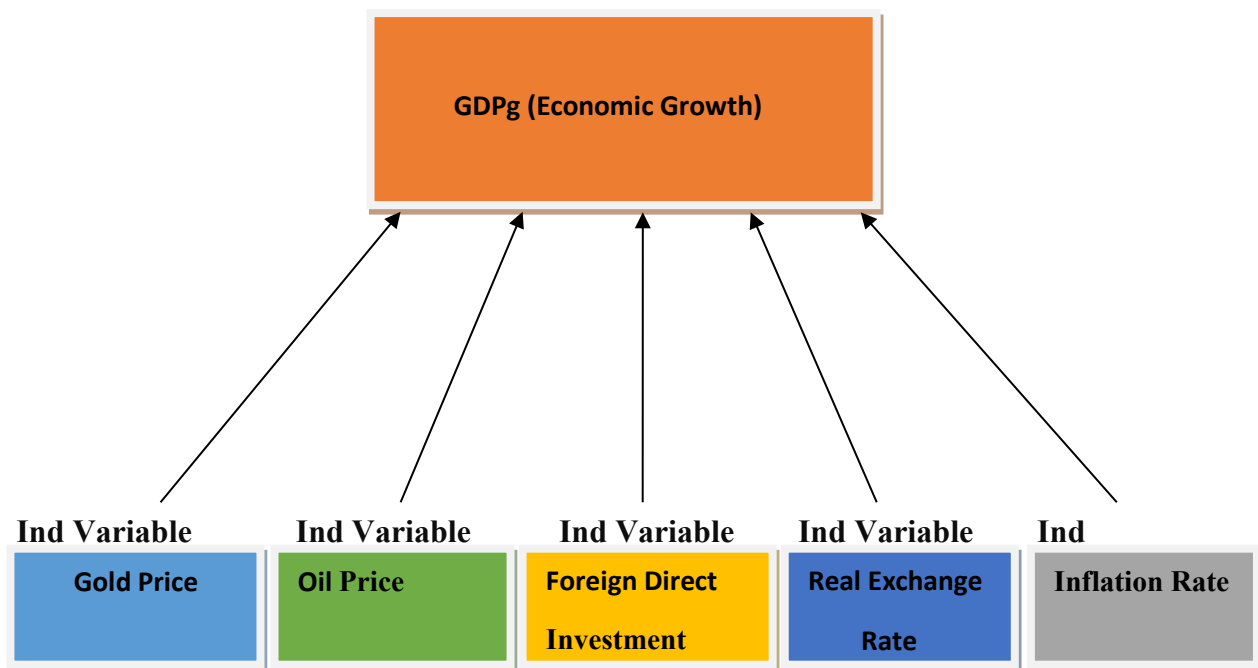


**Ghana Oil Price (USD)**



**Ghana Gold FDI (usd)**



**APPENDIX 3: Variables Conceptual Model:****Dependent Variable**



**APPENDIX 4: Table 1. The Various Econometric testing Results and their Results**

**Descriptive Statistic**

	<i>Ghana GDP growth</i>	<i>Gold Price</i>	<i>Oil Price</i>	<i>Foreign Direct Investme nt</i>	<i>Exchang e Rate</i>	<i>Inflation rate</i>
<b>Mean</b>	4.499379	756.0467	48.03249	3.007463	26.66813	283.4570
<b>Median</b>	4.794899	593.1701	45.78700	1.791715	18.03144	104.3451
<b>Maximu m</b>	14.04712	1788.325	101.6250	9.466664	122.8745	3053.704
<b>Minimu m</b>	-6.923650	345.9034	15.47572	0.045328	4.865398	67.12236
<b>Standar d Dev</b>	3.626380	402.5588	25.90028	2.900010	25.10371	567.6425
<b>Skewnes s</b>	-0.854899	0.874119	0.623068	0.757595	2.565073	3.693556
<b>Kurtosis</b>	5.697696	2.458375	2.316262	2.317016	9.930463	16.55276
<b>Jacque -Bera</b>	17.42666	5.722397	3.451435	4.718878	127.0141	407.0047
<b>Probabil ity</b>	0.000164	0.057200	0.178045	0.094473	0.000000	0.000000
<b>Cusum</b>	184.4745	30997.91	1969.332	123.3060	1093.393	11621.74
<b>Cusum Sq. Dev</b>	526.0251	6482144.	26832.98	336.4022	25207.86	12888718
<b>Observa tion</b>	41	41	41	41	41	41

