IMPACT OF OIL PRICES ON STOCK MARKET PERFORMANCE

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Submitted to
The Guildhall School of Business & Law
of
London Metropolitan University
In partial fulfilment of the requirements of

Doctor of Philosophy

June 2023

DECLARATION

I declare that this thesis has been composed by myself except where otherwise referenced or acknowledged.

DEDICATION

I dedicate this dissertation to God Almighty, my beloved parents, Late Samuel and Comfort Olateru, and my children, Abayomi and Ikeola, for their unconditional love, support and prayers throughout this journey.

ACKNOWLEDGEMENT

I thank the Almighty God for giving me the ability and strength to complete this PhD. The completion of this doctorate is with the support and encouragement of many concerns.

I express my deep debt of gratitude to all my supervisors, especially my lead supervisor, Dr Lan Jiang, my second supervisor, Dr Nirmala Lee and Late Dr Bode Akinwande, of blessed memory, without whose guidance and patience, this thesis would not have seen the light of the day.

I express a deep sense of gratitude and sincere thanks to my family members, especially my children and siblings for their sincere cooperation, unstinted support, inspiration and understanding at different stages of my studies. No word is sufficient to express my gratitude.

I wish to thank my friends, well-wishers and all those who have directly or indirectly assisted me in completing this PhD.

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ABBREVIATIONS AND ACRONYMS

ARCH	Autoregressive conditional heteroscedasticity
CONDIS	Consumer discretionary
CONSTA	Consumer staples
DVM	Dividend Valuation Model
EGARCH	Exponential general autoregressive conditional heteroscedastic
EMH	Efficient Market Hypothesis
EXRATE	Exchange rate
FINANC	Financials
GARCH	Generalized autoregressive conditional heteroscedastic
GDP	Gross Domestic Product
HEACAR	Health care
INDUST	Industrials
INFLAT	Inflation rate
INFTEC	Information technology
INTRAT	Interest rate
M_2	Broad money supply
MATERI	Materials
MEC	Marginal Efficiency of Capital
OILPRI	Oil Price
OPEC	Organisation of Petroleum Exporting Countries
REAEST	Real estate
STINDEX	Stock index
S&P/TSX	Standard & Poor/Toronto Stock Exchange
TELCOM	Telecommunications
U.S. EIA	U.S. Energy Information Administration
UTILIT	Utilities
VAR	Vector Autoregressive Model
VECM	Vector Error Correction Model

ABSTRACT

The study investigates the impact of oil prices on stock market performance in ten countries, including Canada. The volatility in oil prices and the accompanying swings in stock market performance raised the question of what, if any, is the relationship between these variables. The research seeks to address six strands of the phenomenon. The study evaluates the impact of oil prices on stock performance at the stock market's aggregate and sector market levels. It establishes the effects of macroeconomic variables on stock market performance. Furthermore, it evaluates the role of the business cycle in the oil price shocks and stock market interface. Lastly, it examines the influence of oil prices on stock market performance in net oil-importing and oil-exporting countries. The empirical investigation uses monthly data from January 2003 to December 2020 and quarterly data from 1990Q1 to 2020Q4. Primary and secondary data were analysed using statistical tools and econometric modelling. The investigation employs the impulse response function, EGARCH and Markov switching models.

The thesis concludes that the relationship between oil prices and stock market performance is time-varying, asymmetrical, heterogeneous and complex as several sector or country-specific factors drive the relationship. Specifically, the findings suggest that the response of the stock market sectors to oil price shocks differs substantially, depending on their degree of oil dependence and multiple transmission mechanisms. The findings further indicate that stock returns-generating processes in a net oil-exporting country like Canada exhibited a high degree of persistence in conditional variance, and the modelling of asymmetry was positive. Positive shocks from macroeconomic variables impact the country's stock market more than negative shocks of the same magnitude. Two structural breaks are identified in the Canadian economy between 1990 and 2020. The data was further divided into two subsamples to reflect the two possible states for an economy, the bear and bull periods. Empirical analysis revealed that GDP, exchange rate, inflation rate, interest rate, and oil prices are significant drivers of the country's stock market performance in economic contraction. During the expansion era, all the variables considered in the study, excluding GDP, significantly drive stock market performance. Hence, oil prices and stock market relationships tend to improve more during the economic expansion period than during the contraction era. Further analysis affirmed that the impact of oil price shocks is only significant in the top two net oil-importing countries. These findings convey information that guides policymakers in formulating macroeconomic policies, investors and portfolio managers in risk diversification relating to decision-making and investment strategies.

Chapter 1 Introduction

1.1 Introduction

Certain philosophical theories explain the research phenomenon in this investigation, the impact of oil prices on stock market performance, which is rooted in the philosophy of social science. An understanding of this work is contingent on those philosophical theories. This is reinforced by the fact that no one method can sufficiently explain why and how a phenomenon occurs, and one method cannot contradict the other. The cause of the issue being examined in this paper can be explained by combining these philosophical theories.

Popper's (1974) attempt to demarcate science from non-science with his proposed falsification principle as he reviewed the evidence for scientific theory. It indicated that such a theory must be tested and conceivably proven false. Rather than holding the theoretical hypothesis, science should be opposing such theories as the hypothesis that all swans are white will be falsified once a black swan is observed. He states that "Everybody knows nowadays that logical positivism is dead. Nevertheless, nobody seems to suspect that there may be a question to be asked here - the question 'who is responsible?' or rather, the question 'who has done it?'". Moreover, the modest answer is, "I fear that I must admit responsibility." (Popper, 1974, p.269). While the ontological concept (what it is) has three distinct positions identified by Snape and Spencer (2003) as realism, idealism and materialism, epistemology (what count as experience) has two main perspectives, that is, positivism and interpretivism.

The philosophical theories distinguish the road map of the investigation: a scientific theory (science aiming to find the truth) or logical positivism (falsify the falsification). An ethnographer may choose one approach or a combination of the two, including the epistemology approach that deals with the sources of knowledge in social science. This research work did not foreclose the quantitative scientific approach because of its capacity to explain causality (cause and effect). Hence, the current investigation is not to propound a new theory but to explain the cause and effect of the phenomenon, locating which variable better explains the dependable variable. Suppose one is not powerful enough to explain its impact on the dependable variable; in that case, the study combines variables that better understand the impact of independent variables on the dependable variable.

The work of positivism and interpretivism are combined to explain the philosophical basis for this investigation. Although the study aligns with the philosophical assumptions of the positivist and interpretivist, the positivist paradigm is the main approach, while it was supplemented with the interpretivist paradigm. For instance, the positivist believes that data gathering is sacrosanct to the natural laws (ontology) and what counts as experience (epistemology). This opinion provides empirical evidence that data can be gathered through observation. The interpretivist maintains that descriptive investigation is based on words and patterns of behaviour and that data gathering can only be constructed from human experience, which requires a narrative to come to conclusions regarding questions of how and why, which are examined through an investigation. The trajectory of this work showcases a combined approach based on the two philosophical theories as an instrument of engagement in the investigation of the phenomenon of the impact of oil prices on stock market performance.

A country's stock market is an integral part of its economy, as economic growth is extensively linked with its stock market's continuous and productive activities. The market plays a pivotal role in a country's economy through the growth in its industry and commerce and the growth and development of the economy by mobilising domestic and foreign savings for investment in the corporate sectors and funding the government's capital projects. Companies can raise funds for new business ventures or expand the existing business through the stock market or other sources or take out a loan to finance the business venture. Securities are also traded on the stock market to provide liquidity to investors. The stock indices are equally used as indicators of economic trends. Stock price formation is considered an observable measure of business performance and growth control of an economy. The government, central banks, industries and investors are always interested in the stock market. The financial systems of most modern economies are fully integrated with other countries while leveraging technological advancements to open their markets to international investors.

Stock market performance has been of great puzzlement and interest to economists, academics, policymakers, portfolio managers and investors. Movements and volatility in the stock market have the potential to impact the economy profoundly. Stock prices are highly responsive to the expectations of prospects and changes in present-day elements of the economy. Balke, Brown and Yücel (2002) and Wang and Ajit (2013) researched stock market movements and the economy. Balke, Brown and Yücel's (2002) findings were affirmed by other scholars, such as Jones, Leiby and Paik (2004), Kilian and Park (2009), Bjørnland (2009), Hamilton (2009), Arouri, Lahiani and Bellalah (2010) and Chen (2010), who concluded that higher oil prices impact financial markets and global economic growth. Despite the above assertion, the impact of oil prices on stock market performance remains challenging for economists, academicians, investors, and policymakers, as earlier studies produced contradictory results. These challenges motivated the research presented in this study on oil prices and stock market performance.

The significance of oil to the global economy is imperative to the efficiency of economic performance. Hamilton (2005) concluded that 'nine out of ten of the U.S. recessions since World War II were preceded by a spike in oil price'. The volume of global oil consumption, which is approximately 100 million barrels per day, shows the commodity's significance in the global market. British Petroleum (2021) affirmed that the consumption level fell to approximately 91 million barrels per day in 2020 due to the impact of Covid-19. The British Petroleum report of 2021 further provided evidence of oil as a dominant source of energy by the end of 2020, accounting for 31.2% of the total global energy consumption. The data showcased a variety of signs that oil consumption was declining when compared with other alternative sources of energy, such as coal (increasing), natural gas (increasing), hydroelectricity (increasing), renewables (increasing), and nuclear energy (declining), which respectively accounted for 27.2%, 24.7%, 6.9%, 5.7% and 4.3% of the global primary energy consumption. In contrast, wind and solar played an insignificant role.

Oil is one major energy source that plays a vital role in the growth and development of nations. The importance of oil stems from the fact that households and industries in any society make extensive use of goods and services that contain oil and its elements. Oil is a significant input in producing synthetic materials, such as plastics, fertilisers, pharmaceuticals, solvents and pesticides. Many activities necessary in our day-to-day lives, including transportation and manufacturing, grind to a halt when the supply of oil stops. This upshot underlines why the oil demand is mainly inelastic to oil price (Sanjay and Radhika, 2012) and why rising oil prices due to the classic supply-side effect appeared to explain slow gross domestic product growth and instigate inflation (Balke, Brown and Yücel, 2002). Interestingly, the financial press (Wall Street Journal and Financial Times) has shown great interest in the relationship between oil prices and stock markets in recent years with headlines like 'Oil, Stocks at Tightest Correlation in 26 Years' (Stubbington and Kantchev, 2016), 'U.S. Stocks rally as Oil Prices fall' (Lemer, 2008), 'Oil rally propels Wall

Street to record' (Mikolajczak, 2016), or 'U.S. Stocks Retreat as Oil Price Surges' (Ostroff, Russolillo and Menton, 2019).

1.2 Background

Various factors impact oil and economic conditions, and many historical events shape oil prices, resulting in many interpretations from scholars. The first is the geopolitical movement- at the centre of international politics is power. The power play factor is significant in the Iran-Iraq War, the Asian financial crisis, 9-11, and the recent global financial crisis and pandemic see Figure 1.1. This is to say that many factors beyond the economic factors under investigation also affect oil prices and order new political-economic conditions in the global economy. The research focuses on the causal effect of change in the oil price and economic factors such as the interest rates, inflation rate, exchange rates, and money supply on the stock market. The geopolitical issue may be qualified as other factors but not the focus of the present thesis. A choice of Canada as the focus of the current studies is imperative given the oil contribution to the Canadian economy and the fact that the present studies concerning Canada may provide such an opportunity for comparative analysis of the subject focus in the future.

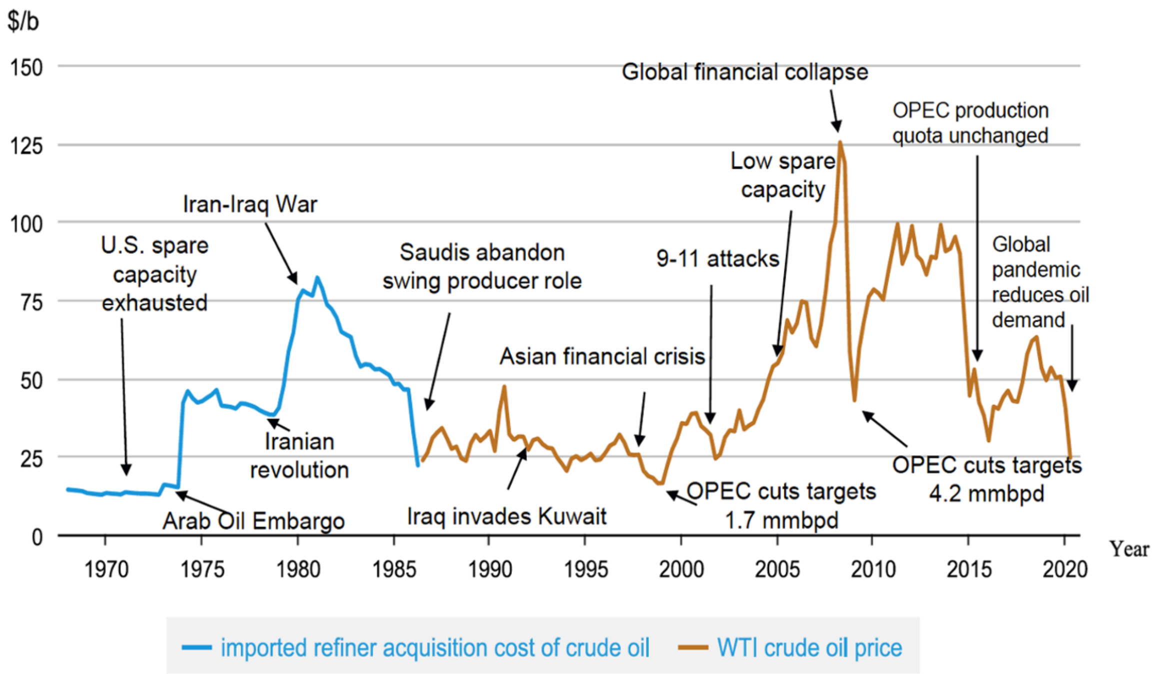
Oil is an essential and highly demanded global commodity; fluctuations in its prices draw significant attention from scholars, economists, policymakers, traders, and citizens of any society. In comparison with other commodities, oil price fluctuations are guided by the laws of supply and demand. In the 1940s, global oil demand was below its supply, and global oil prices ranged between $2.50 and $3.00 per barrel (Alhajji and Huettner, 2000). During World War II, the oil-exporting nations started agitating for better terms in their oil contracts by forming unions to control the affairs of oil, its demand and supply. The activities of these countries led to the establishment of the Organisation of Petroleum Exporting Countries (OPEC).

