IMPACT OF OIL PRICE INSTABILITY ON ECONOMIC GROWTH IN TANZANIA

A CASE STUDY OF ZANZIBAR ISLANDS

MAKAME, JINA HAJI

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A DISSERTATION

SUBMITTED TO THE SCHOOL OF BUSINESS ADMINISTRATION IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF A MASTER OF BUSINESS ADMINISTRATION OIL AND GAS MANAGEMENT AT THE INSTITUTE OF PETROLEUM STUDIES KAMPALA IN AFFILIATION TO UCU.

AUGUST, 2022

DECLARATION

I Jina Haji Makame, hereby declare that this dissertation is my work and it has not been submitted before to any other institution of higher learning for fulfillment of any academic award.

Signature …….

Date ……

APPROVAL

This is to certify that; this dissertation entitled “Impact of Oil Price Instability on the Economic Growth in Tanzania: A Case Study of Zanzibar” has been done under my supervision and now it is ready for submission.

Signature ……

Bruno L Yawe

Date ……

DEDICATION

I dedicate this work to my family especially my husband who supported me enough to finish this work at required time, academic supervisors, relatives, and friends who inspired me to conduct this research. I thank them for their moral support and encouragement throughout the achievement of this thesis report. I pray that the almighty God rewards them abundantly.

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I wish to above all give the grandeur and integrity to ALLAH for making this possible, without Him all this would not have been possible. I attribute everything to Him

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LIST OF ACRONYMS

ARCH	Autoregressive Conditional Heteroskedasticity
BOT	Bank of Tanzania
CF	Cubic Feet
GARCH	Generalized Autoregressive Conditional Heteroskedasticity
GDP	Gross Domestic Product
IEA	International Energy Agency
INFR	Inflation rate
OILP	Oil price
OPEC	Organization of the Petroleum Exporting Countries
TZEXR	Tanzania exchange rate
URT	United Republic of Tanzania
VECM	Vector Error Correction Model
ZURA	Zanzibar Utilities Regulatory Authority

ABSTRACT

The study examined the impact of oil price instability on economic growth in Tanzania, a case study of Zanzibar islands. The study utilized data from 2011 to 2020 and the methodology used adopted a time series approach where the VECM and GARCH models were used for achieving two specific objectives of the study. Johansen test of cointegration revealed that there is a long run relationship between oil price and economic growth in Zanzibar. The results of the study show that there is a negative relationship between oil price and economic growth but all other variables used in the study show to have positive and significance with economic growth of Zanzibar. Also, the study shown that previous quarter one of 2013 conditional variance has a significant impact on the current next quarter two in 2013 conditional variance and current's conditional has a significant impact on the next period of the oil price in Zanzibar. This confirms that there is volatility clustering of oil prices in Zanzibar.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This is an introductory chapter. It presents the background of the study, the statement of the problem, the objectives of the study together with research questions and significance of the study, also scope of the study were presented in this chapter.

1.1 Background to the Study

The role of energy is crucial, and it has always been a must for the world economy (Xiong and Wu, 2009). Oil is directly linked to national economic growth and has an impact on people's everyday lives, despite the global discussion about the importance of other renewable energy sources including water, solar, and nuclear power. Apart from the demand and supply uncertainties caused by price fluctuations, oil is a significant source of fossil energy for all nations in the world. Two significant oil crises that hit the world throughout the 1970s caused significant harm to the global economy. The first oil crisis occurred in 1973 following the start of the fourth Middle East War, giving OPEC members the chance to regain control over oil pricing. This ultimately resulted in a decrease in the production and daily consumption of crude oil in Arabian countries (Guan, 2008). The data at this time reveals that the world's petroleum supply decreased by 7% between October and December 1973, whereas it only decreased by 5% between March and December 1974. The price of crude oil on the world market for petroleum has fluctuated; in 1972, it was $3 per barrel, but by the end of 1974, it had risen to over $12 per barrel, where it stayed until 1979. (Guan, 2008).

The second crisis, which took place in 1978 during the Iranian Revolution and the Iraq-Iraq War in 1980, severely hampered the ability of Iran and Iraq to produce oil. By the fourth quarter of 1980, Iran's oil exports had decreased to 1 million barrels per day and had altogether ceased. Iraq's oil production, on the other hand, was drastically decreased from 3.5 million barrels per year prior to the war to 500 thousand barrels at the end of 1980. Because of the decrease in oil output, the price of crude oil increased, going from 31 dollars per barrel prior to the conflict to 40 dollars per barrel in December 1980. (Yan, 2012).

After the severe impact of the Asian financial crises on the global economy and oil demand in 1997, the international petroleum price continued to decline until it reached $10 per barrel. As a result, the OPEC was drawn to under produce oil, which resulted in a negligible recovery of the international oil price in 1999. However, because of the incident of September 11, the international price of oil begun to increase.

The world economy started to enter an economic recovery in 2002, leading to the issuance of economic policies by countries to boost their economic growth. As a result, the rate of global GDP growth jumped from 2.6 percent in 2001, where it had been for a while. The quick surge in crude oil demand brought about by the economic recovery generated an extraordinary increase in the price of oil on the world market, reaching about $150 per barrel in the middle of 2008. However, the price fell to $40 a barrel in 2008 as a result of the financial crisis. The price increased by 70% in 2009, going from $40 to more than $70 in a short period of time (Song & Ji, 2009).

According to the International Energy Agency (IEA, 2010), the rapid rise in oil demand over the past three decades has been a global issue because of the increase in global affluence and population. Oil is now necessary for daily activities and influences the rise in demand for it due to the improvement in living standards in developing nations, the growth of industry, and the expansion in transportation vehicles.

One of the emerging nations that has discovered in-shore and offshore oil areas is Tanzania, which includes the island of Zanzibar. However, actual extraction has not yet begun, despite Tanzania and Zanzibar Is very promising petroleum exploration discoveries. As a result, the majority of the nation's oil demands are still met by imports. Oil demand is significantly impacted by the fluctuating oil price on the global market, and im port-dependent nations like Zanzibar bear the brunt of the negative effects.

Zanzibar is a semi-autonomous constituency of the United Republic of Tanzania resulted from the union between Tanganyika and Zanzibar on 26 April 1964 (United Republic of Tanzania, 1977). In actuality, some subjects involving the union remained under the United Republic of Tanzania's exclusive jurisdiction, while others involving the non-union did not. Although oil and gas is a global issue that involves international cooperation, each nation has institutions that oversee the industry.

The rise in oil prices tends to drive up the cost of operating various economic sectors, pushing up the price of commodities, which in turn drives up consumer costs. Therefore, the current depreciation, inflation, and deficits in the balance of trade have all been linked to the imported oil in Tanzania (Zanzibar) (BOT report, 2019).

The governments have implemented the system of bulk oil procurement with the help of the Zanzibar Utility Regulatory Authority in Zanzibar and the Energy and Water Utility Regulatory Authority in Tanzania Mainland in order to control oil price fluctuations and stabilize the local currency by reducing the demand for foreign currencies by the oil importers. This was the justification for doing the study in order to determine how oil price fluctuations affect Zanzibar's economic development.

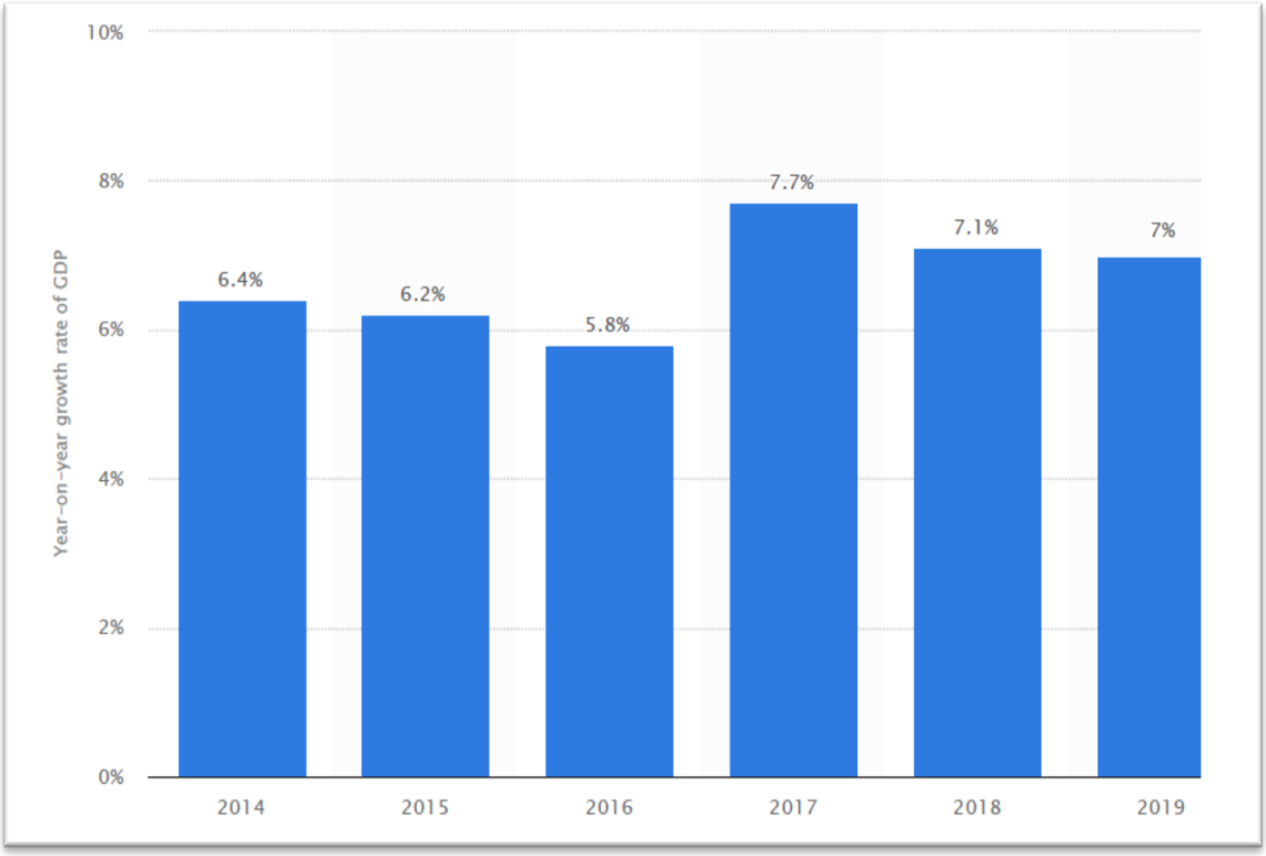
Economic Growth of Zanzibar

Since 2014, the semi-autonomous region of Tanzania, Zanzibar has registered minimal fluctuations in the GDP. Zanzibar has recorded impressive economic growth averaging 6.8 percent over the last five years. As a result, the nominal government budget has significantly expanded, growing by 69 per cent from TSh 841 billion in Fiscal Year 2016/17 to TSh 1,419 billion in Fiscal Year 2019/20 (OCGS, 2020). As of 2019, the Gross Domestic Product (GDP) in Zanzibar increased by seven percent, keeping a stable growth rate in comparison to the previous year. A growth peak of 7.7 percent was measured in 2017.