Source: Eviews 12

**Table 2.1 Augmented Dickey Fuller Unit Root test result**

<i>Variables</i>	<i>Level</i>	<i>1<sup>st</sup> Difference</i>	<i>Order</i>
<b><i>GDP</i></b>	<b><i>0.4456</i></b>	<b><i>0.0000**</i></b>	<b><i>I(1)</i></b>
<b><i>FDI</i></b>	<b><i>0.3252</i></b>	<b><i>0.0000**</i></b>	<b><i>I(1)</i></b>
<b><i>GP</i></b>	<b><i>0.9609</i></b>	<b><i>0.0021**</i></b>	<b><i>I(1)</i></b>
<b><i>INF</i></b>	<b><i>0.0097***</i></b>	-----	<b><i>I(0)</i></b>
<b><i>OP</i></b>	<b><i>0.3280</i></b>	<b><i>0.0000**</i></b>	<b><i>I(1)</i></b>
<b><i>REX</i></b>	<b><i>0.0043***</i></b>	-----	<b><i>I(0)</i></b>

**Source: Automatic lag selection, Akaike Info Criterion**

**Significant: 1%\*\*\*, 5% \*\*, 10% \***

### **GDP % growth at Levels**

Null Hypothesis: GDP has a unit root

Exogenous: None

Lag Length: 4 (Automatic - based on AIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.611142	0.4456
Test critical values: 1% level	-2.630762	
5% level	-1.950394	
10% level	-1.611202	

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

### **GDP % growth at First Difference**

Null Hypothesis: D(GDP) has a unit root

Exogenous: None

Lag Length: 3 (Automatic - based on AIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.431402	0.0000
Test critical values: 1% level	-2.630762	
5% level	-1.950394	
10% level	-1.611202	

### **FDI at Levels**

Null Hypothesis: FDI has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on AIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.888075	0.3252
Test critical values: 1% level	-2.624057	
5% level	-1.949319	
10% level	-1.611711	

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

**FDI at First Difference**

Null Hypothesis: D(FDI) has a unit root  
 Exogenous: None  
 Lag Length: 0 (Automatic - based on AIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.300169	0.0000
Test critical values: 1% level	-2.625606	
5% level	-1.949609	
10% level	-1.611593	

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

**Gold Price at Levels**

Null Hypothesis: GP has a unit root  
 Exogenous: None  
 Lag Length: 5 (Automatic - based on AIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.451368	0.9609
Test critical values: 1% level	-2.632688	
5% level	-1.950687	
10% level	-1.611059	

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

**Gold Price at First Difference**

Null Hypothesis: D(GP) has a unit root  
 Exogenous: None  
 Lag Length: 1 (Automatic - based on AIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.197521	0.0021
Test critical values: 1% level	-2.627238	
5% level	-1.949856	
10% level	-1.611469	

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

**Oil Price Levels**

Null Hypothesis: OP has a unit root  
 Exogenous: None  
 Lag Length: 0 (Automatic - based on AIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.881566	0.3280
Test critical values: 1% level	-2.624057	
5% level	-1.949319	
10% level	-1.611711	

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

**Oil Price at First Difference**

Null Hypothesis: D(OP) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on AIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.489451	0.0000
Test critical values: 1% level	-2.625606	
5% level	-1.949609	
10% level	-1.611593	

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

**INF at Levels**

Null Hypothesis: INF has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on AIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.636868	0.0097
Test critical values: 1% level	-2.624057	
5% level	-1.949319	
10% level	-1.611711	

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

**REX at Levels**

Null Hypothesis: REX has a unit root

Exogenous: None

Lag Length: 1 (Automatic - based on AIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.943650	0.0043
Test critical values: 1% level	-2.625606	
5% level	-1.949609	
10% level	-1.611593	

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

## ARDL Bound Test Result

Table 3.1 bound test result (ARDL)

<i>Model</i>	<i>Lag.</i>	<i>F-Statistic</i>	<i>Decision</i>
<i>GDP, GP, OP, FDI, EX, INF</i>	<i>(1, 4, 4, 4, 3, 4,)</i>	<i>8.660480***</i>	<i>Co-Integration Exist</i>
<i>Bond Critical Value</i>			
		<i>I (0)</i>	<i>I (1)</i>
<i>Sign.</i>	<i>10%</i>	<i>2.08</i>	<i>3</i>
	<i>5%</i>	<i>2.39</i>	<i>3.38</i>
	<i>2.5%</i>	<i>2.7</i>	<i>3.73</i>
	<i>1%</i>	<i>3.06</i>	<i>4.15</i>