In 1960, OPEC was established to coordinate and unify the petroleum policies of its Member Countries and to ensure the stabilisation of oil markets to secure an efficient, economical and regular supply of petroleum to consumers, a steady income to producers and a fair return on capital for those investing in the industry (Gates, Trauger and Czech 2014). This was endorsed in Bagdad (1960), with Iran, Iraq, Kuwait, Saudi Arabia and Venezuela signing on to the first chapter. Other counties that subsequently became members are Qatar (1961), Indonesia (1962) – although its membership has been suspended since November 2016, Libya (1962), the United Arab Emirates (1967), Algeria (1969), Nigeria (1971), Ecuador (1973), Gabon (1975), Angola (2007) and Equatorial Guinea (2017). In all, 14 countries are members of OPEC, and its significance is evident because membership cuts across different continents.

OPEC seeks to limit oil supplies globally to keep prices high (Sanjay and Radhika, 2012). This act led the global oil market to witness the first 'oil price shock' in 1973 and the second oil price shock in 1979 (Driesprong, Jacobsen and Maat, 2008; Sanjay and Radhika, 2012). Oil prices and production were relatively stable before 1973, as a few large United States oil companies, referred to as the Seven Sisters, controlled it. This control of oil prices and production moved from the United States to OPEC during the 1973 Yom Kippur War.

As shown in Figure 1.1 below, oil prices have responded to geopolitical and other events over the past 40 years. Events that disrupt supply or increase uncertainty about future oil supplies tend to drive up prices.

Figure 1.1 Key Geopolitical and Economic Events Driving Oil Prices



Source: Adapted from U.S. EIA (2020)

High oil prices recorded between the 1970s and 1980s were due to the United States' spare capacity being exhausted. An embargo was placed on the United States by the Organization of Arab Petroleum Exporting Countries due to the United States' Emergency Petroleum Allocation Act. The 1979 Iranian Revolution led to the overthrow of the Pahlavi dynasty and the Iran–Iraq War that lasted for eight years after Iraq invaded Iran. The trend continued up to 1986 when it declined as Saudi Arabia abandoned its swing producer role. Fears of supply disruption as Iraq invaded Kuwait and the Asian financial crisis of 1997 due to currency devaluations and other events led to the oil price drops recorded in the 1990s.

The increase in oil price recorded when OPEC cut production targets to 1.7 million barrels per day was temporary, as prices declined due to the September 11 attacks. Low spare capacity resulted in an increase in oil prices due to OPEC's inability to respond to demands. Hence, oil prices experienced an unprecedented spike, with its highest price recorded during this period. After that, the price of oil declined due to the profound global financial collapse of 2008. After the global recession, the economic recovery with OPEC cuts in production targets by 4.2 million barrels per day resulted in an increasingly high oil price. Larger emerging economies recorded slower growth, which led to a reduction in demand and subsequent fall in oil price, while OPEC's production quota remained unchanged. The most significant public health crisis to hit the world in a century was recorded in 2020, the Covid-19 pandemic. Action taken by countries to limit the spread of Covid-19 led to reduced economic activities that subsequently changed the demand and supply patterns, resulting in economic turmoil, unparalleled volatility, and global energy market disruptions. Thus, oil prices have always reacted like any other commodity price.

The development of a new system in the global oil market whereby the forces of supply and demand fixed oil prices corresponded with the 1973/1974 oil crisis. The relationship between oil price fluctuations and economic performance can be traced to Hamilton (1983). He argued that rising oil prices preceded virtually all recessions after World War II, implying that oil shocks account for macroeconomic performance. This assertion has been corroborated by Cologni and Manera (2008), who observed that changes in oil prices significantly influence macroeconomic variables, like real output and inflation. Other studies with similar findings include Gronwald (2008), Kilian (2008b), Cologni and Manera (2008), Lescaroux and Mignon (2009) and Lardic and Mignon (2006, 2008).

Changes in oil prices are determined by supply, demand, and sentiments in the spot market and sentiment towards oil futures contracts (Sanjay and Radhika 2012).

There are two possible channels through which oil shocks could affect the stock market. Firstly, the Capital Asset Pricing Model postulates that asset prices are determined by their expected discounted cash flows (Fisher, 1930; Williams, 1938). Furthermore, Arouri and Rault (2010) observed that macro-level events influence the cash flows of corporate entities that oil price fluctuations can trigger. This assertion suggests that changes in oil prices should be accompanied by changes in corporate cash flows, as a rising oil price, for instance, increases the cost of production, reduces profits and, consequently, reduces stock returns (Driesprong, Jacobsen and Maat, 2008; Nandha and Faff, 2008). Secondly, inflationary pressures and economic recessions occasioned by oil price shocks (Hamilton, 1983; Cologni and Manera, 2008; Gronwald, 2008; Kilian, 2008a) reduce consumer sentiment; this, in turn, reduce overall consumption and investment spending, and hence, stock market performance (Hamilton, 2009). The question is, should these effects be the same for a net oil-exporting country and a net oil-importing country? Therefore, this study attempts to empirically ascertain the impact of oil prices on stock markets' performance.

1.3 Motivation

Numerous factors motivated the study. The growing importance of oil in an economy, increased stock market integration, oil price-revolution - the 2008 financial crisis and recent decline in global energy consumption motivated the research into oil price shocks and stock market performance. The surge recorded in the price of oil with a climax of $145 per barrel mark in July 2008 for the first time in history, the subsequent crash to $33.73 per barrel in December 2008, the accompanying swings, and corresponding movements in the stock market, coupled with the simultaneous onset of the 2008 global financial crisis, was one of the motivating factors for this thesis. As global oil production and exploration constitutes a significant proportion of the global economy, the impact of the new development cut across all sectors of the global economy. The impact has consequences that academics must explore, and this further ignited the interest in the study.

Although considerable research work (Nandha and Faff, 2008; Park and Ratti, 2008; Kilian, 2009; Kilian and Park, 2009; Hamilton, 2009; Basher, Haug and Sadorsky, 2012; Asteriou and Bashmakova, 2013; Filis and Chatziantoniou, 2014; Broadstock, Wang and Zhang, 2014; Ghosh and Kanjilal, 2016; Wen, Bouri and Roubaud, 2018; Degiannakis, Filis, and Arora, 2018; and Xu *et al*., 2019; Hamdi *et al*., 2019; Ahmed and Huo, 2021; Salisu and Gupta, 2020; Sharif, Aloui and Yarovaya, 2020) investigated the link between oil price fluctuations and the stock market, there was no consensus regarding the outcome of these studies. Most of these studies focused on the economies and stock markets of the United States or China (major importers of oil) and other net oil-importing countries.

According to conventional logic, oil price shocks would have different impacts on net oil-exporting and oil-importing economies. Jimenez-Rodriguez and Sanchez (2005) and Bjørnland (2009) argued that shocks in oil prices positively impact the economies of net oil-exporting countries. This affirmation is because earnings from oil exports largely determine public revenues, expenditures, and general aggregate demand (Hooker, 2002; LeBlanc and Chinn, 2004; and Bjørnland, 2009). The increasing oil revenues, public spending and aggregate demand are expected to induce both public and private expenditures (including investments) that would, in turn, boost transactions on stock markets, as affirmed by Keynes (1936), Hammoudeh and Li (2005), and Arouri and Nguyen (2010). Despite this seeming relationship, research on the impact of oil price shocks and stock markets in net oil-exporting countries has continued to lag compared with net oil-importing countries. This study considers both net oil-importing and net oil-exporting countries to narrow the gap in the literature. The focus of the investigation on Canada will further enrich comparative studies.

In addition, motivation stems from the need to deepen the complex connections between oil prices and the stock market. This is the first research work that combines a broad spectrum of strands while investigating oil prices and stock market relationships for a robust outcome. Previous studies of Narayan and Sharma (2011), Arouri and Rault (2012), Degiannakis, Filis and Floros (2013), Filis and Chatziantoniou (2014), and Kang, de Gracia and Ratti (2017) focus on one or two strands of literature. A recent review of the literature by Degiannakis, Filis and Arora (2018) affirmed that oil prices and the stock market relationship are unresolved.

This study used aggregate and sector-level stock market indices to examine oil price and stock market relationship. It further evaluates the stock markets of net oil-importing and net oil-exporting countries and evaluates the complex and time-varying relationship between the two variables. Again, many of the previous studies (Chkir *et al*., 2020; Mokni, 2020; Nandha and Faff, 2008; Jimenez-Rodriguez and Sanchez, 2005; Bjørnland, 2000; and Sadorsky, 1999) that compare the impact of oil price shocks on stock markets rely on the country or region-specific aggregate stock indices. One fundamental problem of exploring the oil price-stock return nexus using aggregate stock market indices is underestimating the heterogeneity of relationships across different economic sectors. This challenge underlines the need to assess the dynamics of oil price movements and sectoral stocks in the context of the New Keynesian Model.

The study was further motivated by the need to explore the complex interaction of the transmission channels between oil prices and stock market performance by engaging mediating macroeconomic variables. Wei (2003), Basher and Sadorsky (2006), Driesprong, Jacobsen and Maat (2008), and Nandha and Faff (2008) detailed the links between shocks in oil prices and stock markets and treated prices of crude oil as an exogenous variable. Theories and empirical studies of Barsky and Kilian (2002, 2004), Hamilton (2003), and Kilian (2008a, 2009) have further demonstrated the fact that global macro-level events have influenced crude oil prices since the 1970s. Kilian (2008b, 2009) echoed an early finding by Hamilton (1983) that the global economic downturn will likely raise crude oil prices. Factors affecting macroeconomic aggregates and stock markets may also influence the price of oil. This breakdown implies that cause and effect are not clearly defined in analysing oil prices and stock markets and the influences on macroeconomic activities are impactful in countries like Canada.

According to Natural Resources Canada (2020), the country is the fourth-largest producer and third-largest oil exporter worldwide, with 97% of the proven oil reserves located in the oil sands. The country's oil deposit is estimated at 167.7 billion barrels, of which 162 billion barrels are found in the oil sands. Production from the oil sands in 2019 was estimated at 2.9 million barrels per day. Ikein (2017) affirmed that overdependence on oil has enormously complicated macroeconomic management issues in economies of oil-exporting countries like Nigeria following fluctuations in oil prices. Despite this, few empirical studies detail how variations in macro-level variables occasioned by fluctuations in oil prices affect the country’s stock market. More surprisingly, researchers need to pay more attention to how the continuous fluctuations in oil prices affect stocks from a sector perspective in a country. Hence, the study narrowed this gap.

According to Sharif, Aloui and Yarovaya (2020), oil price shocks and the business cycle are somewhat interconnected. Both have a combined effect on stock returns, suggesting a combined influence of oil shocks and the business cycle. Despite its economic significance, empirical literature detailing the influence of oil price shocks and the business cycle on stock market performance is limited. Furthermore, most recent studies on oil-stock nexus are carried out without recourse to how the effects of the business cycle can be transmitted to the stock markets. This study is motivated to narrow this gap.

Finally, some empirical studies, including Gong and Zhuang (2017), laid credence that assets in financial markets such as stocks tend to exhibit features of leptokurtosis, clustering properties, asymmetry, and heteroskedasticity effect. According to Reboredo and Ugolini (2016), stock price reactions to oil price shocks could be more straightforward, and other studies also noted similar findings (Chang *et al*., 2020; Peng *et al*., 2018; You *et al*., 2017). Thus, it is crucial to ascertain how oil price shocks affect stock returns while considering heteroskedasticity and volatility clustering – the two features of stock prices that were not considered by most of the previous studies. In this regard, the study employs the EGARCH approach. This study's motivation is designed to contribute to existing knowledge while narrowing these gaps for better understanding and benefits researchers, investors, policymakers, the financial press, and the public.

1.4 Aims and Objectives

This thesis aims to study the interaction between oil prices and stock market performance in ten countries focusing on Canada. A series of objectives must be met to achieve this aim; these objectives can be broken down into the following specifics:

- To critically review the impact of oil price shocks on sectors of the stock market.
- To establish the impact of selected macroeconomic variables (exchange rate, GDP, inflation rate, interest rate and money supply) and oil price shocks on the stock market.
- To evaluate the business cycle's congruent interface concerning oil price shocks and the stock market relationship.
- To discuss and compare the influence of oil prices on stock market performance in a net oil-importing country and a net oil-exporting country.

1.5 Research Questions

In achieving the above aims and objectives, the following questions will be addressed:

- How do sectors of the Canadian stock market (consumer discretionary, consumer staples, energy, financials, health care, industrials, information technology, materials, real estate, telecommunications and utilities) respond to oil price shocks?
- What is the impact of macroeconomic variables like exchange rate, inflation rate, interest rate, money supply and oil prices on the Canadian and German stock markets?
- How does the business cycle explain the congruent interface between oil prices and the Canadian stock market?
- How do oil price shocks affect stock market performance in a net oil-importing country and a net oil-exporting country?