The COVID-19 pandemic has resulted in massive pressure on the government to secure adequate financial resources to cover costs related to the health sector response (COVID-19 Preparedness and Response Action Plan) as well as economic recovery measures (Economy Recovery Plan) including social protection (UNICEF, 2020). Therefore, it is imperative to develop and implement a sound resource mobilization plan and the COVID-19 response contingency plan. The RGoZ, in consultation with the Ministry of Finance in Mainland Tanzania, should consider additional borrowing as a

prime resource mobilization option, using available global resources including the IMF, the World Bank, and the African Development Bank.

Figure 1 Gross Domestic Product (GDP) growth rate in Zanzibar from 2014 to 2019



Source: BOT (2020)

1.2 Statement of the Problem

Zanzibar depends on imported oil for internal consumption in all productive sectors including industry and transport sector, there are efforts which have been made by the government to ensure that Zanzibar produces oil within the country. In 2018, Zanzibar signed a contract for oil and gas exploration with RACGas Company, and the results of the Full Tensor Gradiometry survey revealed three locations in Unguja and Pemba with oil and gas-rich rocks. All those locations demonstrated the existence of a geological structure with a storage capacity for natural gas and oil of roughly 3.8 million cubic feet (CF) (The Guardian, 2018). The process of generating this newly found oil has not yet begun. As a result, the fluctuation in the price of oil internationally and its supply have a substantial impact, endangering the local economy by driving up the price of petroleum products domestically and contributing to price instability.

Different scholars such as Milton (2017) has made research on the oil price instability in Tanzania and other scholars around the world with the main focus of oil exported countries with the few of them focusing on imported countries. The situation of Zanzibar as a semi-autonomous constituency in Tanzania has not been researched yet; therefore, this study has been conducted so as to see the impact of oil price instability to the economic growth of Zanzibar for the period of 2010 to 2020.

1.3 General Objective

The general objective of this study was to examine the impacts of oil price instability in the economic growth

1.4 Specific Objectives

In the course of implementing the general objective, the study carried out the following specific objectives: -

i. To examine the trends of instability of oil price in Zanzibar
ii. To assess the factors influencing oil price volatility in Zanzibar
iii. To analyze the relationship between oil price instability and economic growth in Zanzibar.

1.5 Research Questions

i. What are the trends of instability of oil price in Zanzibar?
ii. What are the factors influencing oil price volatility effect in Zanzibar?
iii. What is the relationship between oil price instability and economic growth in Zanzibar?

1.6 Scope of the Study

The study has been scoped into time scope and context, to conduct this study specific time and specific context under the research.

This time scope of the study mainly focuses on the data from since 2010 to 2020 for the impact of oil price instability in the economic growth of Zanzibar. The main context study was undertaken at Zanzibar with the particular focus at Zanzibar Utility Regulatory Authority, Ministry of Finance and Planning and the Office of Chief Government Statistician.

The reason behind using these institutions is that ZURA regulates the price of oil products after evaluation of different associated factors, at Ministry of Finance and Planning; this study will obtain trend of GDP growth for the period of 10 years from

2010 to 2020, which will be used to detect changes of GDP affected by oil price fluctuation and the Office of Chief Government Statistician is responsible for data collection of GDP and inflation.

1.7 Justification

Zanzibar is one among the developing countries, which has discovered in-shore and offshore oil areas. The petroleum exploration in Zanzibar are very promising; however, the actual extraction has not been yet started. Therefore, the country is still depending on imported oil for internal consumption for almost all productive sectors of its oil needs. The demand of oil in Zanzibar is highly influenced by the volatility of oil price in the international market because the adverse consequences are highly borne by import dependent countries like Zanzibar. Due to Zanzibar as semi-autonomous with no external power, the Zanzibar Utility Regulatory Authority in collaboration with the Energy and Water Utility Regulatory Authority in Tanzania introduced the system of bulk oil procurement so as to tame fluctuations in oil price and stabilize the local currency by decreasing the demand for foreign currencies by the oil importers. The reason for establishing this system is due to the fact that, the increase of oil price tends to increase the running cost of various sectors of the economy hence increasing higher commodity prices which in turn cost consumers their lives. Therefore, the study intended to fill the gap by exploring the impact of oil price instability in the economic growth of Zanzibar.

1.8 Significance of the Study

The results of this study will be useful to the Revolutionary Government of Zanzibar, which will gain in-depth understanding of the relationship between oil price, and

variables that show the fitness of the economy (inflation, exchange rate and GDP growth).

The findings will also help energy policy makers to understand how oil demand in Zanzibar responds to change in price and income so as to control unnecessary oil importation without hindering the proper functioning of the economy in the long run and the business companies to solve business complications, which are resulted because of inflations.

This study will also act as a future research material to researchers and academicians/students who are interested in looking at the impacts of oil and gas activities on infrastructural development.

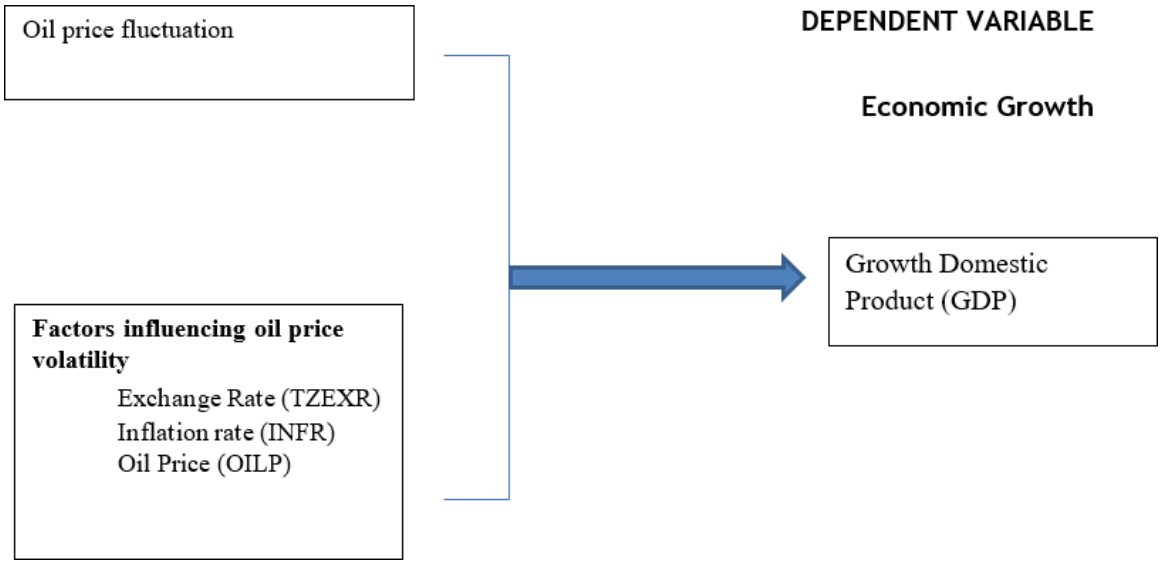
1.9 Conceptual framework

A conceptual framework, according to Adam, J. and Kamuzora, F. (2008), tries to highlight the significance and the particular subject matter of the study. According to Fellows and Liu, a conceptual framework is a technique that presents the key factors to be examined in the research in either graphical or narrative form (2003). A conceptual framework is necessary for research because it serves as the basis and pillar for understanding how dependent and independent variables relate to one another.

Figure 2 a conceptual framework

INDEPENDENT VARIABLE

Trend of Oil Price



Source; Adopted from Abeid (2020) and modified by researcher

Figure 2 of conceptual framework above shows that, the dependent variable iseconomic growth which this study required to verify whether it depends on: oil price which is measured by its trend, factors influencing oil price volatility by looking indicators such as exchange rate, inflation rate as well as oil price, and relationship between oil price and economic growth respectively.

Where; Dependent Variable used in the study was Growth Domestic Product (GDP) and the independent variables were Exchange Rate (TZEXR), Inflation rate (INFR), Oil Price (OILP).

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section presented the literature in this study by reviewing the theories and empirical studies from previous scholars who conducted similar studies to this research. This chapter firstly presents the operational definitions, then explains the empirical reviews underpinning of each specific objective.

2.2 Operational definitions

2.2.1 Price volatility

Price volatility refers to the degree to which prices rise or fall over a period of time. In an efficient market, prices reflect known existing and anticipated future circumstances of supply and demand and factors that could affect them (The Oxford Institute for Energy Studies).

2.2.2 Exchange rate

Exchange rate is exchanging currency of one country for currency of another is the exchange rate. Exchange rate movements frequently focus on changes in credit market conditions. (Job W.B, 2014).

