

Effects of oil Price Changes on Uganda's Economic Growth

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DECLARATION

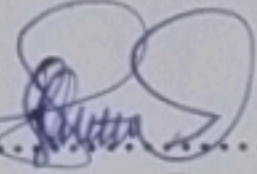
I, Atuhura Patience, hereby declare that this dissertation entitled "Effect of Oil Price Changes on Economic Growth, Case Study of Uganda" is the result of my original work, is not plagiarized and has not been submitted for any other degree at Uganda Christian University or any other institution for any award. Credit has been given to all other writers' works that were used in any part of this research.

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APPROVAL

This dissertation titled "Effect of Oil Price Changes on Economic Growth, Case Study of Uganda" has been submitted by Atuhura Patience to the School of Business in partial fulfilment of the requirements for the award of a Bachelor of Science in Economics and Statistics of Uganda Christian University with my approval as a supervisor.

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Abstract

Oil price changes have been considered as a major factor that affects economic growth of Uganda hence this research is intended to investigate the effects of oil price changes on Uganda's economic growth (2003-2022) using economic indicators such as core inflation rate, real exchange rate and oil price index well as several scientific studies and economic theories suggest a neutral, positive but mostly negative relationship between oil price changes and economic growth depending on whether it's an oil importing or oil exporting state since the effects differ greatly.

In order to analyze a 20-year time series data set of oil prices and economic growth expressed as Gross Domestic Product (GDP), from 2003 to 2022, that was collected from the World Bank data site and Ministry of Energy and Mineral Development Site, the quantitative research approach was applied where econometric analysis and vector autoregressive analysis so as to. The study's conclusions showed a significant relationship between annual oil price sales and Uganda's Gross domestic product, core inflation rate, real exchange rates plus oil price index though an inverse relationship was observed between annual oil sales and core inflation plus gross domestic product. The study then recommends fuel stabilization, fund and reserve to help in controlling oil price shocks that may be backed by supply shocks plus the monetary policy should be tailored to inflation expectations caused by oil price shocks especially the contradictory monetary policy so as to reduce inflationary tendencies, diversification of energy sources so as to reduce the effect of oil price shocks to the economy and the dependence of crude oil as the only source of energy.

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CHAPTER ONE

1.0 Introduction

This chapter introduces the research topic by describing the contextual background, the problem statement which was the basis of objectives and convenient research questions formulation.

Besides the relevance of the research topic is provided.

1.1 Back ground

Globally the oil and gas industry has gone through various shocks in terms of oil price fluctuations as they have occurred since the birth of the industry with many factors that trigger them i.e., through either demand or supply shifts since oil is a global commodity. According to Scot L (2022) oil price shocks can also result from war and revolution periods of rapid economic growth in major importing nations and domestic problems in supplier countries, such as political conflict or lack of investment in the oil industry. Overall, the worst spikes have combined two or more of these factors and that's the situation today where the first shock in oil price first occurred in 1973 when Arab countries under OPEC cut their oil production because western countries supported Israel in the Yom Kippur war with Egypt and Syria (Amy Tikkanen, 2023), World oil prices shot up fourfold, from an average of \$2.90 per barrel to \$11.65 and in response, government leaders in wealthy countries introduced policies to stabilize oil supplies such as finding more oil, investing in energy research and development, and creating strategic oil reserves that governments could use to mitigate future price shocks but six years later, oil prices more than doubled again when Iran's revolution halted that country's output. Between mid-1979 and mid-1980, oil rose from \$13 per barrel to \$34 (Samantha Gross, 2019).

Over the next several years, a combination of economic recession, replacing oil with natural gas for heating and industry, and shifting to smaller vehicles helped to mitigate oil demand and its prices. The next major shock came in 1990 when Iraq invaded Kuwait, United Nations imposed an embargo on trade with Iraq and Kuwait, which raised oil prices from \$15 per barrel in July 1990 to \$42 in October. U.S. and coalition troops moved into Kuwait and defeated the Iraqi army in just a few months (David Henderson, 2014). During the campaign, Saudi Arabia increased oil production by more than 3 million barrels per day, roughly the amount previously supplied by Iraq, to help dampen the increase and shorten the period of higher prices (Robert J, 1992). More disruptive price shocks occurred in 2005-2008 and 2010-2014. The first resulted from increased

demand generated by economic growth in China and India whereby at that time OPEC was unable to expand production due to long-term lack of investment. The second shock reflected the impacts of Arab Spring pro-democracy protests in the Middle East and North Africa, combined with conflict in Iraq and international sanctions that Western nations placed on Iran to slow its nuclear weapons program (Brad Plumer, 2014) together these events pushed oil prices above \$100 per barrel for a four-year stretch – the longest such period on record. Recently with the impact of COVID-19, oil prices dropped dramatically when OPEC and Russia failed to agree on production cuts i.e., OPEC and its allies (OPEC+) in a bid to stabilize falling prices, agreed to cut its combined output by 9.7 million barrels per day each in May and June from the agreed baseline. The timing of the agreement coincided with a period when the global crude oil market had more crude oil than it could use and potentially stored hence oil supply/demand imbalance occurred in line with the depressed need for chemicals and refined products stemming from industrial slow-downs and travel restrictions in the wake of COVID-19 (Olufemi A, Beulah A, Akinola A, 2020). Consequently, the short-to medium-term outlook for high-cost producers, smaller operators and those companies with high levels of debt appeared to be more challenging now than ever, leading to a large loss of output and a corresponding rise in oil prices.

Though African crude oil exploration began in early 1920s in Uganda and Eritrean red sea where there was extensive shallow drilling but successful explorations were recorded from the Sahara Desert province of Libya, Algeria, Tunisia and Morocco from North Africa in the early 1950s and the first petroleum exploration took place in Algeria in 1952. Continentally in 1956 the first commercial quantities of oil in Africa were found in Oloibiri, Niger Delta basin of Nigeria, West Africa by the shell D'arcy (J. Oke, 2006) by 1958 production had reached 5100 barrels per day (M. A. Ajomo, 1987) in 1971 Nigeria joined OPEC and over the years the oil prices become volatile which has affected Nigeria's economic growth since its majorly oil dependent in terms of sources of government revenue i.e., in 1973 the world experienced an oil price shock that rippled through Nigeria until mid-1980s because OPEC raised oil prices by 70 % , according to the Central Bank of Nigeria (2007) the oil boom of the 1970s led to the neglect of non-oil tax revenues , expansion of the public sector and the deterioration in financial discipline and accountability in turn oil dependence exposed Nigeria to oil price volatility which threw the country's public finance into disarray as the government of Nigeria was trying to avoid the

Dutch Disease problem (Ngozi Okonjo, 2008) but Nigeria still went through decades of economic stagflation and degradation of public institutions which affected economic growth rate. though until today the economy of Nigeria has benefited through the oil and gas industry(Ann G, Toyin F, 2016) i.e., employment opportunities , development of new industries, increased revenue and it is currently the ninth largest oil exporter in the world in terms of value and currently five countries Nigeria, Libya, Algeria , Egypt and Angola dominate oil production accounting for 85% of the continent's reserve other oil producing countries are Gabon, Congo, Cameroon, Tunisia, Equatorial Guinea, Democratic Republic Of Congo, Cote d'ivoirie and recently Ghana though it has low output. Overall crude oil discovery and production has boosted the continent's economy and improved the wellbeing of the citizens.