1.6 Significance of Study

This study's comprehensive nature will be of great appeal to a wide variety of readers. This view is particularly so given that oil price shocks create uncertainty in global financial markets despite no apparent pattern. First, the study should be of interest to policymakers in Canada. As with any other economy, the performance of a country's economy is a reflection of activities from various sectors. This viewpoint underscores the need to identify those sectors that are more susceptible to vagaries in the global oil market. Thus, this study explicitly disentangles how sectors of the Canadian stock market respond to oil price shocks. The study also distinguishes the impact of oil price shocks from other macroeconomic shocks to analyse the relative contributions of these shocks on the stock market. This outcome helps investors to gain insight into the sources of past stock market performance.

This study provides relevant market information to stock market analysts and hedgers as the trend exhibited helps make informed decisions. The study is helpful for individual investors, as it helps to appreciate stock market trends for optimal gains. In terms of the field of research in general, the study was administered to add several primary contributions to the literature while introducing primary data analysis into the study of the phenomenon, extending the works of Kilian and Park (2009) and providing an explanation for different outcomes. The outcome of the study will serve as a stepping-stone for further research in the area.

1.7 Contribution to Knowledge

The work makes valid and reliable contributions to the study of the phenomenon under investigation and, more specifically, on the ongoing debate of the responsiveness of change in the oil price and the stock market because there are gaps in previous scholars' work knowledge. Moreover, the principal objective is to narrow the gaps, as clarified in the research questions and the motivation sections. The success of this study lies in answering the research questions covering different strands in the relationship nexus coupled with robust research outcomes that impact knowledge of the study. For instance, previous studies need to combine various strands of the phenomenon for a holistic view, robust outcome and the ability to broaden the understanding of the nexus. This study covers six strands of the phenomenon, including how the stock market responds to oil prices at varying times using the business cycle. The impact of oil prices on aggregate, sectoral stock market indices and stock market indices of net oil-importing and oil-exporting countries were also examined.

This thesis evaluates research philosophy and varies its methodology in data gathering technique and approach. Triangulating the quantitative approach with some qualitative methods combined with primary and secondary data provides opportunities for convergence and corroboration of results as the positivist paradigm was supplemented with the interpretivist paradigm. Moreso, for this type of research and to the best of the researcher's knowledge, previous studies did not verify outcomes using qualitative research methods but adopted different quantitative techniques. Leveraging the methods' strengths and weaknesses increased the research depth, creativity, validity, and richness.

In addition, Kilian and Park (2009) argue that the impact of oil prices on U.S. stock market returns is different and dependent on whether demand or supply shocks in the oil market drive the change in oil price. Wherein the nature of oil price shocks determines the impact on stock market returns as affirmed by their studies, this research further confirms that the stock market performance also depends on the modelling of asymmetry and leverage effect of positive and negative oil price shocks.

The outcome of this study would help capital market investors, traders, portfolio managers, or fund managers, among others, to better understand and explain the dynamics of stock performance and appreciate counterintuitive stock market behaviour around the globe. A better understanding would guide their portfolio diversification, inflation hedging decisions, risk management and diversification amongst stock market sectors and countries. Policymakers would also benefit from a guide to providing appropriate policies to manage exogenous oil and market shocks that could cause economic instability.

1.8 Framework of the Thesis

The study consists of five chapters with some sections and subsections. The current chapter contains the initial understanding of the study. It features the introduction of the thesis, background and motivation of the study, aims and objectives, research questions, the significance of the study, and finally, the framework of the study. The connection between chapters one and two identified gaps within the scope of the literature reviewed in chapter two. Chapter two discusses the theoretical and empirical literature. The chapter investigates the theoretical framework and concepts that influence stock market performance and oil prices. It further examines theories like classical, neoclassical, Keynesian, New-Keynesian, financial instability hypothesis, Hotelling's theory on price, efficient market hypotheses, capital asset pricing model, dividend discount model, and arbitrage pricing theory. It also presents a comprehensive examination of the literature on the concepts within the phenomenon with specific reference to the research questions. The theoretical foundation of the empirical investigation and results of existing literature discussed in this chapter provides a solid basis for the methodological approach adopted in the thesis.

Chapter three provide a detailed exposition of the research philosophy considering positivism and interpretivism paradigm. Econometric and statistical tools were employed in data analysis to achieve the research objectives. Existing literature on the ARCH and EGARCH models and the impulse response function were reviewed. The review was to model how (a) sectors of the stock market respond to oil prices, (b) the impact of macroeconomic variables and oil prices on stock market performance, and (c) the impact of oil price shocks on the stock market performance of net oil-importing and net oil-exporting countries. Markov switching model was used to model how the business cycle explains the congruent interface between oil prices and the stock market. The aims and objectives of the study, with the use of quantitative research methods and some qualitative additions for triangulation, guided the research design and approach. The thesis selected samples of ten countries with specific reference to Canada based on the U.S. EIA classification of the top ten net oil-importing and net oil-exporting countries to draw valid conclusions on the result. Existing data were derived from various data sources, and primary observational data were collected using a survey questionnaire. The study analysed primary data to validate results obtained from secondary data analysis. Macroeconomic variables that strongly influence the discount rate and future dividends are included in the study, while the stock index was used as a proxy for stock market performance.

Chapter four presents and discusses econometric and statistical analysis results incorporating the dynamic relationships among variables for each research question. Sections begin with the descriptive statistics followed by the estimations and application of EGARCH and impulse response function in testing the hypothesis. The chapter analyses the interface of the business cycle in the oil price/stock market relationship by testing the hypothesis with the multiple breakpoint procedure of Bai and Perron (2003) and MSM, estimates structural break, and Markov switching models for the two sub-periods. Econometric results and outcomes were validated with statistical tools like Mann–Whitney's U rank test, logit regression model, non-parametric Spearman's rho correlation test based on ranks, and Kruskal-Wallis test using SPSS statistical software. The chapter concludes by summarising and interpreting key findings in line with the study's objective.

Chapter five presents the summary and conclusion of the study by highlighting the contributions to knowledge and recommendations to regulators, researchers, and market participants. The final section highlights the limitations of the study and suggestions for future research into the phenomenon. Bibliographical references, arranged in alphabetical order and according to the first author's surname where applicable, were given at the end of the study.

Monography distribution

This study will impact the Canadian economy and be distilled into monography for distribution. The research is available to policymakers in Canada for practical application of the recommendations. Again, published papers will emerge from the thesis that will create such awareness of the recommendations. Doing so may enlist interest in cross-studies of the phenomenon under investigation.

Chapter 2 Literature Review

2.1 Introduction

This section was designed to discuss in detail the contribution of authors to the phenomenon under investigation. The sections are structured to review the literature regarding related theoretical frameworks, relevant concepts (oil price, the stock market and Canada) within the phenomenon, and the intercessions of these concepts with a specific focus on the research questions while highlighting the identified gaps.

The aim is to highlight the intricacies of the oil price-stock market relationship by presenting a coordinated argument demonstrating that the concepts are interrelated and maintain a congruent interface. Additionally, a set of key performance indicators shows the parameters of the study, giving credence to support some likely conclusions to be drawn from the investigation, particularly the oil price shocks and stock market relationship, trends of stock performance in oil-exporting and oil-importing countries, stock market sectors and business cycle effects. These will emphasise the importance of the link between oil prices and stock market performance in Canada.

2.2 Theoretical Framework

Scholars have developed various theories supported by empirical evidence, which constitute the discussions in this section. All major economic schools of thought, namely classical, neoclassical, Keynesian, monetarist, new classical, New-Keynesian and ecological economics, claimed that lower rates stimulate economic growth while higher rates slow economic growth (Lee and Werner, 2018). Many theories, including the classical, neoclassical, Keynesian, New-Keynesian, financial instability hypothesis, Hotelling's theory on price, efficient market hypotheses, capital asset pricing model, dividend discount model, and arbitrage pricing theory, have been used to explain the underlying factors that influence stock performance. They are discussed as follows.

2.2.1 The Classical, Neoclassical, Keynesian and New-Keynesian Theories of Economics

The trajectory of the arguments relating to the regulatory and non-regulatory economic frameworks was developed throughout history. If the argument of a free economy devoid of regulation of classical economics had succeeded, this study would not have been necessary. For instance, there would have been a free, unregulated economy in which the Government of Canada or any other country would not have any say, and the stock market institutional framework could have existed in a very different style. According to Nicholas (2012), classical economists focus on production and classes in explaining economic phenomena, while neoclassical economists concentrate on individual behaviours and their exchange process.

The central argument of neoclassical economics was built on foundations laid by the classical theorists and led by Adam Smith and was conversed on collective interest. Adam Smith (1776) maintained, 'it is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our own necessities but of their advantages' (p. 9-10. Smith's 1776 study further extended the above argument to stock matter and stock ownership. He affirmed that 'the directors of such (joint stock) companies, however, being the managers rather of other people's money than of their own, it cannot well be expected, that they should watch over it with the same anxious vigilance with which the partners in a private co-partner frequently watch over their own. As the steward of a rich man, they are apt to consider attention to the small matter as not for their master's honour and very easily give themselves a dispensation from having it. Negligence and profusion must always prevail, more or less, in managing the affairs of such a company' (Smith, 1776: p.482-483).

Keynes (1936) launched enquiries into the arguments of the neoclassic economic theories and specifically questioned the classical phenomenon, using the macroeconomic concern for monetary and fiscal policies, for instance, as it affects inflation, unemployment, the balance of payment, output and growth. The Keynesian theory argues that aggregate demand is volatile, and the market economy will often experience inefficient macroeconomic outcomes in economic recessions (when demand is low) and inflation (when demand is high). Keynesian economics generally advocates a managed market economy – a predominantly private sector with an active role in government intervention through fiscal and monetary policies during recessions and depressions.

Keynes (1936) developed the general theory that an investor would continue to invest until the present value of expected future revenues at the margin is equal to the opportunity cost of capital. The underlying principles of Keynes's theory of investment do not differ much from most theories of investment. According to Bildirici and Badur (2018), the popularity of uncertainty increased after Keynes's (1936) animal spirit concept, even though opinions about the uncertainty of future asset returns in probability distribution were observed in Fisher (1930). The basic framework of Keynes theory is similar to that of classical economists. The theory presupposes that investment results from firms balancing the expected return on new capital (marginal efficiency of capital). He argues that the investment demand curve is volatile because it depends on firms' expectations of the profitability of an investment.

Keynes thought that investors "animal spirits" tended to fluctuate wildly in waves of optimism and pessimism. He viewed the business cycle as a sequence of contagious spells of over-optimism and over-pessimism. During an economic boom, businesspeople project the rapid expansion of the economy to continue. They respond to these favourable projections of future demand by increasing their production capacity through high levels of investment in new capital. This high spending fuels the expansion, raising demand for other firms' products and encouraging optimism (recall that output is determined by aggregate demand in Keynes's system). Since these optimistic expectations eventually run ahead of the economy's ability to sustain the expansion, disappointment is inevitable. When the economy begins to turn downward, many firms find that they have excess capacity, both because demand is now falling and because their high investment rates have left them with the capacity to produce an unrealistically high volume of output. Faced with this excess capacity, firms stop investing, which lowers aggregate demand and accentuates the downward pressure on the economy. As demand and output decline, firms become even more pessimistic, keeping investment near zero during the contraction phase of the cycle. The cycle eventually starts back upward when firms in some industries find their capital stocks depreciated to the extent that they need to buy new capital goods to sustain their current (low) production levels. This initial trickle of investment starts aggregate demand on the road to recovery. Optimism gradually begins to replace pessimism, and the expansion phase of the next cycle begins.

In general, the Keynesian theory of investment postulates that investment decisions regarding stocks are made when comparing the marginal efficiency of capital (MEC) or the yield with the real rate of interest (r). Brealey, Myers and Allen (2006) define the MEC as the rate of discount that equates to the present value of a series of cash flows obtainable from an income-earning asset (such as a machine) over its entire economic life. It is the rate of return at which a project is expected to break ¬even (Jhingan, 2004). Brigham and Houston (2001) further argue that the MEC depends on the immediate profits (cash flows) expected from operating the project and the rate at which these are expected to decline through a reduction in the price of output or increases in the real wages or cost of raw materials and fuel. The MEC differs from the marginal product of capital, which is concerned only with the immediate effect of additional capital on possible output and not how long the resulting profits can be expected to persist. It is the rate of return (profits) on an extra dollar of investment. The theory hypothesis explains that new investment in factories, machinery and other equipment will occur if the MEC is greater than r. However, as increased capital is used in the production process, the MEC will fall due to the diminishing marginal product of capital. Whenever MEC is equated to r, no new investment will be made in any income-earning asset (Jhingan 2004).

The MEC is calculated using the formula below:

$$C_0 = \frac{R_1}{(1+e)} + \frac{R_2}{(1+e)^{\wedge}2} + \cdots . + \frac{R_n}{(1+e)^{\wedge}n} \qquad \text{......2.1}$$

Where C_0 is the initial cost of investment, R_1, R_2...... R_n is the expected cash flow from the investment in the first, second and subsequent years, and e is the MEC that acts as the balancing factor. It makes the two sides of the above equation equal. Here, R_n is the expected cash flow from the investment in the previous year, which also includes its scrap value. Keynes refers to the term R as the expected (prospective) rate of return on new investment. If e exceeds r, an income-earning asset, such as a machine, should be purchased.

On the other hand, the New Keynesian (NK) theory, was developed in response to the New-Classical economists who questioned the precepts of the Keynesian school of thought (Melmies, 2010). The significant difference between New-classical and NK economists is how quickly prices and wages adjust. The New-Classical school assumed that prices and wages are flexible and that prices "clear" markets (equilibrate supply and demand by adjusting quickly). On the other hand, the NK economists argue that market-clearing models cannot explain short-run economic fluctuations; thus, models with "sticky" prices and wages were advocated. The way prices and wages adjust forms the basis of the NK theories. They rely on stickiness to explain the existence of involuntary unemployment and why monetary policies impact economic activity.