2.3 Empirical Literature Reviews

2.3.1 The trends of instability of oil price

Rafiuddin et al., (2021) analyzed the co-movement among the stock indices of GCC members like Abu Dhabi, Bahrain, Oman, Saudi Arabia, Qatar and global oil prices as indicated by Brent, WTI. Gold, S&P 500 index and Dow Jones index have also been taken into account. Daily prices from January 2, 2020 up to September 30, 2020 were used for

the analysis. In order to analyze the co-movement among the above-mentioned indices

in time frequency space, the wavelet transform approach has been used. The techniques employed in the study include wavelet correlation and wavelet coherence approach. The findings of this empirical study suggests that though there was not much interconnectedness among the above-mentioned factors in the short run, the impact of the global pandemic crisis that got added to the oil price shock could be seen in the medium and long run.

Mohd et al., (2016) they conducted a study to analyze oil price fluctuations as having a major impact on the overall economy and finally will lead to increase in the inflation rate. It is important to describe these oil price fluctuations mathematically. This study aims to describe the above phenomena using geometric Brownian motion. Two crude oil prices, namely WTI and Brent have been analyzed based on daily oil price data from year 2000 until year 2015 through the analysis using model assessment and model determination, crude oil price after year 2000 follows geometric Brownian motion process. We conclude that oil price fluctuations follow a geometric Brownian motion process without considering unexpected incidents.

Al Samman and Jamil (2021) aims to investigate the impact of falling and rising oil prices at the beginning of 2020 on 82 industrial companies listed on the GCC stock markets. The research sample period is divided into two periods pre-COVID and during COVID covering the period starting 1st January 2020 to May 15, 2020. The research uses the Panel Least Square (PLS) method and Panel Generalized Method of Moments (GMM) with fixed and random effects in each country. The results of GMM models reveal a positive relationship between oil prices and the share prices of industrial companies in the Gulf countries, which confirms that the share prices of industrial companies in the Gulf Cooperation

Council (GCC) countries have been negatively affected by the decline in oil prices with the beginning of 2020. The findings show that the highest impact of falling oil prices has been recorded in the industrial companies in the kingdom of Saudi Arabia. However, the falling of oil prices does not have a significant effect on industrial companies in the state of Qatar. The research results suggest that GCC economies have to move on the path of non-reliance on Oil and gas-driven economy.

2.3.2 The factors influencing oil price volatility

Congxin et., al. (2020) on their article of influencing factors analysis of crude oil futures price volatility based on mixed-frequency data, they establish a new GARCH-MIDAS model with the residual term of the skewed-t distribution, and analyzes the influence factors of crude oil futures price volatility, which explain better changing laws of crude oil price volatility. The findings show that the low-frequency factors include crude oil production, consumption, inventory, and natural gas spot price, and the high-frequency factors include on-market trading volume and off-market spot price, which can significantly explain the volatility of oil price. Also, low-frequency factors include crude oil inventory, consumption, crude oil production, and speculative factors, and high-frequency factors include crude oil spot price and substitute prices. The increase in the volatility of trading volume is significantly positively correlated with oil price volatility, and the overall volatility model outperforms the horizontal effect model. Third, from the perspective of the combined effect of a single factor level and volatility, we find that supply and demand are the low-frequency factors; the trading volume of on-market factors, natural gas price, and crude oil spot price of off-market factors, among the high-frequency factors, are the most important factors affecting oil price volatility.

According to a 2011 study by Louis et al., the fundamental factors that influence oil prices are a stagnant supply, unexpected economic growth from China and other nations like India, low interest rates, and a weak U.S. dollar. This study also sought to identify gaps in current knowledge about price formation, volatility, and the role of hedging and speculation in the global oil market.

With some evidence indicating that the price run-up and decline may have been exacerbated by the formation and burst of an oil price bubble, possibly brought on by fundamental factors in both the oil market and the larger global economy, the findings of this study have contributed to the sharp run-up in oil prices and subsequent decline in the 2007–2008 period under consideration.

The study came to the conclusion that, despite a great deal of evidence pointing to a significant rise in oil derivatives trading over the past decade and a significant change in the makeup of derivatives traders, the contribution, if any, of these traders and of speculative activity in oil derivatives to the turbulence in the 2007–2008 oil market remains unknown for two reasons. First off, there is currently no conclusive evidence to answer the question of how oil inventories react to the futures-spot price spread, which, in the event that physical oil prices are based on supply and demand, should serve as the link between financial market speculation and the price of the commodity. Second, the Granger causality tests used to determine whether speculators' changes in open interest positions lead or lag changes in futures prices have not provided any insight into how speculation affects oil futures prices.

In a further study, Mats (2010) used a time-varying technique to examine the fundamental causes of variations in crude oil prices during the years 1995 to 2009. This investigation expanded on earlier research on the factors influencing the oil market, employing solely time-varying analysis for a wider range of explanatory variables. During the time period examined for the parameter coefficients, which change over time, the study found and documented structural changes in the crude oil market. The study's conclusions showed that during the study period, participants in the crude oil market paid less attention to fundamental considerations and paid more attention to expectations.

The results, however, do not demonstrate that the positions of financial investors alone significantly affect variations in the price of crude oil. The results, however, indicate that the process of fixing crude oil prices has changed as a result of the introduction of new market participants and is now more akin to the process in financial markets. The time-varying research also revealed a high correlation between variations in global economic activity and fluctuations in crude oil prices during recessionary periods. The analysis found that OPEC has been a significant impact in recent years, not because it sets prices but rather because its capacity to act as a swing producer has been dwindling. The study concluded that lack of OPEC spare capacity in the recent years caused large imbalances in the world crude oil market, as OPEC historically has represented the only major buffer on the supply side.

The goal of Bayan's study (2020) was to examine the independent relationships between oil prices and other global factors, such as the MSCI and US S&P 500 indices, among the three main GCC stock market sectors (consumer discretionary, financial, and real

estate), from 2010 to 2017. The GCC countries held 30% of the world's proven oil reserves, so a significant drop in oil prices had a direct impact on the development of the GCC financial markets.

By examining the volatility transmission behaviors of GCC stock markets at the sectorial level, this study aimed to determine the precise degree to which oil prices, along with other global factors, affect GCC stock market volatility at the sectorial level. This study also provided a better understanding of the volatile behavior of GCC equity markets. In order to test hypotheses about the nature of volatility transmission behaviors involving GCC stock markets and a set of global factors, various advanced quantitative econometric techniques were used in this study. Daily stock return of the selected variables under study was used as the primary data source.

Thus, the Granger causality model, the cross-correlation function (CCF), the multivariate GARCHBEKK model, the exponential generalized autoregressive conditional heteroscedastic (EGARCH) model, and the vector autoregressive (VAR) model were all used in the data analysis of this study. These models assisted the researcher in providing a thorough and in-depth analysis of how different chosen sectors in the GCC stock markets react to the transmission of volatility with a set of the most important global parameters.

The results of the study on the effects of three global factors (the MSCI and US S&P 500 indices, the West Texas Intermediate [WTI] oil price, and the volatility transmission effects between GCC stock markets and these factors) showed that the WTI oil price has a significant impact on a number of selected GCC stock market sectors, whereas

the MSCI and S&P 500 indices have less of an effect on the GCC sectors under study. Using these results, analysis was conducted to determine the ideal weights and hedge ratios for creating the best, most diversified portfolios that include both oil and non-oil assets in the understudied equities markets.

The research of Naoyuki (2019), who created an oil aggregate demand-aggregate supply model and empirically estimated using a vector autoregressive technique and monthly time series data from 1999 to 2017, examined the effects of oil supply and demand determinants on Brent crude oil prices. The People's Republic of China (PRC), India, and the global oil demand are broken down in this study to determine how much each country contributes to changes in oil prices globally. The industrial production (IP) index is also taken into account as a factor in determining the global oil demand side. Among these three, it is discovered that the OECD and the PRC's IP had a favorable effect on oil prices during the anticipated period. Additionally, among all the variables considered in the model, an increase in the value of the US dollar had a considerable detrimental effect on oil prices over the last two decades. This paper's examination of the oil market's equilibrium during the expected duration and demonstration that oil prices were instantly adjusting, confirming the equilibrium's existence, is another addition.

A study on the effects of oil price volatility on financial decision-making was undertaken by Rayan (2011). The purpose of this study was to determine whether the processes used to generate data for OPEC and non-OPEC crude oil prices are similar. Using GARCH models, the study empirically compares the volatility of crude oil prices between OPEC and non-OPEC countries. It also tested the long- and short-term relationships between

crude prices (OPEC and non-OPEC) and stock prices of several oil businesses by applying the Johansen Cointegration Model and the Engle-Granger Error Correlation Model (ECM) model. The final step is to estimate how OPEC and non-OPEC crude oil prices will respond to news and events that may have an impact on oil supply and pricing. A panel data technique with fixed and random effects is employed for this. The findings indicate that membership in OPEC or non-OPEC has little bearing on how crude oil prices behave. This conclusion implies that the global integration of the oil market allows it to account for any potential shifts in supply behavior by OPEC or non-OPEC producers.

2.3.3 The relationship between oil price instability and economic growth

Koseoglu et al., (2020) explored the relations between Oil Prices (OP) and Gross Domestic Product (GDP) per capita in Gulf Cooperation Council (GCC) countries using the asymmetric causality test for the period of 1996-2018. The results of the standard bootstrap causality test reveal bidirectional causality between the OP and the GDP per capita in Qatar and Saudi Arabia. The results of asymmetric causality tests are different for some countries, which demonstrate the unidirectional causality running from OP+ to GDP+ in Oman and Saudi Arabia. Whereas, the bidirectional causality exists between the GDP- and OP- in Kuwait and Oman and unidirectional causality exists between the OP- and the GDP- per capita in Bahrain, Qatar, and UAE. The results support the Real Business Cycle Theory (RBC Theory), which states that external positive or negative shocks have a significant impact on GDP per capita through consumption and investment channels. GCC countries should channelize the huge revenues towards other private sectors, which will create more prospects for the GDP and will provide substitution in case of any crisis.

Darrat and Gilley (1996), for example, while examining the relationship between oil price and economic growth in the Organization for Economic Co-operation and Development (OECD) countries found that oil price shocks are not a major cause of US business cycles. In addition, the study finds that both oil prices and real output cause significant changes in oil consumption without feedback causal effects.