Regionally the first assessment of the oil and gas potential was made in Uganda by a government geologist by the names: E.J. Wayland who documented hydrocarbon occurrences in the Albertine Garden in the 1925 followed by many shallow wells However, progress in the oil industry chilled again with the start of World War II. Then in 1950s the exploration of oil in Kenya begun and according to the National Oil Corporation of Kenya, out of the 30 wells sunk between 1960 and 1992 and only 5 encountered signs of oil staining with exploration in Anza Garden in Kenya in 1980 (Sonal, Njeri, Edwin, Khana, 2017) and hence Kenya is impacted significantly with any oil price volatility i.e., according to the National Energy and Petroleum Policy Report (2015) and also according to Kenya Association Manufacturers (2020) the fluctuations in oil prices caused by mainly global international price changes cause a ripple effect on the economy as the cost of transport and production rises leading to an increase in the cost of finished goods and most especially essential goods especially for most manufacturing sectors who heavily rely on oil and hence Kenya is still recovering from the impact of the pandemic with the cost of living increasing substantially against dwindling purchasing power of citizens and also leading to cost push inflation(Kilui, Nicole Nduku, 2018). As with Kenya, the exploration of oil and gas in Tanzania begun in 1950s with the first natural gas discovery made in the early 1974 in Songo Songo and the second discovery in Mtwana region in 1982 making it the most mature of East Africa's oil and gas producers(Aggrey, Geoffrey, 2017) as it has been producing gas from on and nearshore fields since 2004 and in 2010 Tanzania's growth projections were boosted substantially following natural gas discoveries and hence oil price changes caused by shifts in supply and demand in the market, depreciation of Tshs. against USD dollar, changes in the pricing of oil

products in the world market, oil marketing, weather, technology, and geopolitics instability where a study according to Milton Rwegasira (2017) the consequences of oil price swings caused a (24.3%) raise of prices of commodities and it affected the standard of living. (22.1%) which increased the cost of production and transportation and these could be barriers to investment but generally East Africa's oil and gas sector has a promising future. Following Uganda's independence in 1962, after oil discovery, political instability and civil war continued to dissuade many oil investors, but the largest hurdle facing international oil companies was overcoming the operational challenges and costs of exploring for oil well over 1,000 kilometres inland from nearest major port at Mombasa, on the Kenyan coast but over the years 4 oil licenses which include Total Energies Exploration And Production Uganda B.V (TEPU), CNOOC Uganda limited, Armour Energy Limited And Oranto Petroleum Limited and 9 oil production licenses according to Petroleum Authority Uganda (2023) but Uganda is still importing oil hence making it vulnerable to international oil supply and demand shifts i.e., by July 2022, the domestic price for diesel and petrol in Uganda had increased by 71.5 percent and 56.1 percent respectively compared to July 2021 at a time when the economy was still struggling to rebound from the devastating effects of COVID-19 and the global energy crisis directly affected local fuel prices and therefore the economy (Tonny Odokonyero,2022) however, domestic policy actions influence tax-related costs, distribution, and profit margin but not the international crude oil price as a result, the Government of Uganda did not intervene to curb the escalating prices and according to Constitution 1994 Act the government of Uganda deregulated petroleum prices which gave the oil firms liberty to set prices and over time, this has significantly affected different macro-economic variables such as Balance of payments position, gross domestic product and the cost of doing business since businesses are likely to incur higher input costs in terms of transport and machine operations with fuel energy being a critical intermediate input in the production of goods and services, and thus, any crisis in its prices culminates in far-reaching adverse effects on the economy. It deteriorates the business environment by escalating the cost of doing business because of increased transport costs (Tonny Odokonyero, Enock Bulime, 2021) hence according to the World Bank (2009) high fuel prices are the single greatest contributor to total trade-related transport costs, accounting for more than a third of the costs.

1.2. Statement Of the Problem

The volatility of the oil price is a major concern globally because of its implications on macroeconomic stability. Oil price fluctuations, as suggested by several studies, are one of the external shocks that lead to macroeconomic fluctuations in both the advanced and emerging economies (Hamilton, 2009, Burbidge and Harrison, 1984). In most of the studies carried out, variations in oil price have the strongest effects on oil importing countries compared to oil exporting countries. According to Fowowe & Iwayemi (2010, p. 603), oil price shocks are mainly transmitted to the real economy through two channels namely: the supply and demand side channels. In the supply side channel, oil is an input in the production processes therefore, an increase in the price of oil leads to a rise in the costs of production leading to lower output. On the demand side, a rise in the oil price leads to a decline in consumption and investment as disposable income reduces. While it is true that a number of research studies have been conducted and deduce that oil price fluctuations lead to stagflation and cause a reduction in output (Ojapinwa and Ejumedia, 2012). The Oil price shocks remain of great concern to the developing countries, whose financial sector are still less developed compared to the global economy. These fluctuations in oil prices are proven to have substantial effects on developing economies who are oil importers as they rely greatly on oil imports and yet their consumption oil remains inefficient.

1.3 Study objectives

- i) To examine the effect of oil price changes on real exchange rate. ii)
To determine the effect of oil price changes on core inflation.
- iii) To examine the effect of oil price changes on oil price index.

1.4 Research questions

- i) To what extent have oil price changes affected Uganda's economic growth?
- ii) To what extent have oil price changes affected core inflation rate? iii) To what extent have oil price changes affected oil price index in the economy?

1.5 Scope of the study

1.5.1 Geographical scope

The study will focus on the effects of oil price changes on economic growth in Uganda as a case study. The selection of this region was so because Uganda is a developing economy, and will

specifically show how the oil price fluctuations affect Uganda's economy and also easy access of data on these variables.

1.5.2 Content scope

The study focuses on the effects of oil price changes on economic growth in Uganda as a case study and will examine the effect of oil price changes whether positively or negatively on economic growth relationship in Uganda hence the study will allow for more understanding of the effects of oil price changes on economic growth and this will help the policy makers and other researchers to make informed decisions.

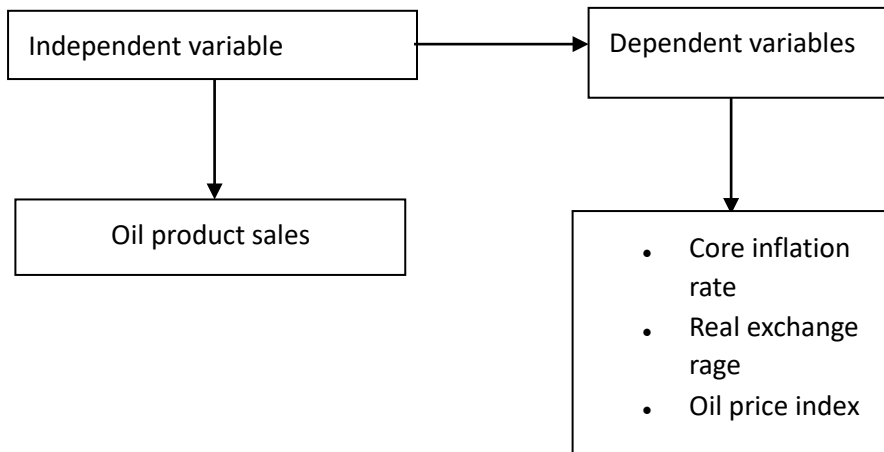
1.5.3 Time scope

The study will take a period of 4 months between May to August 2023 because this period will be sufficient enough to allow the researcher carry out thorough investigation on the effects of oil price fluctuations on economic growth that is to say collect data, analyze, discuss findings and write a report.