Greenwald, Stiglitz and Weiss (1984) are the major contributors to the NK theory. They recognise Keynes' failure to acknowledge the consequences of capital market imperfection that can explain the cost of information. According to Giancarlo (2003), the NK theory was developed to achieve two (2) primary objectives. The first objective is to justify the price rigidity hypothesis. In contrast, the second objective seeks to explain why the flexibility of wages and prices can bring about instability in economic activity. Given the first objective, the NK further develops theories to explain price-wage stickiness. These theories include efficiency wage, staggered price adjustment, small menu cost and aggregate demand externality.

The central belief of the NKs is the existence of market imperfection, leading to markets not clearing at prevailing prices caused by the inability of prices and wages to adjust instantly. In this regard, proponents of the NKs such as Mankiw and Romer (1991) argue that price and wage rigidities arise primarily from optimising behaviour of economic agents by assuming (i) the existence of oligopoly and monopolistic competition (Product market imperfection), (ii) product price rigidity; and (iii) real rigidities (i.e., those factors that make a firm's relative price or real wage rigid when aggregate demand changes)

Following these assumptions, three (3) models of NK were developed. They include (i) sticky price (menu cost) model, (ii) insider-outsider model and (iii) efficiency wage model. The Sticky price model, which is the focus of this research, is based on the premise that firms face imperfect competitors, making the demand curves for their products downward-sloping. The model stipulates that firms find it challenging to reduce the prices of their products despite the downward sloping demand curves even when demand falls. According to the model, this viewpoint is due to the existence of menu costs. These costs refer to the costs that a firm must incur to adjust the price of one of its products and range from the market analysis required to find the right price, the cost of bringing the new price to the notice of customers, the cost of printing as well as changing the price on a menu or website, the cost of losing customer goodwill to the time to meet with executives to persuade them to change course. According to Gordon (1990), the 'menu costs' of adjusting prices could be so high that an organisation decides not to change its price until the old price becomes completely untenable. This implies that employment and output would fall when there is a fall in aggregate demand since the costs of adjusting prices prevent price changes.

The NK has been criticised for their partial equilibrium methodology (Nicholas, 2012) as it ignored production and money in the exchange process of an economy. Critics of the sticky price model argue that since menu costs are minimal (Gordon, 1990), they may not explain price adjustments at a macro level. According to King and Watson (1996), the sticky price model was criticised for suggesting that an increment in the money supply leads to a counterfactual rise in interest rates. However, the model proponents argue that 'smallness' does not necessarily mean 'inconsequential'. This arguement suggests that even though menu costs may be small to an individual firm, they can have widespread effects on the economy when aggregated for all firms.

Ghazouani (2020) applied a dynamic stochastic general equilibrium model to verify the role of international financial integration in a New Keynesian model while examining the impact of oil price shocks on economic activity. He observed that higher financial integration dampens the effect of an increase in the oil price than fewer financial integration. He further affirmed that financial integration plays a vital role in reducing the oil shock effect. Applied to the analysis of this study, the sticky price model of the NK would enable us to understand how price rigidity affects corporate revenue and profit, which, in turn, affect stock valuation. In general, the model predicts higher stock performance (returns) and corporate income for firms with stickier prices when there is a shock in an economy.

2.2.2 Financial Instability Hypothesis

The financial instability hypothesis is another theory employed over the years to explain financial market volatility. Hyman Minsky pioneered it to explain how swings between robustness and fragility in financial markets generate business cycles in the economic system. The financial instability hypothesis is derived from Minsky's interpretation of the General Capitalist Theory, especially regarding Keynes's ideas on investment, portfolio decisions and liquidity preference, and Schumpeter's (1951) credit view of money and finance. Minsky (1986) described a situation where an increase in speculative investments would lead to over-indebtedness and financial fragility throughout the business cycle, ultimately leading to an economic environment conducive to high inflations and debt deflations, a collapse of asset values and deep depressions.

Minsky’s theory assumes that when stock prices rise higher than the interest rate during periods of stability, investors are lured into taking higher risks, which leads them to borrow more and overpay for assets. Minsky (1980) identified three types of financial postures that contribute to the accumulation of insolvent debt: (i) Hedge finance, whereby borrowers can meet all debt payments (interest and principal) from their cash flows. (ii) Speculative finance, whereby borrowers can meet their interest payments from investment cash flows, must roll their debt over to repay the original loan. (iii) Ponzi finance, whereby borrowers can neither repay the interest nor the initial debt from the original investment cash flows, as they rely entirely on rising asset prices to allow them continually to refinance their debt.

The mix of financial postures determines the overall robustness or fragility of an economy's financial structure, ranging from hedge finance providing more robustness and Ponzi finance providing more fragility. Ponzi finance tends to become increasingly prevalent, depending on the period of economic stability, and often results in the collapse of some financial institutions (Minsky, 1980). If the use of Ponzi finance is widespread in the financial system, as might have been the case in the 2008 subprime mortgage crisis, then the collapse of Ponzi finance can also bring down hedge borrowers who cannot find loans despite the apparent soundness of the underlying investments.

Financial institutions often devise ways of getting around regulations and norms to take on greater risk during periods of stable growth. These observations led Minsky (1992) to define two theorems of the financial stability hypothesis: (1) the economy has financing regimes that are stable or unstable, and (2) over periods of prolonged prosperity, the economy transitions from financial relations that make for a stable system to financial relations that make for an unstable system. Periodic shifts' stability and instability generate endogenous business cycles. The weight of speculative and Ponzi finance will have a specific bearing on the extent of the recession. Schumpeter (1939) and Keynes (1936) were concerned with business cycles but had very different views on how they were generated. Minsky understood these different visions as two aspects of the same phenomenon.

2.2.3 Hotelling's Theory on Price

Hotelling's theory on the price of oil and other non-renewable resources is based on cost against revenue, which explains the justification for production because the supply of such resources will yield more than interest-bearing instruments like bonds. Revenue is the main reason for production, and, in all probability, the marginal cost of production is far above the average cost. This, again, is the offshoot of the Keynes argument that when the economy is regulated, the basic activity of an enterprise is that, at least, its average cost is equal to its average revenue (AC = AR). The market will determine demand and supply. Hotelling's theory proposes that owners of non-renewable resources will only produce a supply of their product if it yields more than the instruments available to them in the markets – specifically bonds and other interest-bearing securities. The rule explains that producers are rational to make their products as similar as possible based on observations of many markets. This is also referred to as the principle of minimum differentiation and Hotelling's linear city model.

The deposits of exhaustible resources should be viewed as an asset, just like any other income-producing investment (Hotelling 1931). The theory's rule assumes that producers and owners of resources are only motivated by profit and that production is about earning money. Hotelling theory also assumes that exhaustible resources should be treated as assets or investments that could increase in value. Hence, he compared the future oil prices with bonds or savings in a bank. Broadly, he compared the price development of the exhaustible resource with the development of interest rates of other investments. He further assumes that the resource owners only produce a limited supply if the resource yields a better future value than bonds and other interest-based assets.

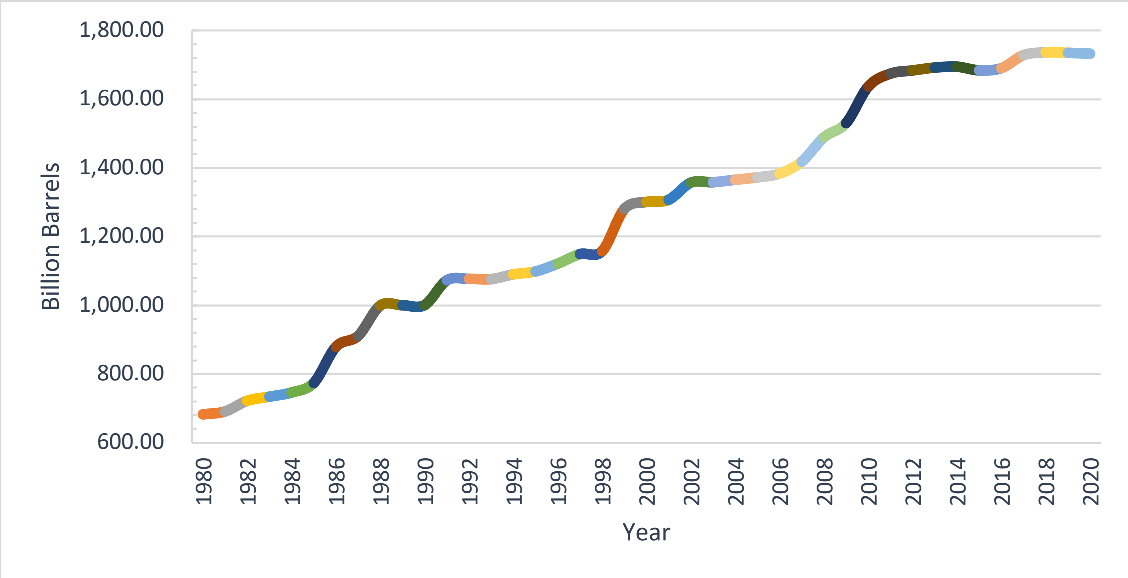
Even though the market will fluctuate in the short-run (resulting in resource price changes depending on its supply and demand), the theory assumes that the net price of the resource should prevail over the interest rate for every year in the long-run. For example, if the resource (including the cost of storage and production) did not increase more than the interest rate, there would be no restriction to the resource supply. If the owners did not expect the resource price to keep up with the interest rates, they would gain more profit by selling the resources and investing their money in interest-based investments such as bonds. However, if the oil prices, for example, increased much faster than the interest-based investments, then it would be worth more for the producers to keep as much oil as possible in the ground because it would yield a more significant profit tomorrow than today.

Hotelling (1931) affirmed that the above process applies to all exhaustible resources and that owners would eventually end up in a situation where increasing prices would lead to a decrease in the demand for the exhaustible resource and even a decrease in resource production. This would occur until the resource is completely exhausted. The owners will treat their resources similar to assets, potentially increasing the price in the future. If the assumption is that future prices of the exhaustible resources will increase, owners will decrease production and not extract the resource. However, if the potential future value decreases, the owners will extract as much oil as possible and invest their money elsewhere, e.g., in bonds. This is the short-term behaviour Hotelling described. However, in the long-run, Hotelling (1931) predicted prices to increase annually at the same rate as the market rate of interest.

Though adored for its contribution to the economics of non-renewable resources, Hotelling's theory has also generated some criticism. The theory lacks empirical evidence to back the trajectory pricing behaviour that oil price increases along with interest rates (Halvorsen and Smith, 1991). The theory has been criticised based on the time horizon as regulation and speculation in oil prices result in alternative phases of downward and upward movements. The time spans have a significant impact on resource prices, according to Hart and Spiro (2011). Hotelling's rule, however, assumes constant time periods. He argues that when a finite time horizon is compared to an infinite time horizon, they yield identical results when used in a standard model of capital accumulation. However, progressive finite time horizons can remove the scarcity consideration of exhaustible resources in natural resource models. This affirmation implies that demand and operating costs are the only determinants of the extraction rate, which further implies that resource prices will be non-increasing, and extraction will be non-decreasing in the long term.

According to Gaugler (2015), the theory mentions unexpectedness in discoveries yet fails to deal with it. The theory's views on oil exhaustion are highly debatable. Economic indicators evidenced growth in oil supply as new deposits were discovered. Growing oil reserves do not support Hotelling's (1931) theory regarding finite resources because he assumes a known stock. This assumption does not resemble the real world as applicable in this research work. Statistics have corroborated that oil reserves have increased almost yearly since 1980, as shown below in Figure 2.1. This attestation contradicts one of the theory's critical assumptions: The more the resource is discovered, the bigger the price drop and the slower the rate of depletion (Kronenberg 2008).

Figure 2.1 World Crude Oil Reserves



Source: Author's visual representation from Appendix A.5

Furthermore, many of the activities in oil trading are traceable to cost adjustment, which ultimately influences decisions that affect the stock exchange activities. Thus, this concludes with a contradiction to Hotelling's theory. As explained in the next section, unexpectedness leaves us finding more and more of the presumably known resource, which undoubtedly affects the price path and depletion rate. Despite these criticisms, the theory has predicted crude oil price development over the last 100 years and highlighted the determinants of resource prices.

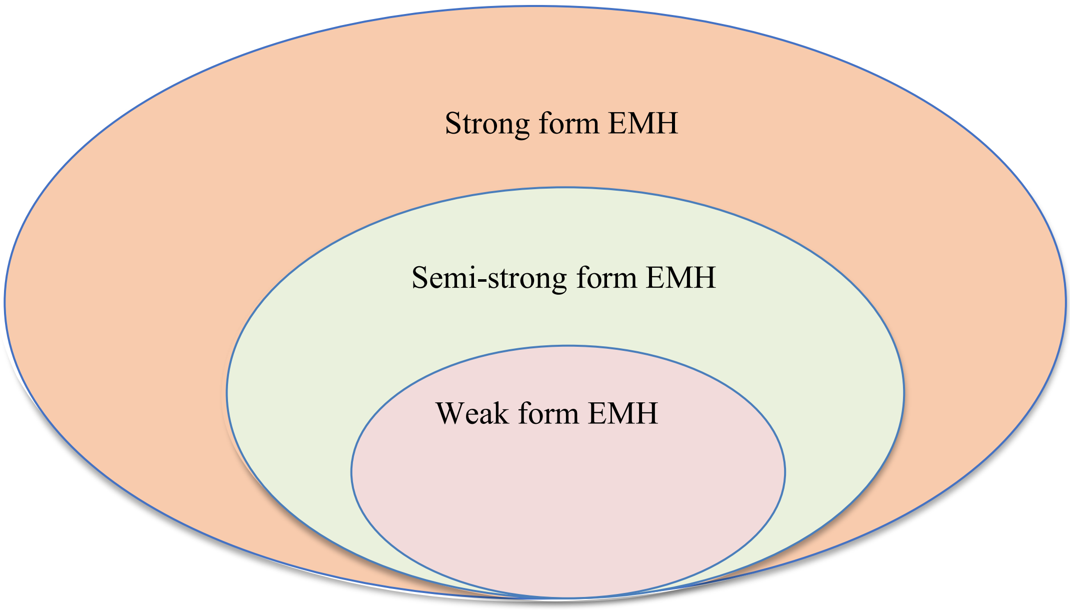
2.2.4 Efficient Market Hypothesis (EMH)

One argument that strongly overshadows the compelling reasons to determine oil prices using Hotelling's theory on price is the EMH theory, which explains that financial economics requires more than the cost against revenue formula. When the cost against revenue formula becomes inevitable, the EMH theory explains that asset prices should fully reflect available information. This explanation is important because it uncovers contract details. Sprinkel (1964), using the quantity theory of money, affirmed that money supply changes could be used to predict stock performance. Contrarily, the EMH postulate that past information like money supply changes cannot predict stock performance if the market is efficient. However, Cooper (1974) affirmed that the quantity theory of money and EMH are complementary and not contradictory. He reaffirmed that changes in money supply have a material effect on stock returns and that stock returns lead rather than lag money supply changes.