Alkhateeb & Sultan (2019) examined the impact of oil price on economic growth of India by the presence of cointegration relationship between economic growth, oil price, capital formation and inflation in the case of India, the study has used Pesaran's bound test method. The study finds that the variables under study exhibit a long run cointegration relationship. Vector error correction model results suggest that oil price, capital formation and inflation Granger cause economic growth in the long run. Further, the result shows that the coefficient of oil price is negative and significant implying that oil price in India adversely affects the country's economic growth. The study suggests that the government should refrain from imposing additional taxes in order to avoid a rise in oil prices and its subsequent adverse effect on economic growth of the country.

Odhiambo & Nyasha (2018) studied the dynamic causal relationship between oil price and economic growth in Kenya has been explored during the period from 1980 to 2015. A trivariate Granger causality framework that incorporates oil consumption as an intermittent variable – in an effort to address the omission-of-variable bias – has been employed. Using the newly developed ARDL bounds testing approach to co-integration and the Error-Correction Model-based Granger-causality framework, the results of the study reveal that there is distinct unidirectional Granger-causality flowing from

economic growth to oil price in the study country. These results were found to apply both in the short run and in the long run.

Abdullahi (2017) evaluated the effect of oil price volatility on the expansion of the Nigerian economy in his study. The study made use of annual time series data from 1981 to 2015 that was pulled from the CBN statistical database and analyzed using the VAR model. The results of this study's cointegration test supported the existence of a long-term relationship, and the test for the unit root revealed that all the variables were non-stationary at the level but stationary at the first difference. The Granger causality result, on the other hand, showed that oil prices drove economic growth and the exchange rate, whereas inflation was produced by exchange rates. Furthermore, the variance decomposition result showed that oil price volatility is the biggest cause of variation in economic growth and exchange rates, whereas exchange rates are the biggest source of variation in inflation rates. The study came to the conclusion that while inflation is indirectly impacted by oil price instability, it has a substantial impact on Nigeria's economic growth and exchange rate. The research also suggested that the Nigerian economy diversify.

The study conducted by Aarón et., al, (2009) expanded the Mork & Olson (1994) model, which concentrated on the effects of an oil shock on GDP growth. To make inferences and evaluate whether swings in crude oil prices have an impact on GDP growth in the modern economy, the model is extended from 1993 to the third quarter of 2008. Sweden and the United States were picked to compare how sensitive their GDPs are to changes in oil prices. The United States continues to have the greatest economy in the world, consumes 25% of all oil produced globally, and has the highest oil dependence

among developed nations, according to the EIA. Sweden, on the other hand, is more energy-efficient and uses less oil per person than many industrialized nations. It is also thought to be one of the most forward-thinking nations when it comes to creating and utilizing renewable energy sources, making it less susceptible. However, the U.S.A. appeared to be more vulnerable to oil price rises. The bivariate data do not show a pattern of negative correlations between GDP growth and real oil price increases for Sweden.

The study conducted by Mahmoud (2020) aimed to explore the extreme effect of crude oil price fluctuations and its volatility on the economic growth of Middle East and North Africa (MENA) countries. Specifically, the study investigated the asymmetric and dynamic relationship between oil price and economic growth, to what extent the quality of institutions will change the effect of oil price fluctuations on economic growth and made a separate analysis for each MENA oil-export and oil-import countries. The study used a panel quintile regression approach with other linear regression models such as fixed effects, random effects and panel generalized method of moments to analyse data. The study's findings showed that for oil-exporting and -importing nations, changes in oil prices and its volatility had different effects; for the former, changes in oil prices have a positive impact but the volatility has a negative impact. While volatility has a favorable impact on the latter, changes in oil prices have a negative impact on the former. The results also showed that various quintiles are affected differently by oil price movements and their uncertainty. There is also proof of the asymmetric impact of oil price variations on economic expansion. Finally, the effect of variations in oil

prices on economic growth was lessened when institutional quality was taken into account.

Another study carried out by Hanna et., al, (2015) aimed to analyse how oil price shocks affect the economic growth in net-oil exporting countries. The study used time series data which covered the years from 1980 to 2008 and includes 19 (11 OPEC and 8 non OPEC) countries' yearly real gross domestic products and annualised world oil price deflated by the all urban consumer price index (USD). The Augmented Dickey-Fuller test and the Im, Pasaran and Shin test were used to analyse data. The included countries were divided into two groups, OPEC and non-OPEC exporting countries, from which two separate unrestricted bivariate vector autoregressive models (VARs) were constructed. The VARs investigated the response of each group's combined economic growth to oil price shocks. The VARs were analysed through the use of impulse response functions, variance decompositions and Granger causality tests. The calculations were made using EViews. The findings of the study showed that a 1% increase in the change of the oil price will increase the GDP growth rate the following year with 0.145% (OPEC) versus 0.141% (non-OPEC), consequently a positive relationship was found. Moreover, 2.82% of the variation in the OPEC countries' growth rate is explained by oil price shocks, while the responding ratio for the non-OPEC countries is 2.81%. Conclusions: OPEC and non-OPEC oil exporting countries' economic growth illustrated nearly identical responses to oil price shocks. Through the discussion it is thereby concluded that the price setters, OPEC, appear to be just as sensitive to oil price shocks as non-OPEC countries.

Ethiopia, Gambia, Mali, Mozambique, Senegal, Tanzania, and Uganda are seven low-income countries in Sub-Saharan Africa (SSA) that import oil, and the study by

Motunrayo et al. (2020) looked at the effect of oil prices on economic growth in these nations. The study used Panel-Auto Regressive Distributive Lag (panel-ARDL) to analyze the short- and long-term effects of oil prices on economic growth. According to the study's findings, the price of oil does not significantly affect the group's economic growth over the short term, but it does so negatively over the long term. The short-run national coefficients, however, showed that all seven countries' economic growth is significantly but inconsistently impacted by the price of oil. The study also investigated the asymmetric impact of oil price on economic growth by breaking down oil price into negative and positive changes using the Non-linear Autoregressive Distributed Lag (NARDL) model. The researcher was able to evaluate both the long-run and short-run asymmetric effects of real oil price on growth with the aid of this model. According to this model, the study discovered that an increase in oil prices has a large negative influence on growth while an increase in oil prices has a positive and significant impact. Moreover, the error correction terms are negative and statistically significant for both the PMG and five of the countries in the short-run country coefficients. Finally, the study concluded that it would be important for policymakers to explore and implement efficient energy policies and employ technological advancement policies to mitigate oil price risks, especially in the long run.

Oleg (2014) focused his study on six macroeconomic variables: nominal foreign exchange rate, CPI, real GDP, interest rate, monetary aggregate M1, and average world oil price in order to examine the effects of changes in oil prices on the Ukrainian economy. According to Cologni and Manera (2008), the study allowed for changeable interconnectivity and used the SVAR/VECM technique for this. In particular, the study's

choice of one of two closely comparable model types was based on the data's cointegration characteristics, which let it discover long-run equilibrium, estimate VECM, and carry out further innovation accounting. The results of the study found that oil price increases tend to deteriorate real economic activity in the short run (though with one-month lag) as opposed to the long run. The reaction goes through indirect effect, namely downward demand effect, which is characterized by contraction of aggregate demand in response to adverse oil supply shock. Finally, the study checked whether there is asymmetry effect between oil price changes and real GDP response as discovered by Mork (1989) is present in Ukrainian data. Also the study found the sustaining evidence in favor of symmetric response of real GDP to oil price increases/decreases in the short run.

Junchuan (2013) looked at how speculative information affected the price of oil and how it affected the macro economy. The crude oil price shocks are broken down in the study using a structural vector auto regression (VAR) model, and the price of gold is used as a stand-in for speculative information. The researcher made the case that utilizing the gold price as an alternative to the other indicators mentioned in the literature is a very useful way to account for speculative information. The results showed that speculative information plays a very important role in driving crude oil price shocks; it accounts for about 20% of the variation of the oil price. Furthermore, the study revealed that speculative shocks to the crude oil price are correlated to future macroeconomic downturns on one hand and on the other hand speculative shocks may create inflation pressure, although the effect is not as strong as that on the macroeconomic output growth.

Additionally, the study used a generalized autoregressive conditional heteroskedasticity (GARCH) specification to model the volatility on both the oil and stock markets, and it extended Elder (2004)'s GARCH-M (GARCH in mean) vector autoregression (VAR) model to capture the relationship between the volatility of the oil price and stock returns at the same time as well as the spillover between the two markets. Therefore, the study detected a structural change of the oil price-stock returns relationship near the middle of 1987. A unidirectional volatility spill over from the stock market to the oil market is found to be statistically significant before the break, while a negative relationship between oil price volatility and the conditional mean of stock returns is more pronounced afterwards.

In order to present a research review and recommend future research objectives, Bashir (2022) did a study to determine the current dynamics in the oil price-stock market nexus. In order to detect research trends in oil price shocks, stock market returns, and volatility spillover effects, the study employed the bibliometrix R program to analyze 684 studies. In the current body of scientific literature, we identify the most significant writers, works, and research institutions. To further highlight how disaggregated sectoral analysis using a meta-analysis approach that includes moderator analysis would extend the research contribution going forward, the study also examined research topics to identify barriers in the existing literature and recommend new research routes. The study came to a conclusion by suggesting new directions for future research.

In a model incorporating monetary variables, Taghizadeh-Hesary et al. (2015) examined the effects of changes in crude oil prices on two macroeconomic variables, the rate of GDP growth and the rate of inflation measured by the consumer price index (CPI), in

three nations: the People's Republic of China (an emerging economy), Japan, and the United States (developed economies) (money supply and exchange rate). This study's major goal was to compare the responses of different economies and determine whether they are still responsive to changes in oil prices. We included monetary variables in this survey because previous research indicated that they have a substantial impact in determining oil prices. To assess the relationship between crude oil prices and macro variables the study adopted an N-variable structural vector auto regression (SVAR) model. According to the findings, the GDP growth of developed oil importers is far less affected by changes in oil prices than is the GDP growth of an emerging economy. However, compared to the two wealthy nations studied, the People'sRepublic of China's inflation rate was shown to be less affected by changes in oil prices.