Source: Source: E-Views 12: Model selection Criterion Akaike Info Criterion, coefficient Variance Matrix: Ordinary

## ARDL Short Run Result

Table 4.1 ARDL short-run result

<i>Variable</i>	<i>Coefficient</i>	<i>Standard error</i>	<i>t-Statistic</i>	<i>Probability</i>
<i>GDP(-1)</i>	<i>1.490544</i>	<i>0.217658</i>	<i>-6.848107</i>	<i>0.0000</i>
<i>GP</i>	<i>0.017075</i>	<i>0.003855</i>	<i>4.429188</i>	<i>0.0002</i>
<i>OP</i>	<i>0.049598</i>	<i>0.024893</i>	<i>1.992477</i>	<i>0.0589</i>
<i>FDI</i>	<i>0.677431</i>	<i>0.200704</i>	<i>3.375281</i>	<i>0.0027</i>
<i>REX</i>	<i>-0.085985</i>	<i>0.028218</i>	<i>-3.047122</i>	<i>0.0111</i>
<i>INF</i>	<i>-0.003823</i>	<i>0.000737</i>	<i>-5.187986</i>	<i>0.0000</i>
<i>ECM</i>	<i>-0.871189</i>	<i>0.111481</i>	<i>-7.814679</i>	<i>0.0000</i>
	<i>R-Square</i>	<i>0.739455</i>		

Source: E-Views 12

## ARDL Long Run Bound Test

Table 5.1 ARDL Long Run Bound Test

<i>Variables</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>t-statistic</i>	<i>Probability</i>
<i>FDI</i>	<i>0.975057</i>	<i>0.251573</i>	<i>3.875847</i>	<i>0.0026</i>
<i>GP</i>	<i>-0.002825</i>	<i>0.001393</i>	<i>-2.027538</i>	<i>0.0675</i>
<i>INF</i>	<i>0.055215</i>	<i>0.015732</i>	<i>3.509643</i>	<i>0.0049</i>
<i>OP</i>	<i>-0.052111</i>	<i>0.019667</i>	<i>-2.649679</i>	<i>0.0226</i>
<i>REX</i>	<i>-0.208032</i>	<i>0.070141</i>	<i>-2965886</i>	<i>0.0128</i>
<i>C</i>	<i>5.083806</i>	<i>1.748687</i>	<i>2.907214</i>	<i>0.0143</i>

Source: E-Views 12

**Table 6.1 Granger Causality Test:**

<b>Pairwise Granger Causality Test</b>			
<b>Date: 11/07/22</b>			
<b>Time : 05:22</b>			
<b>Sample: 1 41 Lags: 2</b>			
Null Hypothesis:	Obs	F-Statistic	Prob.
GP does not Granger Cause GDP	39	8.45137	0.0010**
GDP does not Granger Cause GP		0.11596	0.8909
FDI does not Granger Cause GDP	39	1.42267	0.2551
GDP does not Granger Cause FDI		0.19127	0.8268
INF does not Granger Cause GDP	39	1.21894	0.3081
GDP does not Granger Cause INF		4.86558	0.0139**
OP does not Granger Cause GDP	39	0.00737	0.9927
GDP does not Granger Cause OP		0.32059	0.7279
REX does not Granger Cause GDP	39	2.64249	0.0858
GDP does not Granger Cause REX		9.96778	0.0004**
FDI does not Granger Cause GP	39	0.65890	0.5239
GP does not Granger Cause FDI		0.34031	0.7139
INF does not Granger Cause GP	39	0.34851	0.7082
GP does not Granger Cause INF		2.61673	0.0877
OP does not Granger Cause GP	39	0.71099	0.7082
GP does not Granger Cause OP		1.98247	0.1533
REX does not Granger Cause GP	39	1.57964	0.2208
GP does not Granger Cause REX		0.91175	0.4114
INF does not Granger Cause FDI	39	0.29713	0.7449
FDI does not Granger Cause INF		0.10928	0.8968
OP does not Granger Cause FDI	39	1.45105	0.2485
FDI does not Granger Cause OP		2.83245	0.0728
REX does not Granger Cause FDI	39	1.16329	0.3246
FDI does not Granger Cause REX		0.63272	0.5373
OP does not Granger Cause INF	39	0.01856	0.9816