Professor Eugene Fama developed the EMH in the early 1960s, and it is the framework for examining the efficiency of the capital market. The theory postulates that prices of financial instruments like bonds and shares reflect all the information currently available. If the price is rumoured to increase in the near future, investors or traders will buy the instrument now, thus driving its price up to negate the anticipated increase. The EMH implies that if new information is revealed about a company, it will be reflected in the share price rapidly and rationally, concerning the direction and size of the share price movement. Thus, there is no opportunity for making a return on a share (or other security) more significant than a fair return risk associated with that share (or other security), and it is only new information that causes prices to change.

Reilly and Brown (2012) and Fama (1970) presented the EMH as a fair game model and divided the overall EMH into three sub-hypotheses depending on the information set involved: weak-form EMH, semi-strong form EMH, and strong form EMH.

Figure 2.2 Forms of Information Efficiency



Source: Adapted from Ross, Westerfield and Jaffe (2005) pp. 356.

The weak form EMH asserts that current stock prices fully reflect all security market information and past returns. It does not reflect other information like money supply, forecasts, earnings or merger announcements. Weak form efficiency states that the price today is equal to the sum of the last observed price plus the expected return on the stock plus a random component occurring over the interval. This is represented mathematically as

$$P_t = P_{t-1} + Expected\ Returns + Random\ Error_t \ldots \quad 2.2$$

The semi-strong form of EMH states that prices rapidly reflect the release of publicly available stock market information such as historical price information and published accounting statements, i.e., the stock's current price reflects the calculated public information. Such public information includes all stock ratios, dividend and earnings announcements, political news, stock splits and news about the economy. No superior gain can be achieved due to technical or fundamental analysis carried out on the stock. The main difference between weak and semi-strong form EMH is that the former requires that the market is efficient with historical information. In contrast, the later-added information available to the public on stocks is reflected in the stock price.

The strong form of EMH further expands the semi-strong form of EMH. It assumes that all information relevant to the stock has been available and incorporated into the stock price. Such information could be public or private (insider). However, it could be possible in practice to make abnormal returns by exploiting insider information despite the fact that insider trading is illegal in some countries.

Per this hypothesis, any time an investor buys or sells a security, he or she is taking part in a game of chance rather than skill. An efficient and current market will always reflect the most accurate price, so one can never purchase a stock at a bargain price. The key reason for the existence of an efficient market, as emphasised by Brigham and Houston (2001), is the intense competition among investors to profit from any new information. The ability to identify over and under-priced stocks is very valuable (it would allow investors to buy some stocks for less than their "true" value and sell others for more than they were worth).

The argument against this theory explains that a huge swing in the market can be inconsistent with the accuracy of the price of market information. Only some new information is precipitated for the market prices to reflect all public and private information, and managers can achieve abnormal or excess profit. Therefore, the EMH in its strong form can be shown to be false simply because insider trading consistently yields above-average returns, as the theoretical approach ignores both overreaction and underreaction of financial investors. For instance, there are scenario game plans whereby analysts who rate such share prices could predict future information. Such ratings could have high impacts on a share price and form the basis of a decision to trade and determine price while the necessary information is available. In addition, one can achieve above-average risk-adjusted returns using only public information, and this would make it impossible to make money on insider trading.

Some scholars (Malkiel, 2011; Kothari, Shanken and Sloan, 1995; Lakonishok, Shleifer and Vishny, 1994; Bernard and Thomas, 1990) have criticised this theory. They argue that many investors base their stock performance expectations on past prices, earnings, track records and other backwards-looking indicators. Stock prices are largely based on investor expectations, meaning that stock prices and activity in the past indirectly impact current and future prices. Arguments by Keown and Pinkerton (1981), De-Bondt and Thaler (1985), and Lakonishok, Shleifer and Vishny (1994) noted that stocks with low long-term past returns tend to have higher future returns and vice versa – stocks with high long-term past returns tend to have lower future returns (long-term reversals). This conclusion is in contrast with the prediction of the hypothesis.

De-Bondt and Thaler (1985) presented another counterargument against the hypothesis in a widely publicised study demonstrating that the EMH implies that financial analysis is pointless. They affirmed that the argument must be incorrect, as financial analysts are not driven out of the market. Investors who attempt to research security prices are wasting their time suggesting that throwing darts at the financial page will produce a portfolio that can be expected to do as well as any managed by professional security analysts. This affirmation implies that the services of financial analysts are valuable.

The EMH came under another criticism following several events (starting from the economic meltdown of 2007 and 2008) that occurred, underpinning the premises of the hypothesis. One of such event includes the dot com and the technology bubbles which occurred between 1995 and 2000, a time of high speculation and high valuation of stock, leading to abnormal returns for investors and rapid growth in share prices (Schubert *et al.*, 2018; McAleer, Suen and Wong, 2016). Another significant event worth mentioning is the crisis in the U.S. subprime mortgage and the subsequent global financial crisis of 2007-2008, leading to the crash of the stock market from 2007 to 2010. Financial/economic analysts queried the importance and efficacy of the Efficient Market Hypothesis on the ground of these events (dot com and technology bubbles and the U.S. crisis in the subprime mortgage). They affirmed that these events would not have happened if the assumptions of the EMH were valid (Gilson and Kraakman, 2014; Constâncio, 2014).

In corroborating the above argument, Ball (2009) tested the relevance of the EMH. He noted that the aftermath effects of the financial meltdown (crisis) of 2008 made many financial system regulators, markets and scholars more critical of the EMH. According to the author, this was due to the fundamental assumption of EMH, which states that asset prices reflect available information. This assumption made many market participants and regulators believe that assets' market prices were accurate and reflected all information, resulting in an asset price bubble. However, as observed by Barberis and Thaler (2003) and De-Bondt *et al*. (2008), asset prices sometimes tend to deviate from the fundamental value, and these deviations can be substantial and long-lived (Barberis and Thaler, 2003). In corroborating this argument, Rossi (2015) and Hong and Stein (1999), in their separate studies, aver that stock market participants often do not have adequate access to all the necessary information. Even when they do, their sentiment about the available information may differ, leading to a variance between the market prices of assets and their fundamental values.

Despite its criticism, this study acknowledges that the constant fluctuation of stock prices could indicate that markets are efficient. New information affecting the value of securities constantly arrives, causing continuous adjustments of prices to information updates. Observing that prices stayed the same would be consistent with market efficiency since relevant information arrives continuously. This provides theoretical and empirical proof of the postulation of the EMH.

Like many countries, the contributions of EMH in stock trading are imperatively significant to the activities in the stock market and Canada, specifically. Stocks always trade at their fair value on stock exchanges, making it impossible for investors to purchase undervalued stocks or sell stocks for inflated prices. This view is consistent with the finding of Duarte-Duarte, Pérez-Iñigo, and Sierra-Suárez (2014), who investigated the assumption of EMH in its weak form using the stock market data generated from the Stock Exchange of Colombia. he study found an improvement in EMH in the market between 2008 and 2010, and this period coincided with the beginning of the global market crisis.

Some empirical studies in developed countries have validated the relevance of (the presence of the weak-form) efficient market hypothesis (Anagnostidis, Varsakelis and Emmanouilides 2016; Mensi, Tiwari and Al-Yahyaee, 2019; Yang *et al*., 2019). In developing countries, studies carried out in this regard yielded mixed results. Boamah, Watts and Loudon (2017) argued that regulatory/institutional constraints, principal-agency problems, and information asymmetry in emerging markets are the reasons for varying results on the relevance of the efficient market hypothesis.

For instance, Dahel and Laabas (1999) examined the relevance of the EMH in stock markets in Kuwait, Bahrain, Oman, and Saudi Arabia and found weak-form EMH in Kuwait. The study, however, rejected the presence of a weak-form EMH in Saudi Arabia, Bahrain and Oman. Similarly, Iqbal and Mallikarjunappa (2011) observed that stock markets in India did not support either the weak or semi-strong form of EMH. Also, Shiller and Radikoko (2014) investigated the market efficiency under the weak form assumption using stock market data from Canada. The study found varying results for different sample periods and concluded that the Canadian equity market is weak-form inefficient. Other studies with similar findings include (Awan and Subayyal, 2016; Hawaldar, Rohit and Pinto, 2017).

In contrast, Karemera, Ojah and Cole (1999) supported the weak form of EMH for stock market prices in Turkey. Data compiled by Morningstar Inc. Active/Passive Barometer study supports the conclusion (Johnson *et al*., 2015). In their separate studies, Brandt and Kavajecz (2005) and Titan (2015) found a relationship between asset prices in sovereign debt markets and available information. The authors identified two significant channels for the variations in asset yields in this market. According to the authors, the channels are the flow of information on one hand and how this (macroeconomic) information is interpreted, referred to as price discovery. They, therefore, concluded that movements in asset returns are influenced by public information such as macroeconomic announcements, suggesting that these announcements explain the volatility and high persistence observed in asset prices.

Bollerslev, Cia and Song (2000) investigated the characterisation of the return volatility in the U.S. Treasury bond futures contracts using the U.S. five minutes intraday Treasury bond futures on data between Jan. 1994 and Dec1997. The study found that Treasury futures in the U.S. market tend to show high and persistent volatility after announcements on certain macroeconomic indicators. The study further noted that the open/close markets tend to have higher volatilities than mid-day, indicating that macroeconomic announcements are key sources of the U.S. Treasuries market volatility. In other empirical evidence, Brandt and Kavajecz (2005) noted that macroeconomic announcements have a higher and more prolonged impact on stock volatility. This finding has also been corroborated by a study by Andersson *et al*. (2006).

Proponents of the EMH conclude that investors could do better by investing in a low-cost, passive portfolio because of the randomness of the market. Data compiled by Morningstar Inc. Active/Passive Barometer study supports the conclusion (Johnson *et al*., 2015). Morningstar compared active managers' returns in all categories against a composite of related index funds and exchange-traded funds (ETFs). The study found that only two groups of active managers successfully outperformed passive funds more than 50% of the time year after year and these were U.S. small growth funds and diversified emerging markets funds. The usefulness of EMH has always been subject to doubt, as it is often said that no one can make above-average returns just by using historical data in the long-run. Regardless of the information level possessed by participants, they should not be able to generate an abnormal profit.

An important conclusion drawn from the review of EMH is that wealth-holders and arbitragers who have essential information and insights into past changes in asset prices should predict current stock returns and future prices. In a competitive/efficient market setting, current asset prices are expected to adjust quickly to reflect all the information at the time, thus eliminating the ability of arbitragers/ investors to utilise previous information to forecast future and current prices (Bhargava, 2014; Degutis and Novickytė 2014 and Andrianto, and Mirza, 2016). However, this empirical review has suggested that this depends on the level of market development. While the EMH has empirical proof in developed markets, the reverse is the case in developing markets.

2.2.5 Dividend Valuation Model (DVM)

The dividend valuation model (DVM), proposed by Gordon (1962), is often referred to as the dividend discount model. The theory is used to determine the overall stock value by predicting share values based on future dividends. To an investor, the stock value is the discounted present value of the sum of the next period's dividend plus the next period's stock price or the discounted present value of all future dividends. The DVM can be expressed as follows:

$$P_o = \frac{Div_1}{1+r} + \frac{P_1}{1+r} \qquad \text{2.3}$$

Where P_o is the present value of the common-stock investment, Div_1 is the dividend in year 1, P_1 is the price at year's end, and r is the discount rate of the stock.

The above equation can be extended for more years regardless of whether the level of expected dividend is growing, fluctuating or constant. Hence, the model can be generalised to reflect the firm's dividend patterns of 1) zero growth, 2) constant growth, and 3) differential growth, as expressed below.

Zero dividend growth

$$P_o = \frac{Div_1}{1+r} + \frac{Div_2}{(1+r)^2} + \cdots = \frac{Div}{r} \qquad \text{2.4}$$

Constant dividend growth

$$P_o = \frac{Div}{1+r} + \frac{Div(1+g)}{(1+r)^2} + \frac{Div(1+g)^2}{(1+r)^3} + \frac{Div(1+g)^3}{(1+r)^4} + \cdots = \frac{Div}{r-g} \qquad \text{2.5}$$

g is the growth rate, and Div is the dividend on the stock at the end of the first period.

Differential dividend growth

The model is expressed as stated in Pattern 2 above. However, the present value of expected dividend payments must be established for each period to apply the model.