1.6 Significance of the study

The empirical validity of the export and import-led growth strategy has been called into question by numerous researches undertaken in numerous nations regarding the relationship between trade and economic growth. This is research aims to contribute to closing the empirical knowledge gap by examining the effects of oil price shocks on Uganda's economic growth. This paper contributes to previous studies in different aspects i.e., first, it explores the extreme impact of both oil price and uncertainty of oil price on the real product second, it explores to what extent the effect of oil prices is asymmetric. The analysis of this paper can used as a decision support tool for policymakers as it attempts to investigate to what extent oil prices and oil prices volatility should be taken into consideration when calculating and predicting economic growth.

1.7 Conceptual framework



Chapter Two

Literature Review

2.0 Introduction

The purpose of this chapter, in the context of this research, is to establish important theories that help us talk in-depth about the connection between oil price changes and economic growth. This chapter also emphasizes, both conceptually and empirically, previous empirical research that was conducted to evaluate the effects of oil price changes on economic growth. It's crucial to comprehend some theories in order to analyze how oil price changes has impacted Uganda's economic growth.

2.1 Channels of oil price changes to the economy.

The asymmetric effect of oil price on economic growth, whether positive and negative oil price shocks is another important topic for recent literature. The likely asymmetric effect of oil price could be justified using three justifications: uncertainty, sectoral effects and counter inflationary monetary actions (Kilian and Vigfusson, 2011; Raheem,2017; Akinsola and Nicholas, 2020). For instance, Hamilton (2008) argues that oil price shocks might push customers in intensive energy sectors to reduce their demands while other sectors which do not intensively depend on energy might be more costly to pay the cost of shifting of labor and capital inputs across sectors due to training costs and other mobility costs. Studies such as (Hamilton, 2003) conclude that positive changes in world oil prices have a stronger effect on economic performance than negative ones. According to Mar (2007) oil demand is modelled as a function of global economic activity and oil price where a rise in oil prices will lead to a decline in output as production costs go up for both the services and industrial sectors conversely an increase in oil price leads to a decline in its demand and productivity (Dermot & Huntington, 2001). In a situation where energy has an inelastic demand in countries such as Uganda which are net importing countries where an increase in prices of oil cause total expenditure on energy and costs of production to increase which leads to a reduction in production, consumption, income and employment. Supply side shock transmission channel, changes in the oil prices can have great impact on the macroeconomic activities especially for economies whose gross output is directly hinged to the global flow of goods and services and international inflows/ outflows of foreign investment, an increase in the world oil prices would cause a rise in the variable costs of the firms whose major input is oil. This would lead to an increase in product prices, leading to a contraction in demand and consequently national output declines if a considerable number of the countries' industries depend on oil (Brown and Yucel, 2002). The resultant impact would be inflationary to the general price level yet deflationary to the real output. In an attempt for consumers to smoothen

consumption due to high oil prices, they will reduce their saving levels or borrow more which would raise the real interest rates (Marcel, 2010).

According to Fattouh (2007), Theory of exhaustible resources deals with resources that cannot be replaced since oil depicts characteristics of exhaustibility as its demand outstrips supply making it a classic example of an exhaustible resource. According to Hotelling(1931) ,It is likely that a resource owner might hold back an exhaustible resource if he expects that the price of the resource might rise faster than the rate of interest which creates an artificial decline in supply of the resource leading to a rise in the general price level hence leading to a conclusion that oil price is likely to continuously rise overtime however studies have shown that oil prices are not always exponential as described by Hotelling's theory of exhaustible resources. In an importing country, another transmission channel linked to a hike in the oil prices is the observed rise in general price levels which then leads to a decline in supply causing an increase in interest rates and eventual contraction in economic activity (Chuku, Akpan Sam and Effiong ,2011). In addition, an increase in the general price level causes the real wealth to decrease leading to a reduction in consumption. This competition of domestically produced goods for oil importing countries is also decreased when there is an increase in the price of oil which stems from the shift in demand that occurs when there is an increase in the general prices of domestic goods relative to the price of imported goods. A negative impact on economic activity caused by the increment in oil prices can be counteracted if oil exporting countries use part of their profits to buy more of the exports of the oil importing countries i.e., according to Trading Economics (2023) Uganda on average exports 15% and 5% of its total exports to oil exporting countries of Sudan and United Arab Emirates respectively though there has been not yet any proven evidence attributing increase of Ugandan exports to the above mentioned destinations as a result of increase in oil prices. While in the supply side, the pass-through effect of the variations in the oil price to the economy is mainly registered from changes in the production cost and reallocation of resources, an increase in the oil price tends to create a situation where the mix of factors of production has to be adjusted to bridge the gap caused by oil price variation. However, the resource allocation has to counteract the short run impact of the oil price shocks might generate costs such as irreversible capital investments and labour training fees which may further impact on the oil price level i.e., from the demand side, a fall in oil prices generates a rise in disposable income of an oilimporting country, leading to an increase in the demand for other commodities, especially those with high-

income elasticity. A decrease in oil prices, however, has an impact on other energy products, such as coal, gas, and electricity. From the supply side, oil is a production input for many commodities, such as electricity and transportation. An increase in oil prices will lead to an increase in production costs and prices of other commodities. Therefore, oil price fluctuation may affect the prices of other commodities and thus plays a key role in its relationship with GDP growth (Lescaroux and Mignon, 2008, Odhiambo, 2010).

Ghosh and Kanjilal (2009) emphasizes the real balance effect of transmission whereby an oil price shock affects the demand for money i.e., consumers are forced to borrow money to meet short term consumption if they “expect the short-term effect of a rise in oil prices to exceed its long-term impact on output” (Chuku, Akpan, Sam and Effiong ,2011). This will lead to a rise in interest rates and reduced demand for real cash balances. According to Marques (1983) the impact of oil price rise pass through to both oil importing and oil exporting countries (OPEC) is international, on one hand, the hike in the energy prices leads to a shift of real income from oil importing countries and oil exporting countries. this can be evidenced through a decline of foreign reserves causing a negative impact on output growth as imports become more expensive which also worsens the balance of payments position of oil importing countries.