2.4 Research Gaps

Base on the impact oil price fluctuations in relation to economic growth which is trending among the developed and developing nations and the persistence of similar studies in this area (Rafiuddin et al., 2021: Al Samman and Jamil, 2021) which have been done and continue to be conducted in different countries, there is a need to examine this impact of oil price instability in relation to the economic development of a semi-autonomous countries which has no legal power to enter into international business by proposing the policy and implementation measure of the oil through utility authority in Zanzibar.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents research design, Data Type and Source, Data Analysis plan, Model Specification, Unit Root Test (Stationary test), VECM and GARCH model for impact of oil price fluctuation on economic growth of Zanzibar.

3.2 Research Design

The study adopted a time series approach to analyze the trends of instability of oil price and to assess the factors influencing oil price volatility as first and second specific objectives respectively. Because it uses longer periods of time and offers more insights, this strategy is thought to be appropriate (observations). Regression analysis was utilized to evaluate the correlation between changes in oil prices and economic growth, as well as the VECM and GARCH models, in the study. The study's particular aim three, which is the relationship between oil prices and economic growth, was also examined.

3.3 Area of Study

The study was conducted at Zanzibar with main focus at the Zanzibar Utility Regulatory Authority, Ministry of Finance and Planning and the Office of Chief Government Statistician in Zanzibar

3.4 Data Type and Source

Because Zanzibar Utilities Regulatory Authority (ZURA) underwent programmatic change during this time, utilizing modern technology, and more oil companies were

registered, the data obtained was primarily monthly secondary data, which was collected from the period of January 2011 to December 2020 for each variable.

The monthly long-term government interest rate was used from the Bank of Tanzania website and the monthly economic review report published by B.O.T. The monthly currency rate of Tanzania shillings is bilateral rate in term of US dollar that was collected from Bank of Tanzania website, oil price changes which track the performance of ZURA was in term of local currency, and were collected from ZURA.

3.5 Data Analysis plan

The study used E-View 12, a statistical package for Windows that is the industry leader in wind ows-based econometric software and produces the best and highest-quality results. It is mostly used for time series-oriented econometric analysis. For the purpose of getting the best data ready for the analysis stage, data cleaning, sorting, and validation were carried out.

3.6 The factors influencing oil price volatility

GARCH model

One area of particular relevance to this study is the modeling and forecasting of oil price volatility. The ARCH model developed by Engle (1982) and the GARCH model, an extended version of ARCH developed by Bollerslev (1986), have both been used extensively in studies to simulate stock market volatility.

The GARCH model is shown to be helpful to examine financial time series and stylized phenomena like volatility clustering. Regression with many variables was used in this

model. Bollerslev (1986) proposed the general equation for the GARCH (p, q) model, where the mean equation is provided by;

$$y_t = x_t \beta + \varepsilon_t \quad (11)$$

And the variance equation is given by:

$$\sigma_t^2 = \gamma_0 + \gamma_1 \varepsilon_{t-1}^2 + \gamma_2 \varepsilon_{t-2}^2 + \cdots + \gamma_p \varepsilon_{t-p}^2 + \delta_1 \sigma_{t-1}^2 + \delta_2 \sigma_{t-2}^2 + \cdots + \delta_q \sigma_{t-q}^2 \quad (12)$$

Where y_t the conditional is mean, σ_t^2 is the conditional variance, ε_t^2 is the square residual, γ_i are the ARCH parameters and δ_i are the GARCH parameters, where the mean equation is given by;

$$DSE_t = \beta_0 + \beta_1 TZS_t + \varepsilon_t \quad (13)$$

We will use a GARCH model where the variance equation is given by:

$$\sigma_t^{oilp} = C_{oilp} + \gamma_{oilp} \varepsilon_{t-1}^2 + \delta_{oilp} \sigma_{t-1}^2 + \beta_1 LOGTZEXR_t + \beta_2 LOGGDP_t + \beta_3 LOGINFR_t$$

(14)

Where $C_{oip} > 0$, $\gamma_{oip} \geq 0$ and $\delta_{oip} \geq 0$. While $OILP_t$, $OGTZEXR_t$, $LOGGDP_t$ and $OGINFR_t$ are the monthly data of Oil price, Tanzania exchange rate and inflation rate respectively. Also σ_t^{oilp} is the variance of residual derived from the mean Eq. (1), C_{oilp} is the constant, $\gamma_{oilp} \varepsilon_{t-1}^2$ is the previously or past news of ARCH parameters, $\delta_{oilp} \sigma_{t-1}^2$ is the previously or past news of GARCH parameters, β_1 and β_2 are the coefficients of the exogenous variable as explained above. This GARCH model expresses the conditional variance of the random error term (σ_t^2) as a function of its own past values and the

squared error terms of previous periods.

3.7 The relationship between oil price instability and economic growth

Model Specification

The following model tested the long-run relationship between oil price, exchange rate, and inflation rate as dependent variable and the economic growth measured in GDP: This model employed multivariate regression, and hence the basic model used as follows:

$$GDP = f(TZEXR, INFR, OILP)\ GDP = f(TZEXR, INFR, OILP)$$

(3)

From the basic model, our linear regression model was represented as follows: -

$$GDP_t = \beta_o\ +\ \beta_1 TZEXR_t + \beta_2 INFR_t + \beta_3 OILP_t + \varepsilon_t$$

$$GDP_t = \beta_o\ +\ \beta_1 TZEXR_t + \beta_2 INFR_t + \beta_3 OILP_t + \varepsilon_t \qquad (4)$$

Where $\beta_o\beta_o$ is the constant term, $\beta_1\beta_1$,$\beta_2\ and\ \beta_3\beta_2\ and\ \beta_3$ the parameters to be estimated, t = 1,2,.....T, is the time index for 135 months from January 2011 to December 2020, and ε is the stochastic error term, and hence the general model was applied:

$$logGDP_t = \beta_o\ +\ \beta_1 logTZEXR_t + \beta_2 logINFR_t + \beta_3 logOILP_t + \varepsilon_t$$

$$logGDP_t = \beta_o\ +\ \beta_1 logTZEXR_t + \beta_2 logINFR_t + \beta_3 logOILP_t + \varepsilon_t \qquad (5)$$

3.7.1 Unit Root Test (Stationary test)

Testing the stationary of those variables is crucial to prevent skewed results. There are various methods for determining whether a unit root exists. In order to evaluate the property of time series data, this study used two different unit root tests: the Augmented Dickey-Fuller (ADF) test proposed by Dickey and Fuller (Dickey & Fuller, 1981), and the Phillips-Perron test proposed by Phillips and Perron, (1988). The well-known Augmented Dickey Fuller (ADF) test described in Dickey and Fuller (1981) proved appropriate for the model that incorporates the term dependent variables as independent variables. The ADF test always assumes that a unit root is not the null hypothesis. The hypotheses of unit root are:

Null hypothesis

H_o: $\emptyset = 0 H_o$: $\emptyset = 0$: There is a unit root problem (non-stationary data)

Alternative hypothesis

H_1: $\emptyset < 1 H_1$: $\emptyset < 1$: There is no unit root problem (stationary data)

The test was conducted for the coefficient of the lagged dependent variables from the following equation:

$$\Delta Y_t = Y_t - Y_{t-1} = \emptyset Y_{t-1} + \mu_t \Delta Y_t = Y_t - Y_{t-1} = \emptyset Y_{t-1} + \mu_t \quad (6)$$

The first difference of time series data $Y_t Y_t$

The Philips & Perron test (PP Test), which was created by Philips & Perron in 1988 with the assumption that the error term will be more statistically independent and have

constant variance, is another test for assessing whether a series is stationary or non-stationary. The ADF test's testing procedures are identical to those of the PP test, but it has been determined that the PP test is more significant than the ADF test because it more effectively presents the corrected non parametric test and takes into account the serial correlation problem than the ADF test's t-statistic does.

3.7.2 Co-integration test

After the investigation demonstrated that all variables are integrated at the same order, I(1), the co-integration test was used as the second step in the methodology. This was accomplished utilizing the trace and maximum Eigenvalue tests of the Johansen co-integration test developed by Soren Johansen and Juselius in 1990 and Soren Johansen in 1991 and 1995, respectively. If it turns out that the variables are co-integrated, the relationship might be seen as a long-term relationship. At this point, the Vector Autoregressive (VAR) technique described in was used to test for cointegration using the Johansen process (Granger, 1986).

To make sure that errors are white noise, the test's lag-length (p) must be selected appropriately based on the Akaike Information Criterion (AIC) introduced by Akaike in 1969. The hypothesis for the co-integration vectors will be provided since the study examines how changes in oil prices affect Zanzibar's economic growth. The co-integration vector's order must be established before the hypothesis can be tested.