DVM estimates an organisation's intrinsic value by discounting future payoffs like residual income, dividends or abnormal earnings growth. Some empirical studies have investigated how the DVM performed. For instance, early research efforts by Shiller (1981) tested for market efficiency. They claimed that stock prices are the present value of expected future dividends using a simple valuation model on time series data. He concludes that the valuation model alone cannot explain movement in stock prices and that stock prices are too volatile to conform with efficient markets. That is, the valuation model is invalid, and markets are inefficient. Contrary to the above, Kleidon (1986) employed a statistical model of Monte-Carlo simulation and concluded that the valuation model holds and is consistent with market efficiency. He criticised Shiller's incorrect methodology of using ex-post dividends for valuation model testing. The DVM is helpful when valuing a firm that pays a dividend and maintains an estimable dividend pattern, as the model can be modified for varying dividend patterns.

Furthermore, Francis, Olsson and Oswald (2000) compare intrinsic values of stock prices estimated using the DVM, residual income valuation (RIV), and the discounted cash flow model. The study utilised the analyst forecast data and computed error metrics for individual organisations. The study found median and mean pricing errors obtained from the DVM to be about −0.7 while RIV was −0.2. Thus, the study concluded that estimates obtained from RIV outperform the other models (DVM and discounted cash flow model) in terms of accuracy, ability to explain stock prices and bias. In a related study, Jorgensen, Lee and Yoo (2011) extended the forecast periods to 5 years from 2 years and found that intrinsic values obtained using the DVM are less accurate when compared with those from the RIV and AEG. The authors argued that AEG appeared to overvalue shareholder's equity on average, probably due to optimism.

Charumathi and Suraj (2014) explored frameworks for the valuation of bank stocks using Ohlson, CAPM, DDM, and P/E models. The study further investigated the explanatory power of these valuation models using R-Squared values obtained from Ordinary Least regression models. To achieve this, 14 Indian banks that make up the BSE Bankex were sampled, and monthly stock data was gathered between January 2000 and November 2010. The study found that the R-squared values of P/B and Ohlson models are higher than those from other valuation models (DDM and CAPM). Put differently, the study found that Ohlson and P/B valuation models have high explanatory power, are more informative and provide more accurate and better estimations of equity values for Indian bank stocks. Thus, the study concluded that the DVM and CAPM are unreliable for valuing bank stocks in India.

In a study from a developing economy, Olweny (2011) ascertained the predictive power of the dividend valuation model using stock data of listed firms on the Nairobi Stock Exchange. Data on share prices, dividends per share and market indices of 18 listed firms were obtained. The market model was employed as the equilibrium model to link a non-observable expected value to real values. Values of forecasted share prices were compared with actual prices, and the variance between the two was subjected to a t-test. The study found that only 3 of the 18 firms sampled had a significant link. Thus, that DVM might not be a reliable measure of stock valuation.

Similarly, Lehmann and Alfredsson (2016) compare the DVM, the discounted cash flow model (DCFM), the abnormal earnings growth model (AEGM), and the residual income-based model (RIVM) to assess their relative precision in valuing stock prices. More specifically, the study investigated the performance of these models relative to the OMX30 index and how each model is impacted when the forecast period/horizon is extended. Following analysis of data, the study found AEGM to outperform the others prior to and after the period extension. This finding is consistent with Ho *et al*. (2017), who noted that stock valuing accuracy tends to be better for RIV than for other models such as AEG and DVM. This is in terms of accuracy, inherent speculative nature and spread of the model. Against this backdrop, the study questions the justification for the use of DVM in decision-making by investors.

As with the previous studies, Anesten *et al*. (2020) tested the pricing accuracy and applicability of three fundamental valuation models - dividend valuation, residual income, and abnormal earnings growth. These models are based on forecasts of firms' earnings, dividends, and or equity book values. Stock data of Scandinavian companies between 2005 and 2014 were obtained. The study found that pricing errors are lower than those found in a prior U.S. based study for DVM. Hence, their study concluded that the model of the residual income generated the best pricing accuracy.

2.2.6 Capital Asset Pricing Model (CAPM)

The CAPM is one of the leading asset pricing models that have been employed over the years. Akpo, Hassan and Esuike (2015) ascertained that the mechanical complexity of Markowitz's portfolio model spurred the development of the CAPM. According to Drake and Fabozzi (2010), the theory was formulated by William Sharpe, John Lintner, Jack Treynor, and Jan Mossin. It was built on the risk-return portfolio theory developed by Markowitz (1959) and Tobin (1958). The CAPM seeks to describe the asset's sensitivity to non-diversifiable risk (also known as systematic risk or market risk), often represented by the quantity beta (β) in the financial industry, as well as the expected return of the market and the expected return of a risk-free theoretical asset (Drake and Fabozzi 2010). That is, expected discounted cash flows determine asset prices, and expected return on asset equates to a risk-free rate and a risk premium.

The CAPM starts with the idea that investment contains two types of risk, systemic or market risks and unsystemic or specific risks. The systemic risks, according to the model, are risks that cannot be diversified away. These include risks associated with the macroeconomic system (interest rates, inflation, business cycle, and wars). Unsystemic risks, on the other hand, are those risks that can be diversified away as the investor increases the number of stocks in his or her portfolio. In more technical terms, it represents the component of a stock's return that is not correlated with general market moves (Fama and French, 2004). The CAPM, therefore, evolved into measuring this systematic risk.

The CAPM determines the expected return on stocks as a function of their level of market risk, such as

The expected return on a security $E(R)$ = Risk-free rate of interest (R_f) + beta (the systematic risk of the security represented by β) x the market risk premium expected return on market portfolio $\{E(R_m)$ – Risk-free rate $R_f\}$.

The expected return on a security is linearly related to its beta, such that beta is the only relevant measure of a stock's risk.

$E(R) = R_f + \beta\{E(R_m) - R_f\}$……………………………………….…………2.6

This equation implies that the CAPM has only one systematic risk factor: the risk of the market's overall movement, referred to as market risk. So, in the CAPM, market risk and systematic risk are interchangeable terms.

What this means is that the expected return for asset i, according to the CAPM, is equal to the risk-free rate plus a risk premium. The risk premium is $\beta_i\left(E\{R_m\} - R_f\right)$.

Another way of looking at this is that the risk premium on the market portfolio is $\left(E\{R_m\} - R_f\right)$, and β_i adjusts this for the systematic risk of asset i.

$E(R_i) = R_f + \beta_i\left(E\{R_m\} - R_f\right)$…………………………….…….………………..2.7

Where

$E(R_i)$ = Expected return on security i

R_f = Risk-free rate

$E\{R_m\}$ = Expected return on market portfolio

β_i = Beta of security i.

The CAPM demonstrates how the minimum return required of security is a function of its riskiness by making the following assumptions, according to Lee, Lee and Lee (2009): (i) All investors are rational and maximise wealth; (ii) All investors are risk-averse; (iii) Standard deviation is the most appropriate measure of risk; (iv) There are no transaction or taxation costs; information is available at no cost; (v) All investors can lend and borrow unlimited amounts under the risk-free rate of interest; (vi) All investors have homogeneous expectations about future returns; (vii) The capital market is always at equilibrium.

Early empirical work, such as Black, Jensen and Scholes (1972) and Fama and MacBeth (1973), somewhat support the Sharpe-Lintner CAPM. They show that a linear and direct relationship exists between higher risk (beta) and a higher level of return. The slope, however, is flat and does not seem to conform to the Sharpe-Lintner CAPM. Many of these assumptions have been challenged, resulting in modifications to the CAPM. This modification is despite its effectiveness in explaining how market risk affects asset prices and returns. The CAPM came under severe criticism for restricting asset pricing factors to only one systematic risk factor – *market risk.*

According to Glickman (1994), asset prices reflect more than just market risks in a country. This view is corroborated by Fama and French (2004) and Drake and Fabozzi (2010). In their separate studies, these authors argue that more than one risk factor affects asset returns and that the behavioural assumptions of the CAPM do not reflect the way investors make portfolio decisions in the real world. Other scholars (Blume and Friend, 1973; Miller and Scholes, 1972; Douglas, 1968) reject the CAPM. For instance, Chan and Lakonishok (1993), Black (1993), Ross (1977), and Fama and MacBeth (1973) prove that the single-factor CAPM is rejected when the portfolio used as a market proxy is inefficient.

Kandel and Stambaugh (1995) and Roll and Ross (1994) revealed that a slight deviation from efficiency could result in an insignificant correlation between risk and expected returns. Also, Kothari, Shanken and Sloan (1995) highlighted the survivorship bias in the data used to test the validity of the asset pricing model specifications. Faff and Brooks (1998), Brooks, Faff, and Lee (1994), Faff, Lee and Fry (1992), and Bos and Newbold (1984) observed that beta is unstable over time. Studies such as Kim (1995) and Amihud, Christensen and Mendelson (1993), for instance, argue that the use of the standard deviation or variance as a measure of risk does not capture what is observed in financial markets regarding the probability distribution of asset returns and that the assumptions of the CAPM do not reflect the way investors make portfolio decisions in the real world.

Similarly, Alves (2013) took a comparative analysis of the Capital Asset Pricing Model using the Fama and French (1993) Three-Factor model to explain returns on the stock. Also, Khudoykulov, Khamidov, and Aktamov (2015) analysed the Capital Asset Pricing Model using eight different stocks from five countries. Both studies concluded that CAPM did not adequately explain stock returns. In corroborating this view, Kristoufek and Ferreira (2018) evaluated the risk profiles of the stock market index in Portugal using the theoretical framework of the CAPM. The study specifically estimated the CAPM using fractal regression models to show if risk perception differs according to market participants in different horizons. Following the analysis, the study found stock prices deviating from the anticipated risk perception across different horizons. This finding suggested that the CAPM needs to be more adequate in explaining stock prices.

Anwar and Kumar (2019) tested many monotonic models in the Indian stock market using daily stock data between 1st April 2009 and 31st March 2016. The study affirmed that the two-factor model is better at explaining stock prices than the CAPM and Fama and French (2004) three-factor models. Their further finding reveals that the three-factor model and CAPM are more vigorous in explaining financial firms than non-financial firms. Similarly, Pankaj and Priya (2020) empirically compared the predictive power of the standard CAPM, three-factor, four-factor and five-factor models of Fama, Carhart and French, respectively. They further assess the validity of these asset pricing models in explaining stock returns in pre, amid and post-crisis periods. The Fama-French regression model was employed. The study found that the three-factor model effectively explained stock returns more than the standard CAPM.

After a considerable number of CAPM tests, some modifications were made to the standard CAPM. The recent work of Brennan and Zhang (2020) tested one of the modified CAPM and the extended version of the CAPM. They observed that the model outperformed the standard CAPM as well as Fama and French 3-factor model. Nevertheless, it should be noted that a considerable number of scholars encourage the use of the standard CAPM (Guermat, 2014) as the model continues to be used in different samples and contexts. Other scholars consider price to earnings ratios and debt to equity as important measures of expected stock returns. Also, the deployment of networks and the arbitrage pricing model are alternative methodologies to analyse the CAPM (Squartini *et al.*, 2017).

2.2.7 Arbitrage Pricing Theory (APT)

Based on arbitrage arguments, Stephen Ross (1976) developed an alternative to the equilibrium asset pricing model discussed above. The APT model is a multifactor model which postulates that an asset's expected return is influenced by various risk factors instead of market risk, as suggested by the CAPM. These include industry-wide and market-wide risk factors. While the CAPM is a single-index (beta) model, the APT is a multi-index model. The APT could incorporate a multitude of factors, like industry-specific indices and interest rates. Several studies pronounced that the APT could be verified empirically, and its assumptions are less restrictive (Akpo, Hassan and Esuike, 2015). Under the multifactor version, the relationship between risk and return can be expressed as follows:

$$\overline{R} = R_f + (\overline{R}_1 - R_f)\beta_1 + (\overline{R}_2 - R_f)\beta_2 + (\overline{R}_3 - R_f)\beta_3 + \cdots .. + (\overline{R}_k - R_f)\beta_k \quad \text{.......2.8}$$

R_f = Risk-free rate

$\overline{R}_1$ = Expected return on a security or portfolio (analogue interpretation given to $\overline{R}_2$, $\overline{R}_3$ ……. $\overline{R}_k$)

β_1 = security's beta for the first factor, β_2 = security's beta for the second factor … β_k

Because the market compensates for risk, $(\overline{R}_1 - R_f)$ will be positive in a normal case.[1]

According to the APT model, the return on an asset is linearly related to a number of risks, industry-wide and market-wide factors such as theoretical market indices or various macroeconomic factors, where a factor-specific beta coefficient represents sensitivity to changes in each factor. However, the APT model does not specify these risk factors, but the relationship between asset returns and risk factors is linear in the model. Moreover, in the APT model, unsystematic risk can be eliminated so that an investor is only compensated for accepting the systematic risk factors (Ross 1976).

The three major assumptions of APT, according to Ross (1977, 1976), are: (i) Capital markets are perfectly competitive; (ii) Investors always prefer more wealth to less wealth with certainty; (iii) The stochastic process generating asset returns can be expressed as a linear function of a set of K risk factors or indices as expressed below:

$$R_i = E(R_i) + (b_{i1}\delta_1) + (b_{i2}\delta_2) + (b_{i3}\delta_3) + \cdots + (b_{ij}\delta_k) + \varepsilon_i \; for \; i = 1 \; to \; n \quad \text{.......2.9}$$

Where

R_i = Actual return on asset i during a specific time period, $i = 1, 2, 3, \ldots n$

$E(R_i)$ = Expected return for asset i if all the risk factors have zero changes

b_{ij} = Reaction in assets $i's$ returns to movements in a common risk factor j

[1] $(\bar{R}_1 - R_f)$ could be negative where factor i is perceived as a hedge of some sort (Roll and Ross 1994)

δ_k = A set of common factors or indices with a zero mean that influences the returns on all assets
ε_i = A unique effect on asset $i's$ return (a random error term that is assumed to have a mean of zero and completely diversifiable in large portfolios)
n = Number of assets.