Although a substantial number of studies analyze the impact of oil prices on economic growth, most focused on Asia, Latin America, developed countries and Arab countries. Examples include studies by Cunado and Perez-de Gracia, 2003, Cunado and Perez-de Gracia, 2005, which focused on several European and Asian countries respectively. Lescaroux and Mignon (2008) investigated a large group of countries, including both importing and exporting countries, and Du and Wei (2010) investigated China’s economy. Hanabusa (2009) focused on the Japanese economy, Jiménez-Rodríguez and Sánchez (2005) provided empirical evidence for some OECD countries, while Berument, Ceylan and Dogan (2010) examined countries in the Middle East and North Africa (MENA) region. The effect of sharp changes in oil price depends on whether a country is an importer or an exporter of oil. Since oil is input in the production process, a rise in the price of oil increases the production costs for an oil importer, leading to cost-push inflation and lower economic growth (Mordi and Adebisi, 2010, Sauter and Awerbuch, 2003). The impact of oil price changes on oil-importing nations is twofold. Firstly, a fall in oil price is beneficial to oil-importing countries, as the balance of payments and terms of trade tend to increase. Secondly,

a rise in oil price may cause a steep drop in income, especially for the countries whose economies are highly dependent on oil (Deaton, 1999).

2.2 Effect of Oil Price Changes on Real Exchange Rate.

Two main channels of transmission through which changes in oil prices can affect exchange rates have been widely documented in the literature. The first channel is through the terms of trade. For oil importing countries, an increase in oil prices will lead to a deterioration of the trade balance and subsequently to a depreciation of the local currency. In this light, Backus and Crucini (2000) show that the variation in oil prices even determines most of the variation in the terms of trade. Second, oil prices can also affect exchange rates via wealth effects. Krugman (1983) and Golub (1983) document that higher oil prices will transfer wealth from oil importers to oil exporters, which leads to a change in the exchange rate of the importing country through current account imbalances and portfolio reallocation. The final impact will depend on the dependence on oil and the share of exports to oil-exporting countries. More recent evidence on this effect can be found in Kilian et al. (2009) and Bodenstein et al. (2011), amongst others. On the other hand, the negative correlation can arise because changes in the US dollar exchange rate negatively affect oil prices. More specifically, exchange rates can change oil prices via its effect on oil supply and oil demand, and via financial markets. First, on the supply side of the oil market, a depreciation of the US dollar might lead oil producers to limit oil supply and raise oil prices to stabilize the purchasing power value of their export revenues in dollars, see e.g., Wirjanto and Yousefi (2003, 2005) for evidence on this channel. Second, a depreciation of the dollar might also increase the demand for oil, as oil imports become cheaper in local currency for countries besides the US (De Schryder and Peersman 2012). Moreover, several countries such as China peg their currency to the US dollar. Dependent on their oil intensity, a depreciation could lead to an increase in oil demand driven by higher exports (Bénassy-Quéré and Penot 2005).

2.3 Effect of Oil Price Changes on Inflation Rate.

Historical data and existing studies have demonstrated that oil price shocks pose a threat to every economy in the world as it exposes countries to depression and macro-economic instability for example to economic indicators such as inflation which measures the overall rate of price increases across the economy but also oil price shocks and economic growth are known to have a cause and effect relationship i.e., higher oil price raise indirectly because crude oil is a key ingredient in petrochemicals used to make plastic and also in the transportation sector in terms of

fuel prices. These indirect contributions of crude oil to inflation are reflected in the core inflation rate which does not include energy or food prices because they tend to be more volatile however reduced reliance on energy especially crude oil promoted a decline in inflation as some analysts have argued that the recent correlation between crude's diminished importance as an economic input and lower inflation rate may no longer hold as oil is supplemented by less climate damaging but more expensive renewable energy sources and global supply chains give way to costlier domestic or regional sourcing (Katrina, 2023). Nevertheless inflation is explained by monetarists and structuralists differently i.e., the monetarists argue that domestic inflation results from monetary expansion where inflation is sought to be caused by excess demand for money influencing the central bank to increase the amount of money in supply and it can be curbed through use of contractionary monetary policy i.e., Friedman (1971) argues that inflation is always a monetary event however according to the structuralists argue that domestic inflation results from changes in fundamental factors of the economy, changes in relative prices hence inflation which can result from oil price shocks. Darby (1982) and Hamilton (1983) revealed that an unexpected increase in oil price is linked with economic recession and higher inflation rate however when changes in oil price manifest through an exchange rate increase, the effect on inflation was found to be positive, Zakaria (2021). As oil price changes have an impact on inflation and sub-indexes of consumer product index across different sectors of the economy, sectors such as transportation sector that significantly depend on oil for their activities tend to feel the effect more relative than other sectors because transportation sector can't survive without oil and so these costs are normally extended to consumers through their demand for different goods especially goods with inelastic demand. Bottom line, the price of oil has historically correlated with inflation as the relationship has become less pronounced as result of the growth of the service sector which uses energy less intensively than manufacturing sector. Since oil is a key input in manufacturing and a major cost factor in shipping, oil prices have tended to have a greater effect on the cost of goods than services.

2.4 Evidence of Previous Studies

Research on the impact of oil prices on economic growth has been growing since the oil price crisis of 1985/86. However, little research has been done on low-income oil-importing countries. Bacon and Mattar (2005) estimated that, compared to the highest income group, the effect of oil

price shocks on developing countries could be twice as hard. The magnitude of the impact of oil price volatility on economic growth, however, depends on the distribution of oil imports across oil-importing countries and portfolio preferences of both oil-importing and oil-exporting countries (Huang and Guo, 2007, Fowowe, 2014). A study by Bacon (2005) calculated the impacts of a continuous increase of US\$10 per barrel in oil price for 131 countries. The author found that countries with less than US\$300 per capita income experienced the highest percentage decrease in GDP than other income groups in the study. According to the British Petroleum (B.P.) (2018), growth in oil consumption has been on the increase since 2008 excluding major consumer countries such as Algeria, Egypt, Morocco, Nigeria and South Africa, African countries. One of the key studies that ascertained the existence of a linear relationship was conducted by Hamilton (1983) whose assessment of the impact of oil on the USA macroeconomy showed that the economic recessions faced by the US since World War II were usually linked to increases in the price of crude oil. The studies that focused on assessing the breakdown in the linear relationship were mostly carried out following the decline in world oil prices in the mid-1980s. According to Bohi, (1991) an analysis of disaggregated data of four countries after the oil price shock in the 1970s showed that there was no similarity amongst the countries in terms of the impact of the oil shock on output and employment and there was no relationship between the level of industrial activity and energy intensity. Similarly, a study carried out by Mork (1989) and Jimenez-Rodriguez & Sanchez (2004) concluded that there are no significant effects of oil price declines on output growth. Fowowe & Iwayemi (2010, p. 603) attribute the decline in the linear relationship between oil and real economic activity to “the asymmetric effect of oil price shocks, the declining impact of oil on the economy and the role of monetary policy”. The studies that focused on finding the relationship between oil price shocks and monetary policy included: Bernanke, Gertler, Watson, Sims, & Friedman (1997) who concluded that ‘endogenous monetary policy’ in the USA plays a significant role on the ‘aggregate impact of oil price shocks’ thus the impact of oil price shocks was noted strongest during periods of strong monetary policy. Hamilton & Herrera (2001) refute the conclusion that monetary policy has great ability to revert economic contraction following an oil price shock.

Chapter Three Methodology 3.0 Introduction

This chapter presents the methods that will be used in the study. It describes the research design, study population, sample size and selection, data collection methods and instruments, validity and reliability of findings, data analysis of quantitative and qualitative data and the measurement of variables.