3.7.3 Vector Error Correction Model:

Since our goal was to analyze the relationship between oil price fluctuation and Zanzibar economic growth, we used a causality test based on the Vector Error

Correction Model (VECM), which is typically used when there is co-integration among the variables. In order to calculate and determine whether short-term dynamics and long-term causality were utilized as indicators of the co-integration of the variables, we used the VECM model. The VECM was then estimated as shown below:

$$\Delta lGDP_t = \alpha_0 + \sum_{i=1}^{p} u_{1i}\Delta lnGDP_{t-i} + \sum_{i=1}^{p} v_{1i}\Delta lnTZEXR_{t-i} + \sum_{I=1}^{p} w_{1i}\Delta lnINFR_{t-1}$$

$$+\sum_{t=1}^{p} y_{1i}\Delta lnOILP_{t-1} + \theta_1 ECT_{t-i} + e_t + \sum_{t=1}^{p} y_{1i}\Delta lnOILP_{t-1} + \theta_1 ECT_{t-i} + e_t \quad (7)$$

$$\Delta lnTZEXR_t = \alpha_0 + \sum_{i=1}^{p} u_{2i}\Delta lnGDP_{t-i} + \sum_{i=1}^{p} v_{2i}\Delta lnTZEXR_{t-i} + \sum_{I=1}^{p} w_{2i}\Delta lnINFR_{t-1}$$

$$+\sum_{t=1}^{p} y_{2i}\Delta lnOILP_{t-1} + \theta_2 ECT_{t-i} + e_t + \sum_{t=1}^{p} y_{2i}\Delta lnOILP_{t-1} +$$

$$\theta_2 ECT_{t-i} + e_t \quad (8)$$

$$\Delta INFR_t = \alpha_0 + \sum_{i=1}^{p} u_{3i}\Delta lnGDP_{t-i} + \sum_{i=1}^{p} v_{3i}\Delta lnTZEXR_{t-i} + \sum_{I=1}^{p} w_{3i}\Delta INFR_{t-1}$$

$$+\sum_{t=1}^{p} y_{3i}\Delta lnOILP_{t-1} + \theta_3 ECT_{t-i} + e_t + \sum_{t=1}^{p} y_{3i}\Delta lnOILP_{t-1} +$$

$$\theta_3 ECT_{t-i} + e_t \quad (9)$$

$$\Delta lnOILP_t = \alpha_0 + \sum_{i=1}^{p} u_{5i}\Delta lnGDP_{t-i} + \sum_{i=1}^{p} v_{5i}\Delta lnTZEXR_{t-i} + \sum_{I=1}^{p} w_{5i}\Delta lnINFR_{t-1}$$

$$+\sum_{t=1}^{p} \quad y_{5i}\Delta lnOILP_{t-1} + \theta_5 ECT_{t-i} \quad + e_t \quad + \sum_{t=1} \quad y_{5i}\Delta lnOILP_{t-1} +$$

$$\theta_5 ECT_{t-i} \quad + e_t (10)$$

From the above model, $e_t e_t$denotes the white noise error terms and *t* stands for the time lags, $\theta_i ECT_{t-i} \theta_i ECT_{t-i}$ is the error term which explains the long run causality between variables, the optimum lag length, *p*, is determined using the Akaike Information Criterion (AIC).$\alpha_0 \alpha_0$ Is a vector of constants,$u_i u_i, v_i v_i, w_i w_i$, and $y_i y_i$ indicate the parameters to be estimated which will determine the long run relationship. The null hypothesis of short run relationship between variablesof $TZEXR, INFR \ TZEXR, INFR$ and OILP are rejected if the parameters of $\alpha, u, v, w, y, \theta \neq 0 \alpha, u, v, w, y, \theta \neq 0$ or are jointly significant or the coefficient of the error-correction term $\theta\theta$ is significant.

3.8 Limitation of using VECM model

VECM was used for regression model and runned it in order to test for the presence of a long-run relationship between variables.

You should use VECM if

1) Your variables are nonstationary and

2) You find a common trend between the variables (cointegration)

3.9 Limitation of using GARCH model

GARCH models is their inappropriateness in the cases where an asymmetric effect is usually observed and is registered from a different instability in the case of good and bad news.

GARCH models are used when the variance of the error term is not constant. That is,

1. The error term is heteroskedastic. Heteroskedasticity describes the irregular pattern of variation of an error term, or variable, in a statistical model.

2. The GARCH model is that it has much less parameters and performs better than the ARCH model.

3. The generalized autoregressive conditional heteroskedasticity (GARCH) model has only three parameters that allow for an infinite number of squared roots to influence the conditional variance.

3.10 Ethical Considerations

According to Wellington (2000), ethics are moral principles that guide behavior and are held by a group or even a profession. The researcher examined legal rights, privacy, and confidentiality of the data, which was gathered and used purely to inform this study and not anything else, and secured ethical research licenses from the Second Vice President Office and Office of Chief Government Statistician.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF THE FINDINGS

4.1 Introduction

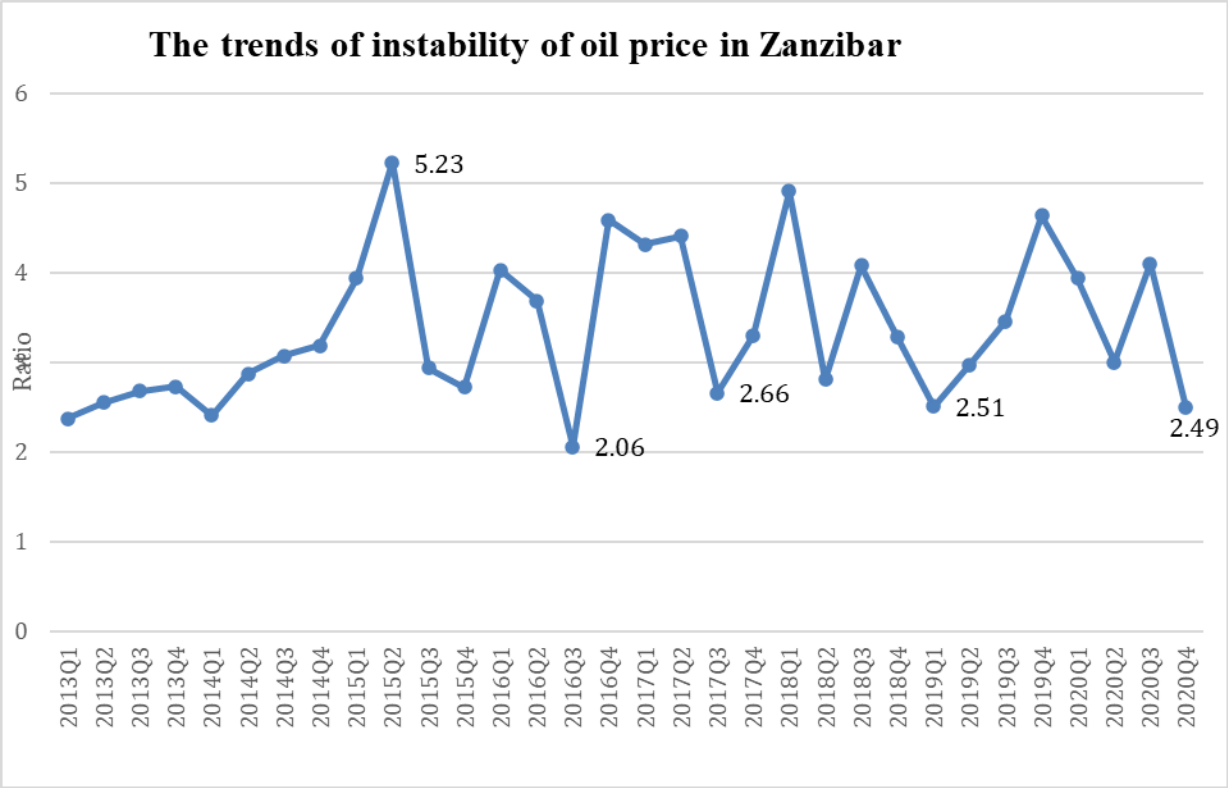
In this chapter results from tests and estimations are presented. There are the results for trends of oil price volatility presented quarterly from 2013 up to 2020, the results for pre-test for data to be used in the econometric model employed in the study such as stationary test (Unit Root Test), Johansen test for co-integration, and also gives results for Vector Error Correction Model (VECM) tests for objective three.

4.2 The trends of instability of oil price in Zanzibar.

Figure 3 below shows the trends of instability of oil price in Zanzibar for the period of 2013 to 2020 on a quarterly basis. The Figure 1 shows there is an inverse relation pattern; this means that this variable (oil price) has variability trends for the whole period under the study between 2013 and 2020.

The study analyzed the data from 2013 to 2020 rather than 2011 to 2020 as planned before because availability of oil price data from Zanzibar Utilities Regulatory Authority was limited to that periods (2011-2012).

Figure 3 the trends of instability of oil price in Zanzibar



Source: Author's computation (2021)

4.3 The factors influencing oil price volatility

4.3.1 GARCH model

In this part, the volatility of the oil price is modeled using both ARCH/GARCH models. According to Table 1, ARCH-LM test is statistically significant which indicates the presence of ARCH effect in the residuals of the mean equation. To determine which ARCH model is adequate for describing the conditional heteroscedasticity of the data at a 5% significance level. This implied that last month's conditional variance has a significant impact on the current month's conditional variance and current's conditional has a significant impact on the next month of the oil price in Zanzibar. This confirms that there is volatility clustering of oil prices in Zanzibar-Tanzania.

Table 1 Heteroskedasticity Test: ARCH-LM test

F-statistic	18.19213	Prob. F(1,239)	0.0000
Obs*R-squared	17.04681	Prob. Chi-Square(1)	0.0000

Source: Researcher Data Analysis, 2021

Table 1 shows the result of the test for ARCH effect from the residual. Given the high values of the F and Chi-Squared statistics and their corresponding small p-values, there is evidence to conclude that there is presence of ARCH effect in the price series

Table 2 GARCH (1,1) Volatility persistence of the oil price

	Coefficient
Constant	0.0818(0.0461)*
arch α	0.4823(0.1643)**
garch β	0.3073(0.0633)***
LOGGDPt-1	-0.0027(0.1400)
LOGINFRet-1	-0.0099(0.0046)**
LOGTZSEXRt-1	0.0197(0.0018)**

Note: *, ** and *** indicate significance level at 10%, 5% and 1%, respectively.