Conceptually, arbitrage is the simultaneous buying and selling of an asset at two different prices in two different markets. The arbitrageur makes a profit without taking any risk by buying cheaply in one market and simultaneously selling at a higher price in the other market. Less obvious, arbitrage opportunities exist in situations where a package of assets can produce a payoff (expected return) identical to an asset that was differently priced. Thus, arbitrage relies on a fundamental principle of finance, *the law of one price*, which states that a given asset must have the same price regardless of how one goes about creating that asset (Fabozzi, Gupta and Markowitz 2002). The law of one price implies that if an investor can synthetically create the payoff of an asset using a package of assets, the price of the package and the price of the asset whose payoff it replicates must be equal (Drake and Fabozzi, 2010). This law implies that when a situation arises whereby the asset package price differs from that of an asset with the same payoff, rational investors will trade these assets in such a way as to restore price equilibrium. The APT assumes that this arbitrage mechanism is possible and is founded on the fact that an arbitrage transaction does not expose the investor to any adverse movement in the market price of the assets in the transaction.

It is worth mentioning that a few empirical works, like Allen (2014), Frahm (2018), and Hüseyin and Önder (2020), attempted to test the theoretical postulations of the APT model. The APT applications in the empirical studies of Hüseyin and Önder (2020) are based on apparently unrelated regression analyses. For instance, Allen (2014) evaluates the effects of information friction in agricultural trade. The study employed the APT theoretical framework and argued that markets in the agricultural sector are not fully integrated spatially. The non-integration created some issues and challenges that tend to raise the costs of transactions. Their study further identified information asymmetry as one major factor preventing market integration and concluded that the presence of substantial frictions in information would lead to the failure of arbitrage. Hüseyin and Önder (2020) assessed the validity of the APT in Turkey. The study used two different periods (2002-2008 and 2008-2019). Variables such as time deposit interest rates, gold prices, exchange rate, leading indicators index of the Central Bank and the VIX fear index were gathered and regressed on stock returns. Models like the Augmented Dickey-Fuller test for stationarity, the Bounds Test for cointegration and the ARDL were employed. They observed that a unit increase in financial fear level (VIX) in the post-2008 period would reduce BIST 100 index returns. Given the above, the present study tests the applicability of the APT using stock market data for a cross-section of countries.

In summary, the APT model asserts that investors want to be compensated for all the risk factors that systematically affect the return of an asset. The compensation is the sum of the products of each risk factor's systematic risk and the risk premium assigned to it by the financial market. As in the case of the CAPM, an investor is not compensated for accepting the unsystematic risk. However, the CAPM states that systematic risk is market risk, while the APT model does not specify systematic risks.

2.2.8 Theoretical Linkage

Expected discounted cash flows determine asset prices. Hence, any factor that alters the expected cash flows will influence the stock price. This study is anchored primarily on the New-Keynesian theory of Sticky Price, the CAPM and the APT. Understanding the determinants of oil prices and stock market movement is a fundamental goal for academics and researchers, hence the empirical structural analysis. The Sticky Price model argues that market imperfection leads to price rigidities occasioned by menu costs (the cost of market analysis required to find the right price, the cost of bringing the new price to the notice of customers, and the cost of losing customer goodwill, among others). This price stickiness impedes investors' ability to predict and interpret corporate revenue and profit, which has significant implications for stock valuations. In sum, the model postulates that when there are macroeconomic shocks, stock performance (returns) and corporate income should be higher for those firms with stickier prices. A strong tie between oil price shock and stock performance is expected in this regard.

The view of the tie between oil price movement and stock market performance is in tandem with the theoretical postulation of the CAPM. Chen, Roll and Ross (1986) proposed that stock returns are theoretically dependent on expected cash flows discounted by interest rates. They further emphasise that only general economic state variables would influence the pricing of large stock market aggregates. This accent was based on the diversification argument that was implicit in capital market theory that any systematic variables that affect the economy's pricing operator or dividends would also influence stock market returns. They argued that only general economic state variables would influence the pricing of large stock market aggregates. In addition, variables that are necessary to complete the description of the state of nature also form part of the description of the systematic risk factors. They affirmed that stock prices could be written as expected discounted dividends:

$$p = \frac{E\ (c)}{k} \quad \ldots\ldots 2.10$$

Where c is the dividend stream, and k is the discount rate. This implies that actual returns in any period are given by

$$\frac{dp}{p} + \frac{c}{p} = \frac{d\ [E\ (c)]}{E\ (c)} - \frac{dk}{k} + \frac{c}{p}. \quad \ldots\ldots 2.11$$

It follows that the systematic forces that influence returns are those that change discount factors, k, and expected cash flows, $E\ (c)^2$.

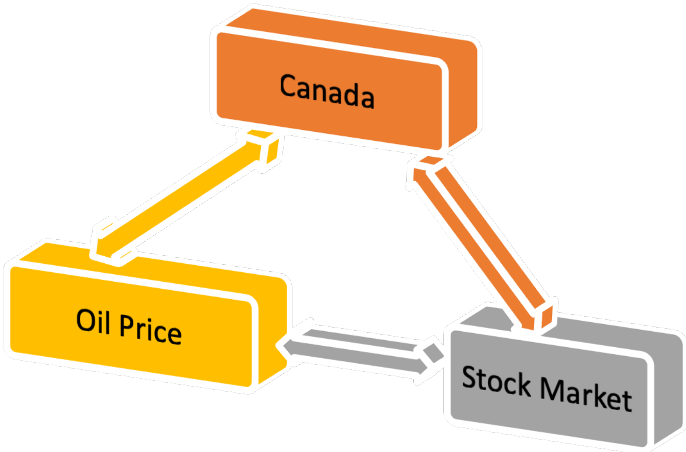
Supporters of the APT model argue that it has several major advantages over the CAPM. First, it makes less restrictive assumptions about investor preferences towards risk and returns. The APT is more general than the CAPM because it allows the rate of return to be affected by a more significant number of factors (Cuthbertson and Nitzsche 2004). As explained earlier, the CAPM theory assumes investors' trade-off between risk and return solely based on the expected returns and standard deviations of prospective investments. The APT model, in contrast, requires some relatively unobtrusive bounds to be placed on potential investor utility functions. Second, no assumptions are made about the distribution of asset returns. Finally, because the APT model does not rely on identifying the actual market portfolio, it assumes that each investor will hold a unique portfolio with its distinct array of betas instead of the identical market portfolio (Diacogiannis, 1986). The theory is potentially testable.

Rising oil prices have posed a significant threat to the global financial market, as both oil and financial markets experience high volatility due to contagion and shock transmission between the oil and financial markets during the turmoil period (Hooker 2002). According to the author, this consequence is a result of the fact that the stock market is forward-looking – the market may fall before an economic downturn and rise before a recovery. On the contrary, oil prices depend on demand and supply fundamentals, and they change contemporaneously with business cycles (Hooker 2002). The traditional argument on the mechanism through which oil price movements impact a country's economy (especially on the stock performance) can be traced to its impact on firms' cash flows. Economic theory suggests that any asset price should be determined by expected discounted cash flows (Brealey, Myers and Allen, 2006). Thus, any factor that could alter the expected discounted cash flows should significantly affect these asset prices.

2.3 Thesis Concepts

The concepts of the phenomenon in this thesis are the oil price, stock market and Canada, as presented in Figure 2.3 below.

Figure 2.3 Concepts of the Phenomenon

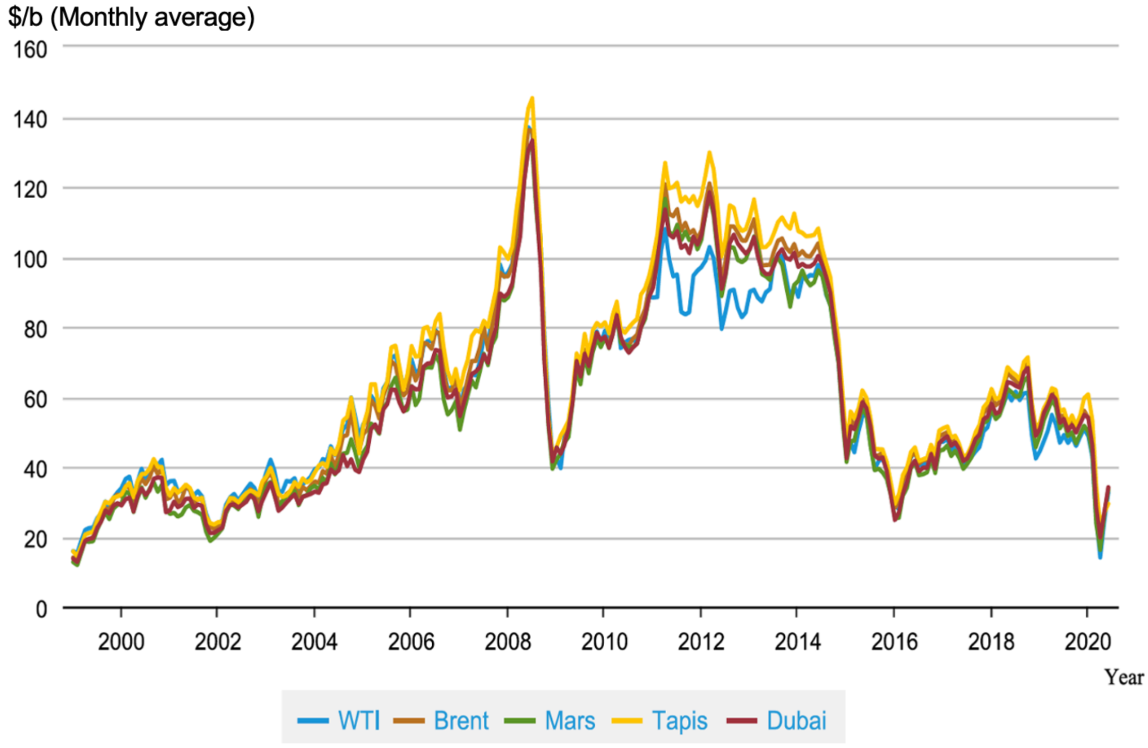


Source: Author's visual representations

2.3.1 Oil Price

Oil maintains a position as a lifeline in the world's economy, and oil price is one of the most unstable in the commodity markets based on its complex dynamics (Mokni, 2020). Oil is a non-renewable and strategic commodity vital to the growth of all economies (Pradhan, Arvin and Ghoshray 2015) and one of the essential commodities in the world (Tabak and Cajueiro 2007). Bountiful and affordable oil increased riches and living standards, and it is vital to sustaining fast-growing emerging economies in Asia, Latin America and Africa (McNally 2017). West Texas Intermediate (WTI) and Brent are the most critical benchmarks globally due to their low sulfur content and grades in the production of gasoline and diesel fuels. They serve as a reference price for sellers and buyers. Both grades are light, based on American Petroleum Institute (API) gravity, and sweet, based on a maximum of 0.5% sulphur content. OPEC use Brent as their pricing benchmark, and Brent has a slightly higher API gravity and is suitable for diesel.

Figure 2.4 Crude Oil Benchmark Prices



Source: Adapted from U.S. EIA (2020)

Historically and prior to 1973, oil prices and production were relatively stable, as few large U.S. oil companies referred to as the Seven Sisters controlled prices. Between the 1930s and 1960s, world oil prices were set by the Texas Railroad Commission. The development of a new regime in the global market for crude oil during the oil crisis of 1973/1974, whereby the control of oil price and production moved from the U.S. to the Organisation of the Petroleum Exporting Countries (OPEC) in the 1973 Yom Kippur War, made oil prices to subsequently fluctuate in response to the forces of demand and supply (Alquist, Kilian, and Vigfusson, 2013; Dvir and Rogoff, 2009). Thus, oil prices have always reacted like any other commodity prices within an economy, as shown within crude oil benchmark prices in Figure 2.4 above. An oil price shock is an unexpected element of a change in the price of oil, and its magnitude is obtained by comparing price expectations to subsequent outcomes. Consumers, policymakers, financial markets and economists view oil price expectations differently, and the expectation defines the shocks.