3.1 Research design

The research design refers to the overall strategy developed to combine the numerous study components in a coherent and logical manner, ensuring that it would successfully address the

research problem. It is the underlying plan for data collection, measurement, and analysis. It is crucial to keep in mind that the study's design choice is based on the research problem. As a result, time-series data were collected and statistically analyzed using a quantitative research technique.

A quantitative research methodology was employed in the statistical analysis of the collected timeseries data. The framework of this study will be used to examine the relationships between Uganda's oil prices and economic growth in order to accomplish the goals of this work. In order to incorporate the short and long-term association between oil price changes and economic growth in the model, the expected analysis for this study would cover annual time series data. The data set includes observations for the prices of oil products, real gross domestic product, core inflation rates, real exchange rates in their respective measures and all data sets have been collected directly from the World Bank development indicators.

3.2 Area of Study.

Economic Growth refers to the increment in amount of goods and services produced by an economy. In the context of a growing economy like Uganda which is still importing crude oil from abroad since it's a major factor input in production in several sectors yet there is evident discovery of crude oil in the western region of Uganda, this has caused a rise in concern as oil prices have proven to be very volatile and the government having no regulations in place to control them, this has made their effect on economic growth very evident. Hence this study demonstrates how oil price changes affect Uganda's economic growth using core inflation rate, real exchange rate and oil price index as economic indicators for the analysis.

3.3 Data and source

The study made use of secondary data defined as gathering information gathered by someone other than the researcher for a purpose unrelated to the current study effort. The secondary datasets contained details on core inflation rate, real exchange rate, real oil price index, Uganda's gross domestic product rates over the last 20 years (2003- 2022), given the availability of the data from the different data sources i.e., the World Bank's data database was used to get the quantitative information. The test evaluations methodology, the indicators used to record the program's results, and the kind of analysis to be done are all determined by the quantitative structure of the data that is required.

3.4 Econometric model

The Ordinary Least Square (OLS) technique was used to create a linear multiple regression model because the ordinary least squares estimator also known as the best linear unbiased estimator has minimum variance among the class of linear unbiased estimators as proven by Gauss-Markov theorem hence making it efficient and consistent to use in determining the effect of oil price changes on different economic indicators using in this analysis (Brooks, 2008).

$$REER_t = \beta_1 + \pi_{11}OIL_{t-i} + \epsilon_{yt}$$

$$INF_t = \beta_2 + \pi_{21}OIL_{t-i} + \epsilon_{pt}$$

$$P_t = \beta_3 + \pi_{31}OIL_{t-i} + \epsilon_{rt}$$

Where $i = (1, 2, 3, n)$ β_1 and

β_2 are intercept terms

P_t represents Real Oil Price index at time t

$REER_t$ represents Real Exchange Rate at time t

INF_t represents Core Inflation Rate at time t

OIL_{t-i} represents Oil Price Sales at time t

ϵ_{yt} and ϵ_{pt} represent error terms

3.5 Variable definitions

Real exchange rate $REER_t$ between two currencies is the product of the nominal exchange rate i.e., the price of one currency in terms of another (IMF, 2022) i.e., the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar (World bank,2022)).

Core inflation INF_t is the persistent rise in the costs of goods and services, but it does not include those from the food and energy sectors. This measure of inflation excludes these items

because their prices are much more volatile. It is most often calculated using the consumer price index (CPI), which is a measure of prices for goods and services (Will Kenton, 2022).

Real oil price index P_t is a measure used to track the inflation-adjusted price of oil over time. It reflects the changes in the purchasing power of a unit of currency concerning the price of oil, accounting for inflation or deflation effects and by accounting for inflation, the real oil price index allows for a more accurate comparison of oil prices over different time periods. It helps to understand the true changes in oil prices and assess their impact on the economy.

3.6 Quality control

This section states the efforts and procedures that were put in place to ensure the quality and accuracy of data being collected using the methodologies chosen for this particular study (James Roe, 2022). The indicators of Uganda's GDP are sourced from the World Bank Development Indicators website and oil price data is collected from the Ministry of Energy and Mineral Development which are credible sources since the use of internationally accepted standards and norms results in a consistent, reliable source of information. Furthermore, the data that will be used in the regression model has undergone diagnostic testing. One of the most important stages in the modelling process is regression diagnostics i.e., Regression model diagnostics are tools that check a model's adherence to its presumptions and determine whether a single observation or set of observations is poorly represented by the model (WISC,2022). In this research, the diagnostic tests run include: normality of the errors and autocorrelation.

3.6.1 Diagnostic tests

Normality of the errors:

The skewness test provides two tests for normality, one based on kurtosis and the other on skewness—and then combines the results of the two tests to provide a single test statistic. For its calculations, it needs a minimum of 8 observations. This test is an adaptation of the Jarque-Bera test for normalcy; it is frequently recommended that error terms have a normal distribution so that we can draw precise conclusions. The systematic portion of the regression equation is supplemented by the errors, which are random disturbances. They combine “pure error,” omitted variables, equation error, and/or misspecification. Error analysis makes frequent use of the normalcy assumption. The random errors are typically thought to have a normal distribution. When there are numerous connected sources of errors, this presumption may fail. Additionally,

this assumption might not be true if the errors are not completely random. If the assumption of normality is made yet the error distribution is not normal, this could result in an improper statistical analysis and consequently incorrect conclusions. With a 5% threshold of significance, the null hypothesis of normality is not disputed (Gujarati, 2009).

Autocorrelation:

Testing the residuals for autocorrelation is necessary because the study will be working with time series data, which greatly increases the likelihood of autocorrelation. Autocorrelation, in other words, ascertains the existence of correlation between the values of variables based on related characteristics. It resembles how two signals cross-correlate with one another. The premise of instance independence, which the majority of statistical models rely on, is violated by autocorrelation (Gujarati,2009 and Porter, 2022).

Unit root test

A unit root is a stochastic trend in time series also known as a random walk with drift, if a time series has a unit root, it shows a systematic pattern that is unpredictable leading to spurious regressions and errant behavior hence making it customary in the time series analysis that the data is tested for stationarity. In the current study the series are tested for stationarity using the most popular Augmented Dickey Fuller test because it has a downside of a fairly high type I error rate and is based on linear regression where serial correlation can be an issue hence the need for the test (Stephanie Glen, 2023).

3.7 Data Analysis

To perform econometric analysis STATA 15 and Microsoft excel software were used to run econometric tests that enable us to determine if there is a relationship between oil price changes and economic growth divided into real exchange rate, core inflation rate and oil price index for the past 20 years. Below are different analysis tests that can be performed in this study.

3.7.1 Correlation Analysis:

It refers to the process of examining the associations between two or more variables in order to ascertain whether there is a statistical correlation between them, the strength of that association, and whether one variable can be predicted from another (Gujarati, 2009 and Porter, 2022). The following precise objectives served as the study's direction: To investigate how oil price changes

and economic growth are related: Establishing whether there is any association of any kind and assessing the strength of the relationship and will be used to make this determination.