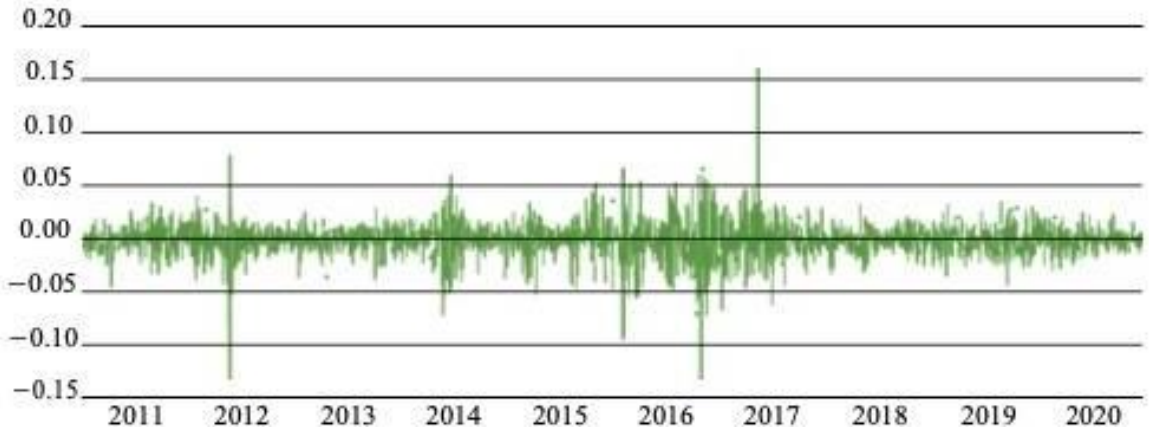
Standard errors in parenthèses ()

Source: Researcher Data Analysis, 2021

The Table 2 is inferred that there exists auto regression and heteroskedasticity in the series. So it is evident from these results that ARCH family can be used to forecast volatility in the data.

As the oil price exhibits an ARCH effect, it is followed by applying a GARCH model that is sufficient to cope with the changing variance. The study applies the GARCH (1, 1) consistent with many previous studies such as (Al-najjar, 2016). However, the parameters of the GARCH model for Tanzania exchange rate are positively significant at 5% level, which implies to reject the null hypothesis and accept the existence of volatility clustering in the return series. In other words, volatility from the previous periods has a power of explaining the current volatility condition. So there is volatility persistence in most of oil price; current month period's oil price index has an effect on forecast variance of future oil price.

Figure 4 Oil price volatility



Source: Researcher Data Analysis, 2021

From figure 4, it can be seen that the trend moved in quick succession, indicating that spikes reached its highest points of 0.15 this was the period where world crude oil prices

increased in 2017, and Brent-WTI spread widened. The price in 2011 was found to be low volatility in the points of 0.05 but in the year 2012 the spikes reached its highest points of 0.7 and -0.13 this was going in tranquility through volatility created by market forces especially declining of exchange rate of Tanzania shilling against USD.

This feature of sustained periods of calmness and sustained periods of high volatility, as indicated in the phases, signifies volatility clustering, a stylized fact financial time series exhibit a condition necessary for the application GARCH model.

The presence of volatility shocks of the exchange rate and inflation rate on oil price. This gives an indication that changes in the tradeoff between risk and return is predictable thus serving as a useful guide for risk management. The results of this study also help oil and gas investors to consider the volatility of the oil price into concern while decision making to invest here since the oil price volatility is mainly influenced by change in Tanzania exchange rates and inflation rate.

4.4 The relationship between oil price instability and economic growth

4.4.1 Stationary Test

This test was conducted to determine whether the variables had unit root issues; it is preferable to test unit roots before examining the co-integration of the variables in order to prevent the issues with erroneous results (Engle and Granger, 1987). The study tested the unit root at both levels and first differences using the Augmented Dickey-Fuller (ADF) approach, as described in chapter 3 above. Table 3 and Table 4, respectively, both show the outcomes of the unit root test. The critical value statistics

are given in response to MacKinnon (1996) values. All the variables are transformed by applying the logarithm such that: LOGGDP, LOGTZEXR, LOGINF and LOGOILP.

Table 3 Results for Unit Root Test (At Level) for variables

Variables	T-Statistics	Probability	Results/Remark
LOGGDP	-0.372597	0.9020	Not stationary
LOGTZEXR	-0.848378	0.7908	Not stationary
LOGINF	-0.265305	0.9175	Not stationary
LOGOILP	-1.581802	0.4784	Not stationary

Note: Null Hypothesis (Ho: variables are not stationery (NS) i.e. unit root) was not rejected at level. Significant at 5% significance level

Source: **Author computation from collected Data (2021)**

Table 4 Results for Unit Root Test (At First Difference) for variables

Variables	T-Statistics	Probability	Results/Remark
LOGGDP	-5.629921	0.0001	Stationary
LOGTZEXR	-6.192304	0.0000	Stationary
LOGINF	-3.515237	0.0157	Stationary
LOGOILP	-9.742489	0.0000	Stationary

Note: All variables became stationary at the 5% level of significance after the first difference. The results are obtained from MacKinnon's table by using Eviews7 packet program

Source: Author computation from collected Data (2021)

Table 5 Results for Johansen Co-integration Test (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.770158	85.20572	69.81889	0.0018
At most 1	0.520216	44.03552	47.85613	0.1092
At most 2	0.365568	23.47178	29.79707	0.2237
At most 3	0.272351	10.73106	15.49471	0.2286
At most 4	0.063228	1.828839	3.841466	0.1763

Note:* denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1996) p-values
Source: Author computation from collected Data (2021)

Table 6 Results for Johansen Co-integration Test (Max Eigen)

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.770158	41.17020	33.87687	0.0057
At most 1	0.520216	20.56375	27.58434	0.3035
At most 2	0.365568	12.74071	21.13162	0.4764
At most 3	0.272351	8.902225	14.26460	0.2944
At most 4	0.063228	1.828839	3.841466	0.1763

Note:* denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1996) p-values
Source: Author computation from collected Data (2021)

Therefore, from the results of Table 5 and 6, it is concluded that the series are co-integrated and a long run equilibrium relationship exists among the variables, for that reason vector error correction mechanism was applied to test the long run relationship between variables and dynamic effects (short run relationship between the series). These results enabled the study to run for the objective three.

4.4.2 Vector Error Correction Model

The aforementioned finding, which demonstrates that all the variables were co-integrated in all models, demonstrates that there is an equilibrium long-run relationship between the variables. According to Granger (1988), there is evidence of causality between two variables when their integration is coordinated, at least in one direction. As a result, the error correction term within the VAR model framework, known as the VECM, is utilized to determine the direction of causality between the variables.

The study of objective three, which presents and discusses the anticipated findings and looks at the connection between oil price volatility and Zanzibar's economic growth, was deemed appropriate for VECM.

4.4.3 Analysis of relationship between oil price instability and economic growth in Zanzibar

The results from the estimated equation below showed that, the coefficient of the constant term is 6.76674 implying that at zero performance of the various explanatory variables used, stands at 6.76674 units. The VECM estimated regression model results, which show the long run relationship between variables, are as follows;

Table 7 VECM Coefficient Standard Errors and Statistic

	LOGINFR	LOGTZEXR	LOGOILP	
Coefficient	0.015356	0.050661	-0.016291	6.76674
Standard error	0.0053507	0.01719671	(0.00882)	
T-statistics	[2.86990]	[2.94597]	[- 2.84639]	

***Source*:** Author computation from collected Data (2021)

CHAPTER FIVE

INTERPRETATIONS OF THE FINDINGS

5.1 Introduction

This chapter discusses the interpretation of the findings of the study obtained, each specific objective analyzed has been well interpreted in this part of the report to give the insight of the meaning of the results obtained.

5.2 The trends of instability of oil price in Zanzibar

From the figure 3 above revealed that there is persistence of oil price due to the fluctuating with increasing and decreasing in value over period of time. At January 2013 oil price had a ratio of 2.43, this value means the oil price found to be affordable by consumers in Zanzibar. In 2014Q2 oil price started to increase to 2015Q1 with its highest peak of mean value of oil price 5.23, this finding indicating a bad sign for performance of oil price in Zanzibar causing other commodities to rise in price and also fluctuation.

During the 2015Q3 the oil price declined to 2.94. Then the price value fluctuated where oil price was reduced to 2.06 at 2016Q3 this was a good sign for the oil sector in oil price has been reduced such that consumers have enough purchasing power to afford buying oil.

Figure 3 shows that, for the whole period from 2013Q1 to 2016Q2 oil price increased in mean value, because the international oil price from the producers has taken measures to improve business environment and reduce cost of doing business. In order to maintain good performance in the oil sector in Zanzibar, the Zanzibar Utility Regulatory Authority will continue to monitor the public utility market through proper management and

supervision, mandatory use of security and control measure reference information and enhancement.

In 2017Q1 oil price increased to the point of 4.18, as a part of tranquility the movement continued to be in moderate shock of fluctuation. But in 2020Q2 oil price fell up to 3 points. This finding indicates that performance of oil prices was good due to the high number of lowering ratios of oil prices. There are many factors causing the situation of high lowering oil prices such as covid-19 pandemic, which hit the oil sector worldwide.

5.3 The factors influencing oil price volatility in Zanzibar

The Table 1 is inferred that there exists auto regression and heteroskedasticity in the series. So it is evident from these results that the ARCH family can be used to forecast volatility in the data.

As the oil price exhibits an ARCH effect, it is followed by applying a GARCH model that is sufficient to cope with the changing variance. The study applies the GARCH (1, 1) consistent with many previous studies such as (Al-najjar, 2016). However, the parameters of the GARCH model for oil price in Zanzibar are positively significant at 5% level, which implies to reject the null hypothesis and accept the existence of volatility clustering in the oil price series. In other words, volatility from the previous periods has a power of explaining the current volatility condition. So there is volatilitypersistence in most of the oil prices. The current month period's oil price has an effecton forecast variance of future oil price in Zanzibar.

It was also revealed that an increase (decrease) in Tanzania Exchange rate and inflation rate expectation in future rise will decrease (increase) oil price index volatility. In

addition, the Tanzania Exchange rate has a strong relationship with oil price volatility as compared to inflation rate.

Figure 4, shows volatility clustering of oil price series in Zanzibar for the study period from 1st January 2011to 31st December 2020. From the Figure 4, it is inferred that the period of low volatility tends to be followed by period of low volatility for a prolonged period and the period of high volatility is this was due to turnover of oil depreciated as the bourse is going through volatility created by market forces especially declining of exchange rate of Tanzania shilling against USD.

This feature of sustained periods of calmness and sustained periods of high volatility, as indicated in the phases, signifies volatility clustering, a stylized fact financial time series exhibit a condition necessary for the application GARCH model.