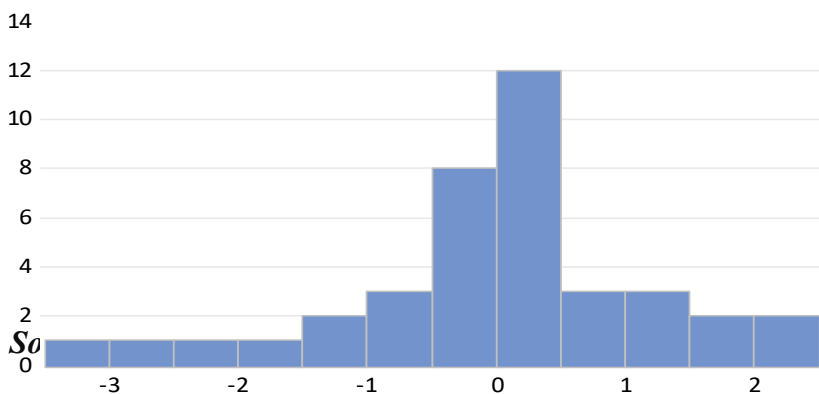
INF does not Granger Cause OP		0.08810	0.9159
REX does not Granger Cause INF	39	19.4354	2.E-06
INF does not Granger Cause REX		6.92219	0.0030**
REX does not Granger Cause OP	39	0.18052	0.8356
OP does not Granger Cause REX		0.66266	0.5220

**Table 7. IResidual Diagnostic Test**

**Residual Diagnostic test**

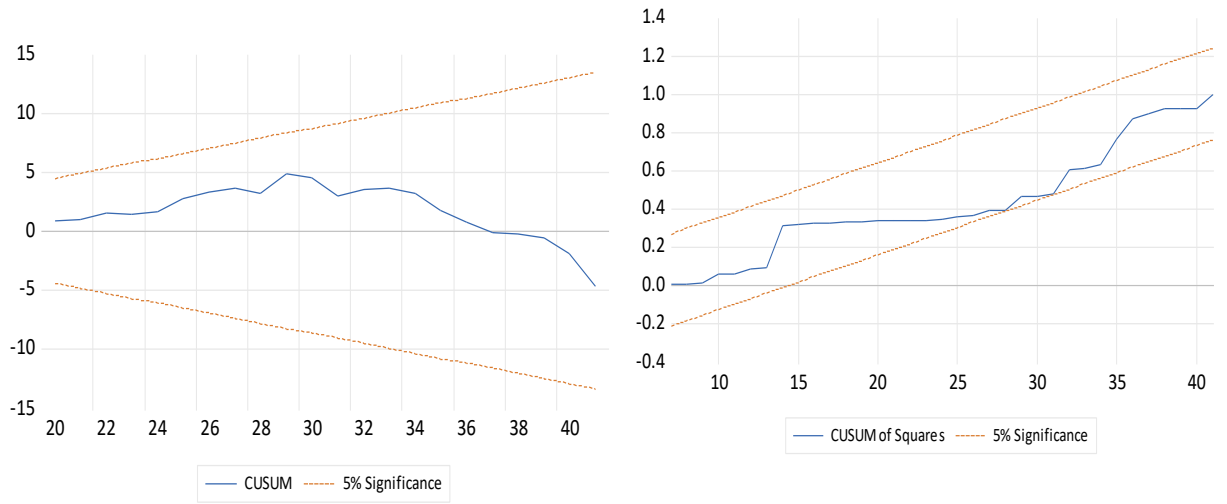
Test	Statistic	interpretation	p
Serial Correlation	0.128912	No serial Correlation	
Normality	3.786206	Normality Distribution	
Heteroskedacity	0.524564	No Heteroskedacity	

**Normality Table**



Series: Residuals	
Sample 3 41	
Observations 39	
Mean	-5.81e-16
Median	0.092552
Maximum	2.389475
Minimum	-3.425347
Std. Dev.	1.202369
Skewness	-0.645972
Kurtosis	3.812929
Jarque-Bera	3.786206
Probability	0.150604

**Table 8.1 Cusum and Cusum Square**



**Source: E-Views 12**



## Appendix B

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