3.7.2 Multivariate Regression analysis:

Multiple regression is a statistical technique that uses several explanatory variables to predict the outcome of one or more dependent variable with the goal to model the linear relationship between the independent variables and dependent variables as it allows an analyst to predictions about one variable based on information that is known about another variable but the independent variables are not meant to be highly correlated with each other and the residuals should be normally distributed with mean of 0. The null hypothesis is stated that the regression coefficient is equal to 0 therefore there is no significant relationship between the independent variable and dependent variable. Hence its necessary to carry out this regression so as to avoid having spurious results that have no meaning.

3.8 Ethical considerations

Ethical considerations in this research are a set of principles that guided the research designs and practices. When gathering information from various sources, researchers are required to constantly abide by a set of ethical principles (Bhandari, 2021). The World Bank's development indicators provided the data for this study, which is available for free use for commercial or noncommercial purposes to reproduce, distribute, adapt, display, or incorporate into other works under the terms of a Creative Commons Attribution 4.0 International License (WORLD BANK, n.d.) and also the Ministry of Energy and Mineral Development provides this data for policy analysis and decision making (MOFEMD, 2019). The dissertation has utilized the APA 7 reference style to properly credit all other writers' works that were used in any part of this research. As a result, all communication on this research has been done in an honest and open manner.

Chapter Four

Data Presentation, Discussion and Interpretation of Results 4.0 Introduction

This chapter presents, explains, interprets and discusses the results in line with the set objectives of the study with the primary objective of this study to investigate the effects of oil price changes on economic growth in Uganda. The chapter begins with the unit root tests and proceeds to the results for the objectives of the study involving presentation, analysis and interpretation of the study results of regression and correlation tests presented in the form of tables and figures based on the responses got from the data that was collected from the World Bank Indicators.

4.1 Unit root test

While using ordinary least squares technique, it is customary in time series analysis before carrying out a regression analysis that a unit root test is carried out so to avoid spurious results since this results to non-meaningful relationships between variables therefore it is commended to carry out a unit root test so as to correct such errors. In the current study the series are tested for stationarity using the most popular Augmented Dickey Fuller test. The null hypothesis of nonstationarity is tested against alternative hypothesis of stationarity by employing the Dickey

Fuller (DF) and where we reject the null hypothesis if the test statistic is less than the critical values either at 1%, 5% and 10% or the p-value is less than the 0.05 threshold.

Table 4.1 Unit Root Test Results

	Test statistic	Critical value at 5%	Critical value at 10%	Difference
Core Inflation	-3.927	-3.000	-2.630	I (1)
GDP	-2.927	-3.000	-2.630	I (1)
Real exchange rate	-4.049	-3.000	-2.630	I (1)
Annual oil sales	-3.351	-3.000	-2.630	I (1)

Source: World Bank (2003-2022)

As shown in the results from table 4.1. the series were differenced to make them stationary at first difference as new variables were generated, given their respective tests statistics were less than the critical values at 5% and 10%, core inflation rate is stationary given the test statistic - 2.927 is less than -2.630 hence making the data set suitable for further analysis.

4.2 Regression analysis

Linear regression is a technique used to understand the relationship between one or more independent variables and dependent variables using a regression coefficient which signifies the percentage change in independent variable for a unit increase in dependent variable where the null hypothesis states that the coefficient is equal to zero and that there is no statistically significant relationship between independent variable and dependent variable and if the p value is above the 5% threshold, we still reject the null hypothesis which will result into concluding that there are non-meaningful relationships among variables hence the need to carry out a regression test (Statology, 2023).

4.2.1 Effects of Oil Prices on Real Exchange Rate to Uganda's economy.

The results in Table 4.2.1 show that there is a statistically significant relationship between oil price changes and real exchange rates given the p value 0.000 which is below the 0.05 threshold hence we reject the null hypothesis meaning the real exchange rate coefficient is not equal to zero and this is explained as a percentage increase in oil price rise leads to real exchange rate appreciation by a 1.971 percentage meaning as oil prices rises, production and transportation costs rise leading to higher prices of goods and services which then attract capital inflows from

foreigners so as to invest in those sectors whose commodity prices are rising and the increased demand for the currency can lead to its appreciation plus government may actively intervene in foreign markets to prevent their currency from depreciating due to rise in oil prices through the use of foreign reserves to counteract currency's value or through the monetary policy hence encouraging economic growth.

Table 4.2.1 Regression Analysis for Effect of Oil Price Changes on Real Exchange Rate.

	Coefficients	Std. error	Beta coefficient	t	Significance
Constant	-461.730	348.740		-1.324	.202
Oil annual sales	1.971	0.000	0.901	8.824	0.000

Source: World Bank (2003-2022)

R squared = 0.812

4.2.2 Effects of Oil Prices on Core Inflation rate to Uganda's economy.

The results in table 4.4.2 show that there is a statistically significant relationship between oil price changes and core inflation rate given the p value 0.044 which is below the 5% threshold meaning we reject the null hypothesis where an increase in annual oil sales leads to a decrease in core inflation by a 3.53 rate, given the volatility of oil prices, core inflation focuses on more stable inflationary pressures since it excludes energy and food price volatility therefore an increase in oil price may not affect it as much as it may remain stable or decrease since it focuses on commodity price fluctuations though core inflation rate may increase in the short run because oil is a major input cost for many businesses which tend to pass on these costs to consumers in the form of higher prices but in the long run an increase in oil prices can lead to a decrease in core inflation rate because high oil price can lead to slowdown in economic growth as demand for oil products reduce and the costs are no longer affordable.

Table 4.2.2 Effects of Oil Prices on Core Inflation rate to Uganda's economy.

	Coefficients	Std. error	Beta coefficient	t	Significance
Constant	11.972	2.541		4.711	0.000
Oil annual sales	-3.53	0.000	-.455	-2.169	0.044

Source: World Bank (2003-2022)

R squared = 0.207

4.2.3 Effects of Oil Prices on Oil Price Index to Uganda's Economy.

Objective three which examines the effects of oil price changes on oil price index as observed above shows a statistically significant relationship between oil price changes and oil price index

given a p value of 0.008 which is below the 0.05 threshold meaning we reject the null hypothesis hence explaining that that an annual increase in oil sales leads to a 2.52 decrease in oil price index , oil products tend to become expensive as oil price rise and this normally tends to lead to a reduction of its level of demand which forces oil exporting countries to decrease their selling prices globally so as to attract more buyers to buy in large quantities hence leading to a reduction in the global oil price index since it incorporates inflationary tendencies.

Table 4.2.3 Effects of Oil Prices on Oil Price Index to Uganda’s Economy.

	Coefficients	Std. error	Beta coefficient	t	Significance
Constant	121.078	13.261		9.130	0.000
Oil annual sales	-2.518	0.000	-.573	-2.965	0.008

Source: World Bank (2003-2022)

R squared = 0.328

4.3 Correlation analysis

The statistical method of correlation analysis examines the degree of a relationship between two numerically measured continuous variables, if there is a correlation between two variables, it means that over the course of some time, whenever one variable undergoes a regular change, the other also undergoes a regular change. If a correlation is observed, it may or may not be positive or negative depending on the numerical values examined (Correlation Analysis - Market Research, 2019). If two variables rise at the same time, there is a positive correlation, meaning that the high numerical values of one variable are related to the high numerical values of the other. If one variable fall when the other rises, or if the high numerical values of one variable connect to the low numerical values of the other, then there is a negative correlation.