Many investors realized that the oil business is a volatile place to invest their funds. The daily, monthly, quarterly and annual movements can be dramatic, but it is this volatility that also generates the oil price for the consumer experience. This study explained how volatility in oil price, inflation rate and Tanzania shilling exchange rate affects consumers' purchasing power and how to take advantage of it.

The presence of volatility shocks of the exchange rate and inflation rate on oil price in Zanzibar. This gives an indication that changes in the tradeoff between risk and return is predictable, thus serving as a useful guide for risk management oil business. The results of this study also help foreign investors to consider the volatility of the oil into concern while decision making to invest in Zanzibar since the oil price volatility is mainly influenced by change in Tanzania exchange rates and inflation rate, so in the

case of creating Zanzibar business enabling environment foreign investors can also foresee their exchange risk on account of volatility of oil price in Zanzibar.

5.4 The relationship between oil price instability and economic growth

5.4.1 Unit root test

To determine the nature of the time series, unit root test is employed to understand whether the data are at stationary or non- stationary conditions. By stationarity, it means that there exists a constant figure among the mean, variance and auto covariance at any point while non-stationary experience changes in mean, variance and auto covariance at any point (Suleiman 2016). Significantly, the stationary of time series helps to achieve correlation among research variables. But if non-stationary timeseries exist, then the sample size experiences what is called spurious or nonsense regression. The rule for decision-making under time series unit root test involves the rejection of the null hypothesis at the 1%, 5% and 10% statistical significance level. Thisimplies that time series data sets do not contain a unit root; therefore, at least one- time series is stationary. This automatically implies the acceptance of the alternative hypothesis.

Table 3 shows the result from Unit root test in constant, the result shows that all variables were non-stationary at level (lag 0) but once proceeding to the first difference as shown at Table 4 in which all variables became stationary. Generally, the results showed that null hypotheses of unit root were positive at level, nevertheless, upon the first differences of the variables, the null hypothesis was rejected in favor of an alternative hypothesis which cited that the series are stationary. Conclusively, all study variables achieved stationarity at order one, I *(1)*. These results provide the indication

of the presence of possible long run association in the model. But this can be justified by the test of co-integration to check whether the model has a long run association or not.

5.4.2 Johansen Co-integration Test

After testing and proving that all variables are integrated at order one I *(1)*, the researcher applied Johansen's maximum probability estimation to test for co-integration so as to check the presence of long-run association among the stationary variables. This is for the reason that when time series variables are stationary, as they seem in ADF test, Johansen (1988) approach was used to test Co- integration. Johansen test typically includes two tests cited "Trace statistics' ' and "Maximum eigenvalue". The null hypothesis to be tested for the case of trace test is there at most" r "number of co- integration vectors while the null hypothesis for the Eigenvalue test is there "r" co-integrating vectors beside the presence of alternative r+1 (Shawa 2014).

5.4.3 Discussion of Results from the relationship between oil price instability and economic growth in Zanzibar

From the VECM model, which describes the independent variables used namely; oil price, exchange rate and inflation rate. The estimated result shows that all variables have a positive and significant relationship with economic growth except oil price.

5.4.4 Effects of oil price on Economic Growth

The results in table 7 shows that there is a negative and significant relationship between oil prices on Economic Growth. The coefficient value of oil price was -0.01629, meaning

that a unit increase in oil price led to the decrease in economic growth of Zanzibar by 1.62%.

The most essential variable was oil price, as the other variables were employed as control variables. The negative and statistically significant adjustment parameter indicates that following a destabilizing shock caused by oil price volatility and other variables in the short run, GDP growth reverts to its long-term equilibrium. The GDP adapts to its long-run equilibrium at a pace of 1.62 percent per quarter.

Oil import volatility has a short-run negative and statistically significant link with GDP growth, as predicted. This indicates that, in the absence of other causes, a major fall in oil importation owing to factors such as high pricing is likely to result in a decline in economic growth.

The finding supports those of Kotut, Menjo, and Chepkwony (2012) and Rodriguez and Sanchez (2004) who found similar results in Kenya and G- 7 countries respectively.

Apart from oil price volatility, this conclusion suggests that oil importers and the Zanzibar Utility Regulatory Authority ZURA should consider domestic energy output, as measured by electricity generation, and oil drilling as supplement rather than substitute energy sources in the short term.

5.4.5 Effect of inflation rate on economic growth in Zanzibar

Furthermore, the inflation rate has the sign that accord with prior expectations, that is, inflation has a positive impact on GDP as a measure of economic growth in Zanzibar. The coefficient value of inflation rate found in table 7 is 0.015356 and statistically significant at 5 percent level for its absolute t-values were greater than two (Gujarati, 2004), which is -2.86990.

The result indicated that the positive impact of inflation on GDP could be interpreted as an increase in an inflation rate by one unit will lead to an increase in real GDP by 0.015356 units for a change of current status of 1.53%. These results agreed with various theories of inflation and economic growth (Monetarists) as well as other previous researchers such as (Ahmed, 2010; Chimobi, 2010; Quartey, 2010). These statistically significant results indicated that persistent increase in the general inflation has a positive impact on economic growth in Zanzibar.

5.4.6 Effect of exchange rate on economic growth in Zanzibar

According to the result of the VECM shown in table 7 above, the exchange rate LOGTZEXR exhibits a positive and significant relationship on economic growth measured by LOGGDP in Zanzibar. The coefficient of exchange rate 0.050661, these results revealed that one-unit increase in exchange rate caused the economic growth of Zanzibar to increase by 5.06% units at a significant level of 5%. Therefore, from these results, an increase in Tanzanian shilling exchange rate gain is associated with an increase in Zanzibar economy. More specifically, an increase of Tanzanian shilling exchange rate gain by one percentage is associated with an increase in Zanzibar GDP. These results coincide with results of Farayibi, (2016) in his study on Exchange Rate trends and economics in Nigeria. Thus this signifies that Tanzanian shilling exchange rate is more influenced by economic growth.

CHAPTER SIX

CONCLUSION, RECOMMENDATION AND AREAS FOR FURTHER STUDIES

6.1 Introduction

This is the last chapter of the study, which presents the conclusions; recommendations and areas for further studies are drawn.

6.2 Conclusion

The unit root test is employed to understand whether the data are at stationary or non-stationary conditions; all study variables achieved stationary at order one, I *(1).* These results provide the indication of the presence of possible long run association in the model. But this can be justified by the test of co-integration to check whether the model has a long run association or not.

Also, the study concludes that that there is existence of long run relationship among the variables as found in the Max Eigen and Trace tests, which revealed that there is existence of long run relationship among variables, so it rejects null hypothesis at none where the probability is lower than 0.05, in both Max Eigen and Trace test.

The study concludes that VECM was considered as an appropriate model for the analysis of objective three, which presents and discusses the estimated results of which is to examine the relationship between oil price instability and economic growth in Zanzibar. This conclusion suggests that oil importers and the Zanzibar Utility Regulatory Authority ZURA should consider domestic energy output, as measured by electricity generation, and oil drilling as supplement rather than substitute energy sources in the short term.

In the volatility of the oil price volatility modeled using both ARCH/GARCH models. The ARCH-LM test is statistically significant which indicates the presence of ARCH effect in the residuals of the mean.

This means that the conditional variance from the previous month has a big impact on the current month's conditional variance, and the current month's conditional has a big impact on the next month's oil price in Zanzibar. This demonstrates that there is a clustering of volatility in Zanzibar-Tanzania.

As the oil price exhibits an ARCH effect, volatility from the previous periods has a power of explaining the current volatility condition. So there is volatility persistence in most of the oil prices. The current month period’s oil price has an effect on forecast variance of future oil price in Zanzibar.

It was also revealed that an increase (decrease) in Tanzania Exchange rate and inflation rate expectation in future rise will decrease (increase) oil price index volatility. In addition, the Tanzania Exchange rate has a strong relationship with oil price volatility as compared to inflation rate.

Also, the study concluded that the impact of exchange rate and inflation rate have the effect on volatility for the price of oil in Zanzibar. This indicates that changes in the risk-reward tradeoff are foreseeable, making it a useful guide for risk management in the Oil Company and Zanzibar Utility Regulatory Authority. The findings of this study also assist oil investors in taking oil price volatility into account when deciding whether or not to invest in Zanzibar or for those who are operating oil business have to be aware on oil price trend, because oil price volatility is primarily influenced by changes in Tanzania exchange rates and inflation rates, so in the case of creating a business-

friendly environment in Zanzibar, foreign investors can anticipate their exchange risk due to the volatility of oil prices in Zanzibar.

6.3 Policy Recommendations

Given the findings described in the preceding paragraphs, the following proposals for reducing oil price volatility should be considered. First and foremost, the government should work to keep the currency rate stable. A stable exchange rate will prevent the oil import cost from fluctuating significantly due to unanticipated fluctuations in the exchange rate.

Second, the government should establish or drill domestic energy production in order to reduce its reliance on imported oil, which is bought at a high price. This should involve increased production of cheap and reliable energy such as solar, wind, coal, and geothermal energy which is possible for Zanzibar due to the geographical position as an island country.

Furthermore, there is a chance that discovered gas and oil wells in Zanzibar will be utilized to supply the country's energy requirement. Increased local energy production is anticipated to cut oil imports, encouraging economic growth by ensuring a steady supply of low-cost energy.

Finally, the government should negotiate bilateral trade agreements with key oil producing countries to mitigate the detrimental effects of international oil prices. This will allow the country to have a consistent supply of oil at reasonable prices.

6.4 Areas for further studies

In the future, this research could be expanded by looking at the factors that influence oil import volatility using a different technique or econometric framework. Future research should incorporate more variables to provide more light on the factors that influence Zanzibar's oil price volatility.

Also, there need to investigate the adverse effects of oil price volatility on economic activity and the extent to which countries can hedge against such effects by using renewable energy. The impact of factor price uncertainty on economic activity are examined using the Realized Volatility of oil prices rather than the conventional approach of considering oil price shocks in levels.

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