4.3.1 Effects of Oil Prices on Real Exchange Rate to Uganda’s economy.

As seen from Table 4.3, there is a positive correlation of (0.901) between real exchange rate and annual oil sales meaning that as oil prices increase the real exchange rate appreciates in terms of its value hence making it cheaper to import more oil products to the country since the US dollar becomes cheaper in terms of the Ugandan currency but this is correlation is accompanied by a low negative correlation of -0.2104 between real exchange rate and gross domestic product meaning that as much as the Ugandan currency appreciates when oil price rise, it does not encourage economic growth because it makes exports more expensive since the cost of production through transportation costs becomes high in terms of exporting the goods to other

countries and a strong currency can make it difficult to compete with foreign businesses as the products become more expensive hence reducing their demand globally, also imports become cheaper as domestic buyers may shift to buying goods from other countries where the currency is weaker hence affecting economic growth rate.

4.3.2 Effects of Oil Prices on Core Inflation rate to Uganda's economy.

From the results shown in Table 4.3 we see a negative correlation between annual oil sales and core inflation rate meaning that as oil sales increase the core inflation rate decreases, the more oil firms gain from selling oil at high prices the more prices of goods and services are likely to rise and this normally due to the fact that oil is very valuable necessity in production processes of agriculture and manufacturing industries , so oil price increase tends to make it expensive for firms to efficiently carry out production leading to high prices which are normally extended to consumers especially for goods with inelastic demand but with that as core inflation rate rises this boosts economic growth, a positive correlation of (0.6651) is observed between core inflation rate and gross domestic product meaning that as inflation rises, this encourages investment in those businesses whose prices are rising as the firms may purchase more equipment and production facilities and also workers earn higher wages so as to meet the rising cost of living and this means the government can extract more revenue from the public or selected sectors where prices are rising so as to support economic growth.

4.3.3 Effects of Oil Prices on Oil Price Index to Uganda's Economy.

Given the results from Table 4.3 where a moderate negative correlation of (-0.5794) between oil price index and annual oil price sales is observed meaning that as oil price index increases globally the oil sales in Uganda decrease meaning as the oil exporters rise prices for the oil products this makes oil expensive to oil importing countries such as Uganda hence leading to a spike in prices which in most cases leads to government unpopularity among the citizens since it does not control oil prices and neither does it have regulatory measures to cab there effect on the economy instead oil prices are controlled by majorly forces of demand and supply although a positive correlation of (0.2732) is observed between oil price index and gross domestic product meaning as oil prices rise globally, economic growth is boosted gradually at a slow rate.

Table 4.3 Correlation Test Results.

		Core inflation	Real exch. rate	Oil price index	Annual oil sales	GDP
Core inflation	Pearson corr.	1	-0.309	0.522	-0.455	0.413
	Significance		0.185	0.18	0.044	0.070
Real exch. rate	Pearson corr.	-0.309	1	-0.620	-0.901	-0.518
	Significance	0.185		0.004	0.000	0.019
Oil price index	Pearson corr.	0.522	-0.620	1	-0.573	0.541
	Significance	0.018	0.004		0.008	0.014
Annual oil sales	Pearson corr.	-0.455	0.901	-0.573	1	-0.597
	Significance	0.044	0.000	0.008		0.005
GDP	Person corr.	0.413	-0.518	0.541	-0.597	1
	Significance	0.070	0.019	0.014	0.005	

Source: World Bank (2003-2022)

4.4 Normality test

The normality test examines for a specific statistical distribution called normal distribution which is a symmetrical continuous distribution defined by mean and standard deviation with one peak and bell shaped. Using kurtosis which measures how differently the tails of a distribution are as compared to those of a normal distribution and skewness which measures asymmetry, where the null hypothesis states that variables are normally distributed against the alternative that they are not normally distributed and the values of skewness and kurtosis are meant to be between -2 and +2 to prove a normal distribution.

Table 4.4 Normality Test Results

Variable	Obs	skewness	kurtosis
Core inflation rate	20	1.263	1.137
Oil price index	20	-0.518	-1.072
Real exchange rate	20	-0.835	-0.211
Annual Oil sales	20	-0.089	-1.357

Source: World Bank (2003-2022)

Given that the evidence from the table 4.3, the variables core inflation rate, oil price index, real exchange rate and annual oil sales are all noted to be normally distributed since their kurtosis and

skewness values are within the threshold 2 to -2 hence accepting the null hypothesis. This paves way to carry out statistical tests with meaningful predictions.

4.5 Autocorrelation test

Autocorrelation refers to the degree of closeness between values of the same variable at different periods hence testing the residuals for autocorrelation is necessary because it helps to identify non-randomness in the presented data, to determine if the data are from a random process or not so as to prevent getting spurious results due to errors such as multi-collinearity hence using Breusch-Godfrey LM test for autocorrelation where the null hypothesis states that there is no serial correlation against the alternative hypothesis that auto correlation is present.

Table 4.5 Auto Correlation Test Results

Lags(p)	Chi2	df	Prob > chi2
1	1.985	1	0.1589

Source: World Bank (2013-2022)

We accept that there is no serial correlation since the p value 0.1589 is greater than 0.05 threshold meaning that there is no homoscedasticity present in the data set, there is no correlation of the variable's values between two successive time intervals.

Chapter Five

Summary of Findings, Conclusion and Policy Recommendations 5.0 Introduction

This chapter states the summary of findings, conclusion, policy and recommendations of the study based on each of the objectives of the study.

5.1 Summary of findings

5.1.1 Effect of Oil Price Changes on Real Exchange Rate.

An increase in oil prices causes an appreciation in the real exchange rate of the country as observed from the regression analysis in the chapter above and this backed by the fact that as oil prices increase this attracts foreign investment into the country so as to begin from the indirect effects of an increase in oil price but this does not guarantee economic growth as seen from the correlation analysis since economic growth is highly affected by other major contributors apart from real exchange rate but also higher oil prices can contribute to overall inflation in an importing country, as they directly impact the prices of goods and services throughout the economy and this erodes the purchasing power of a currency, leading to a real depreciation of the exchange rate and this is backed by literature review as seen in chapter two where on the supply side of the oil market, a depreciation of the US dollar might lead oil producers to limit oil supply and raise oil prices to stabilize the purchasing power value of their export revenues in dollars, see e.g., Wirjanto and Yousefi (2003, 2005) for evidence on this channel and secondly a depreciation of the dollar might also increase the demand for oil, as oil imports become cheaper in local currency for countries besides the US (De Schryder and Peersman 2012). Moreover, several countries such as China peg their currency to the US dollar hence depending on their oil intensity, a depreciation could lead to an increase in oil demand driven by higher exports

(Bénassy-Quéré and Penot 2005) but central banks may respond to this inflation by raising interest rates, which can further impact the exchange rate where higher interest rates can attract foreign capital inflows, causing the domestic currency to appreciate. However, this effect may be limited if inflation expectations remain high.

5.1.2 Effect of Oil Price Changes on Core Inflation Rate to The Economy.

An change in oil price causes a decrease in core inflation as seen from the analysis as this is attributed to the fact that oil prices are very volatile where many industries rely on oil as a key input in their production processes so when oil prices rise, these industries face higher production costs, which can lead to higher prices for their products and these cost increases can ultimately be reflected in core inflation plus changes in oil prices can affect consumer behavior because when oil prices are high, consumers may cut back on discretionary spending, leading to decreased demand for certain goods and services. This can put downward pressure on prices in these sectors but may not affect core inflation as significantly although sometimes core inflation does not take oil price changes into account hence making their effect on commodity prices in the economy far fetched since their effect may not be felt by the consumers in the short run and this encourages economic growth as the market value of goods and services does not deplete rapidly and this backed by the literature in chapter two where Darby (1982) and Hamilton (1983) revealed that an unexpected increase in oil price is linked with economic recession and higher inflation rate however when changes in oil price manifest through an exchange rate increase, the effect on inflation was found to be positive, Zakaria (2021). As oil price changes have an impact on inflation and sub-indexes of consumer product index across different sectors of the economy, sectors such as transportation sector that significantly depend on oil for their activities tend to feel the effect more relative than other sectors.

5.1.3 Effects of Oil Price Changes on Oil Price Index to The Economy.

A change in oil price leads to leads to a decrease in oil price index because the price of oil is largely determined by global supply and demand dynamics so when there's an oversupply of oil or reduced demand, prices tend to fall due to factors such as increased production from oilproducing nations, a slowdown in economic activity, or the adoption of alternative energy sources hence a fall in oil prices across the board may lead to a decrease in the oil price index but also geopolitical tensions, conflicts, or disruptions in major oil-producing regions can lead to

fluctuations in oil prices because when prices decrease due to stability or diplomatic resolutions, the oil price index can be negatively affected.

5.2 Conclusion

The effect of oil price changes on economic growth is a complex issue that has been studied by economists for many years through channels such as core inflation, real exchange rate and real oil price index but in general oil price have a negative impact on the economic growth especially countries that are heavily dependent on oil imports and have less flexible economies but as seen from the above results oil price changes has significant relationships with each of the above mentioned variables where a positive relationship is observed between real exchange rate and annual oil sales while a negative relationship is observed with core inflation rate and oil price index against gross domestic product but overall a hike in prices of oil products affects economic growth negatively.

5.3 Policy and Recommendations

5.3.1. Effect Of Oil Price Changes on Real Exchange Rate to Uganda's Economy.

5.3.1.1 Policy Towards the Effect of Oil Price Changes on Real Exchange Rate to The Economy.

A Contractionary monetary policy can be used to curb inflationary pressures emanating from the increase in oil prices, continued diversification of the exports such that there is a rise in export earnings to counter the rise in import prices observed with an oil price shock and the buildup of foreign reserves should continue to be priority so that the Central Bank can be able to intervene in the foreign exchange market during periods of high exchange rate volatility and to support the Balance of Payment position when need arises hence it is therefore, prudent that the monetary policy objectives remain accommodative not only strictly adhering to maintaining low inflation but also considering other objectives such as economic growth because over time the exchange rate appreciation will undergo self-correction after the prices and wages are adjusted and revert to above its pre-shock levels.

5.3.1. Area Of Further Study

I would recommend if a study on impact of floating exchange rate to the economy is conducted for longer time period (panel data analysis) as opposed to just a specific year (cross sectional) because an economic situation in a given year might be heavily influenced by recession, export boom, natural disaster, or political turmoil, whose impact on economy can overpower the

positive or negative impacts from the choice of floating exchange rate regime itself. Therefore, if the study on the impact of floating exchange rate is conducted within 10-20 years' time span, its significance might be justified.

5.3.2 Effect of Oil Price Changes on Core Inflation Rate to The Economy.

5.3.2.1 Policy Towards the Effect of Oil Price Changes on Core Inflation to The Economy.

The government could promote the diversification of energy sources so as to reduce vulnerability of core inflation to oil price fluctuations through investing in renewable energy sources, nuclear power and alternative fuels which can help reduce the dependency on crude oil products especially for the manufacturing and transport sector which heavily rely on oil. This will strengthen energy efficiency through use of taxation and subsidies and also mitigate on the negative externalities of oil consumption to the environment hence reducing overall consumption of oil products and its indirect effects to prices of goods and services in the economy.

5.3.2.2 Area of further study

I would recommend the study on how consumer behavior responds to oil price fluctuations, do consumers adjust their spending patterns and how does this affect core inflation. Factors like price expectations and income elasticity can be put into consideration so as to identify if there is a relationship between consumer behavior and oil price changes.

5.3.3 Effects of Oil Price Changes on Oil Price Index to The Economy.

5.3.3.1 Policy Towards the Effect of Oil Price Changes on Oil Price Index to The Economy.

Fuel stabilization fund and reserve, a fuel stabilization fund or subsidy can be explored to provide mitigation of oil price hikes, especially during an international crisis. Combined with a regulatory measure, a self-sustaining stabilization fund can be developed so that when fuel prices are declining, surpluses can be built and used to control fuel prices when international prices are increasing, recompensing losses incurred by fuel dealers. Lastly, the government can consider building an effective fuel reserve system void of private sector manipulation to target price stabilization when there is a fuel shortage or price crisis, an autonomous public agency can be established to manage and implement both the regulatory measures and the fuel reserve system under one institutional framework.

5.3.3.2 Area of further study

I would recommend a study on the effect of oil price changes specifically to the transport sector by looking at how drivers' behavior towards price shocks, the change in amount of crude oil products purchased before, during and after oil price shocks since this will help to fill the gap as to whether a change in oil prices really affect demand for oil in Uganda.

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Appendix Appendix

A: Data set used for analysis

YEARS	CORE INFLATION RATE	REAL EXCHANGE RATE	OIL PRICE INDEX	GDP GROWTH RATE	OIL ANNUAL SALES
2003	8.71	0	89.1	6.61	536,158,075
2004	3.67	0	94.5	7.93	571,749,139
2005	8.6	0	100	6.3	699,363,443
2006	7.22	1831.45	99.1	9.99	830,369,366
2007	6.09	1723.49	110	8.4	967,513,235

2008	12.04	1720.44	120.3	8.7	985,264,461
2009	13.02	1929.94	115.5	6.8	1,114,809,669
2010	3.98	2028.88	112.1	5.6	1,977,642,961
2011	18.66	2522.80	94.88	9.39	1,302,892,042
2012	14.01	2504.56	94.05	3.84	1,318,876,289
2013	5.47	2586.89	97.98	3.59	1,313,350,223
2014	4.29	2599.79	93.17	5.11	1,438,847,239
2015	3.69	3240.65	48.66	5.19	1,622,515,983
2016	5.17	3420.10	43.29	4.78	1,622,515,983
2017	5.58	3611.22	50.8	3.13	2,021,644,990
2018	2.55	3727.07	65.23	6.30	2,103,939,045
2019	2.14	3704.05	56.99	6.44	2,221,447,621
2020	2.76	3718.25	39.68	2.95	2,047,237,484
2021	2.21	3587.05	68.17	3.54	2,194,787,896
2022	6.78	3689.82	94.83	4.65	2,224,999,198