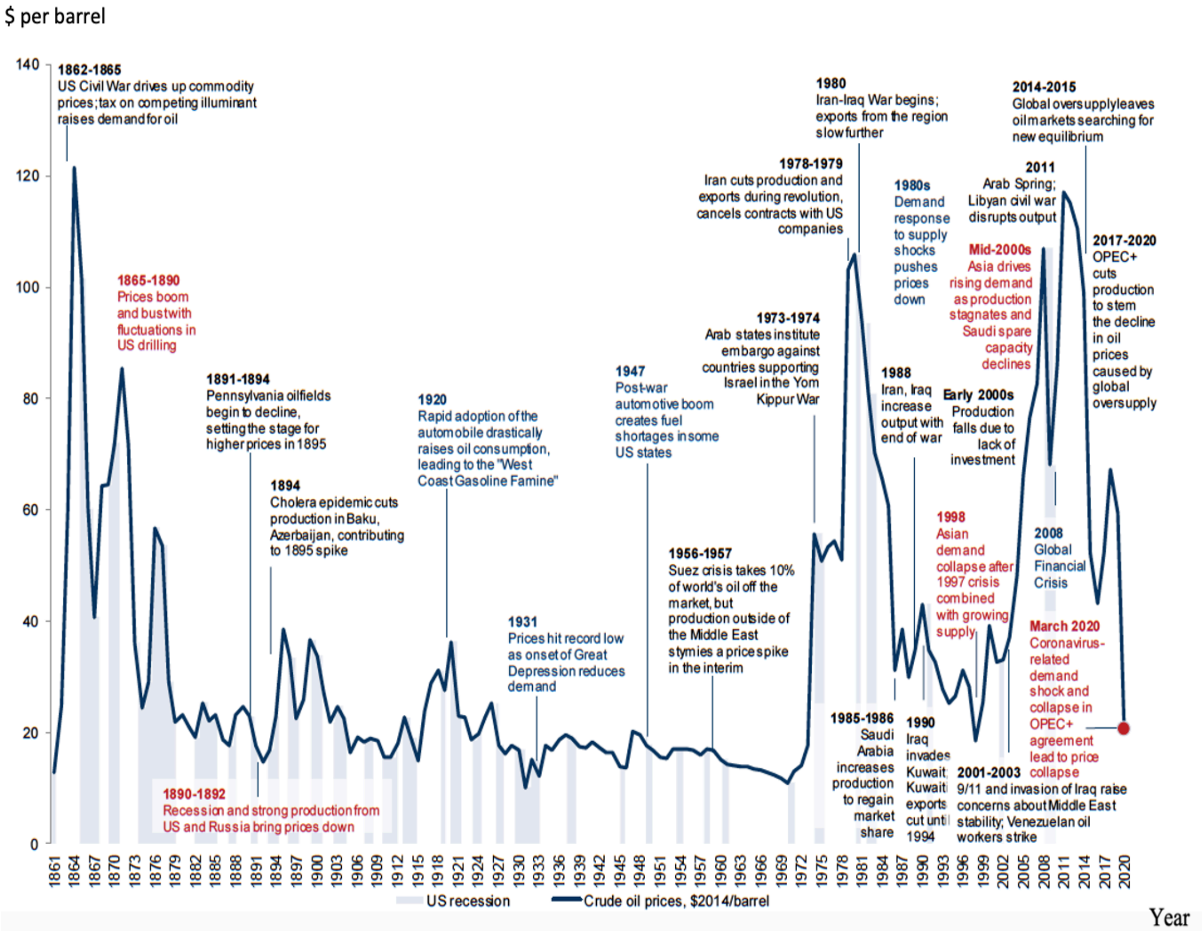
Oil price shocks can be due to events that have the potential to disrupt the flow of oil to the market. Such disruptions, usually referred to as system shocks, could include geopolitical, economic, or weather-related developments that could lead to uncertainty about future supply or demands, thus creating high volatility in oil prices. Moreover, oil production capacity and uses are relatively fixed in the short term. The covid-19 pandemic had a catastrophic impact on the global oil industry, with a decline in demand while supply remained at a high level. For the first time in history, oil prices recorded a slump to negative $37.63 per barrel on 20 April 2020. According to the U.S. EIA, several major oil price shocks occurred at the same time as supply disruptions triggered by political events, most notably the Iranian revolution and Iran–Iraq war in the late 1970s and early 1980s, the Arab Oil Embargo in 1973–74, Persian Gulf War in 1990 and Covid-19 in 2020. More recently, disruptions to supply (or curbs on the potential development of resources) from political events have been seen in Iran, Iraq, Libya, Nigeria, and Venezuela, as shown in Figure 1.1 above.

Since the seminal work of Hamilton (1983), the impact of crude oil price shocks on the economy has been a topic of great concern to economists as oil is classified as an essential commodity. He had concluded that all U.S. recessions but one since World War II were preceded by a lag of around three-fourths of a year by a dramatic increase in the price of crude petroleum. Although he agreed that oil shock did not cause the recessions, he affirmed that oil shock was a contributing factor to all but one of the U.S. recessions before 1972. Some researchers have, however, challenged this position using asymmetric or nonlinear methods. Baumeister and Peersman (2013) and Mork (1989) concluded that economic activity prevailed while the negative links between oil prices increased.

The fall in oil price recorded in 1986 did not result in an economic boost; hence the link between energy and the aggregate economy is quite complex (Bjørnland 2009). As shown in the history of crude oil prices with notable events (Figure 2.5) below, sudden volatility in oil prices is generally acknowledged to significantly impact economic activity and macroeconomic policy, according to Naifar and Al Dohaiman (2013). Thus, changing oil prices are perceived to impact real economic activity significantly, and the mechanism includes both supply and demand channels.

Furthermore, oil price volatility has an impact on oil-importing and oil-exporting countries. Naifar and Al Dohaiman (2013) further affirmed that high variation in oil prices makes oil a primary macroeconomic factor that generates unstable economic conditions and affects financial stability globally. Ferderer (1996) also affirmed that an increase in oil prices adversely affects economic conditions by increasing inflation and economic recession. He concluded that oil shocks have a more significant impact on real economic growth. The oil price boom from 2004 to 2008 inflicted great hardship on consumers and oil-dependent industries, triggering the Great Recessions. The bust recorded since 2014 led to unemployment and raised concern about financial sector stability. Crashing oil prices delayed the European Central Bank and Federal Reserve's plans to raise interest rates from late 2015 until early 2016 (McNally, 2017).

Figure 2.5 History of Crude Oil Prices



Source: Adapted from Goldman Sachs (2020)

2.3.2 Stock Market

The stock market is a common feature of economic growth. It is reputed to perform some necessary functions through which long-term funds of the major sector of the economy are mobilised and harnessed. This process promotes the growth and development of the economy. The stock market mobilises savings and allocates a large proportion of it to firms with relatively high prospects, as indicated by its rate of returns and level of risk. The security market is divided into two segments: the primary market (channel of funds created through the issuance of new securities for firms, public institutions, or governments, including initial public offers for new stock) and the secondary market (channel to trade previously issued securities and financial instruments like stocks, bonds, futures, and options). Similar to Bencivenga, Smith, and Starr (1999), Levine and Zervos (1996) argued that many profitable investments require a long-run capital commitment, and savers do not like to relinquish control of their savings for long periods. Liquid equity markets ease this tension by providing an asset to savers that they can quickly and inexpensively sell while firms have permanent access to capital raised through equity issues. Thus, stock market liquidity, the ability to trade equity easily, is essential for economic growth.

From all points of view, macroeconomic analysis places a central role in the capital market, as the market is usually understood as one where medium to long-term finance is raised. Economic theorists Harrod (Harrod, 1939) and Domar's model (Domar, 1946) and Duesenberry's cash flow theory (Duesenberry, 1958), among others, argued that the capital market serves as a catalyst for economic growth. The importance of the capital market stems from its intermediary role – the market offers platforms for long-term funds needed for development purposes. Thus, the impenitentness of an efficient capital market is to offer the required platform to prevent the economy from being starved of the required long-term fund for sustainable growth (Sule and Momoh 2009).

Several stock markets are operating in Canada. The main markets include the Toronto Stock Exchange, the leading equity market (TSX); the TMX Group Limited (TMX); and Aequitas Neo Exchange Inc. This thesis focuses on the Standard and Poor's (S&P)/TSX composite index, which accounts for 95% of the Canadian equity market and uses market capitalisation to track the performance of large companies. It is owned and operated by TMX Group Limited.

The origin of the TSX can be traced to 1852, just as some Toronto businessmen constitute a union of brokers. Prior to this period, the capital was raised in the London market. A resolution that facilitated the framework for the exchange of financial instruments was passed in 1861, and the 1878 Act of the Legislative Assembly of Ontario formally incorporated the TSX. The annual turnover volume of companies listed on the TSX rose from one million shares between 1900 to one billion by the mid-1900s. The TSX was shut down for a few months in 1914 because of World War I panic. The Great Depression of the 1930s did not impact Canada as the crisis engulfed U.S. firms. However, the TSX merged with the Standard Stock and Mining Exchange to sustain the crisis and maintain the TSX name. By 1980, annual trading volume increased to 3.3 billion shares and daily trading volume of $15 billion in 2000.

Trends in globalisation and the introduction of varieties of new instruments being traded have made the stock market complex. However, as the economy develops, more funds are needed to boost the rapid growth of all facets of the economy. Before the mid-1900s, the TSX experienced significant developments like tightening the 1958 disclosure requirements and launching the world's first computer-assisted trading system in 1977. About twenty years later, the TSX became the first exchange in North America to introduce decimal trading and opted for full electronic trading. The Black Monday crisis of 1987 erased about 11% of the total market value of TSX-listed companies, while U.S. stocks fell by 20%. During the period under review, the Canadian S&P/TSX reached the highest monthly average trading of 17433.40 in December 2020 and a record low of 6343.29 in March 2003.

2.3.3 Canada

Canada, by area, is the world's second-largest country, according to IBP (2019). Its economy has been characterised as a highly developed mixed economy with features of capitalism. While Canada's GDP per capita was $48,617.09 in 2020, worldwide classification in 2017 affirmed it as the tenth largest by nominal GDP and seventeenth-largest GDP by purchasing power parity valuation, with a GDP per capita of $44,773, nominal GDP at $1.640 trillion, and an expected GDP growth rate of 1.7%. Its growth rate in 2016 was more than eighteen times that of 1960, as GDP per capita was $2,294.6 in 1960 and $42,157.9 in 2016 (Chowdhury 2018). It is an open economy ranked as the world's fourth-largest oil producer after the U.S., Saudi Arabia and Russia. It provided nearly 4.96 million barrels per day (mb/d) of crude oil in 2017. Canada is a major supplier of crude oil to international markets, with 97% of its crude oil exported to the U.S. and 3% to Europe and Asia in 2014 (U.S. EIA 2020).

According to Chowdhury (2018), the country's main exports are energy products (17%), motor vehicles and parts (17%), consumer goods (13%), and metal and non-metallic mineral products (12%). Components of energy products are crude oil (44%), natural gas (34%), hydro (7%), coal (7%), and others (8%). Canada has the world's third-largest proven oil reserves after Saudi Arabia and Venezuela, with 167.7 billion barrels, of which 162 billion are in the form of oil sands (Natural Resources Canada, 2020).

Canada is ranked as the best country for business among the G20 due to its stable economy and polity, solid institutional foundations, independent judiciary services, and high regulatory efficiency (IBP 2019). The government expenditure was focused on the redistribution of income by increased spending and tax adjustments. It has increased bilateral trade and economic interaction with the U.S. based on the 1989 Canada-U.S. Free Trade Agreement and the North America Free Trade Agreement of 1994. It is currently the largest foreign energy supplier to the U.S. Due to its strong economic connections with the U.S., Canada is likely to be more influenced by events in the U.S. than the rest of the world. Bank of Canada's monetary policy report of July 2018 affirmed that U.S. tariffs on steel and aluminium products had reduced the country's export volume by about 0.6%.

Recent low oil prices will undoubtedly impact the country's macroeconomic outlook. The Bank of Canada is mandated to promote the economic and financial well-being of the country through its monetary policies, which take about six to eight quarters to work their way through the economy. These policies impact the economy's total demand for goods and services through the Bank's influence on the interest rate, the exchange rate, and domestic asset prices. To achieve the country's priority of maintaining a moderate level of inflation, the Bank, in its financial stability role, has adopted deliberate policies such as an inflation-control target by maintaining a rate of between 1% and 3%, plus the adoption of quantitative and credit easing. Inflation is measured by the consumer price index (CPI), which is an indicator of changes in the comparison of the cost of a fixed basket of goods and services purchased by consumers over a period. The interest rate in Canada averaged 1.90% from 2003 to 2020. It recorded an all-time high of 4.75% between July 2007 and November 2007 and a record low of 0.5% between April 2009 and May 2010 in the first instance and between March 2020 to December 2020. Export growth increases with higher oil prices.

Alzyoud, Wang and Basso (2018) analysed the impact of oil prices on the exchange rate and stock market returns in Canada using the vector error correction model on monthly data from 1986 to 2015 and concluded that there was no cointegration among the three variables: oil price, exchange rate and stock market returns. They further affirmed that oil price and exchange rate, including their variations, have a significant and positive impact on Canadian stock market returns.

Burbidge and Harrison (1984) used the vector autoregressive (VAR) model to examine the impact of oil price increases in Canada using monthly data from January 1961 to June 1982. They concluded that the impact of oil price shocks on the price level is substantial, while the impact of oil price shocks on industrial production is limited. Mork, Olsen and Mysen (1994) examined the correlation between oil price movements and GDP fluctuations in Canada and six other countries. They conclude that the correlation between GDP and the oil price increase is significantly negative, and the correlation between GDP and oil price decrease is significantly positive.

2.4 Empirical Literature and Hypotheses Development

This section provides a review of previous works carried out in oil price movement and stock market performance. Other subsections review literature related to oil prices and sectors of the stock market; macroeconomic variables, oil price shocks and stock market performance; business cycle, oil price and stock market nexus; and oil prices and stock market performance in net oil-importing and net oil-exporting countries. The final subsection provides a summary of the literature and identified gaps.

Oil Prices and The Economy

Hamilton (1983) found a negative relationship between oil price shocks and real activity. `He further affirmed that between World War II and 1972, all but one of the U.S. recessions were preceded by an increase in the price of crude oil. Hulten, Robertson and Wykoff (1989) reaffirmed Hamilton's position while they examined the link between energy price increase, U.S. capital stock, and reduction in the growth rate of output per worker. Using structural dynamic factor models and VAR techniques to study the effects of different real commodity price shocks on a set of macro-variables in Canada, Charnavoki and Dolado (2014) observed that negative commodity-specific shocks and positive global demand achieved higher commodity prices. However, only negative commodity-specific shock led to the expenditure effects and Dutch disease. Alternatively, positive global demand shocks stimulated real output and real spending in the Canadian industry. Donayre and Wilmot (2016) used a threshold vector autoregression (TVAR) to examine the asymmetric effect of oil price shocks on the Canadian economy. They argued that asymmetry was significant during recessions but not during expansions. They further observed that the decline in inflation rates due to the negative impact of oil price shocks was greater than the increase in inflation rates after the positive oil price shocks, particularly during periods of low output growth.

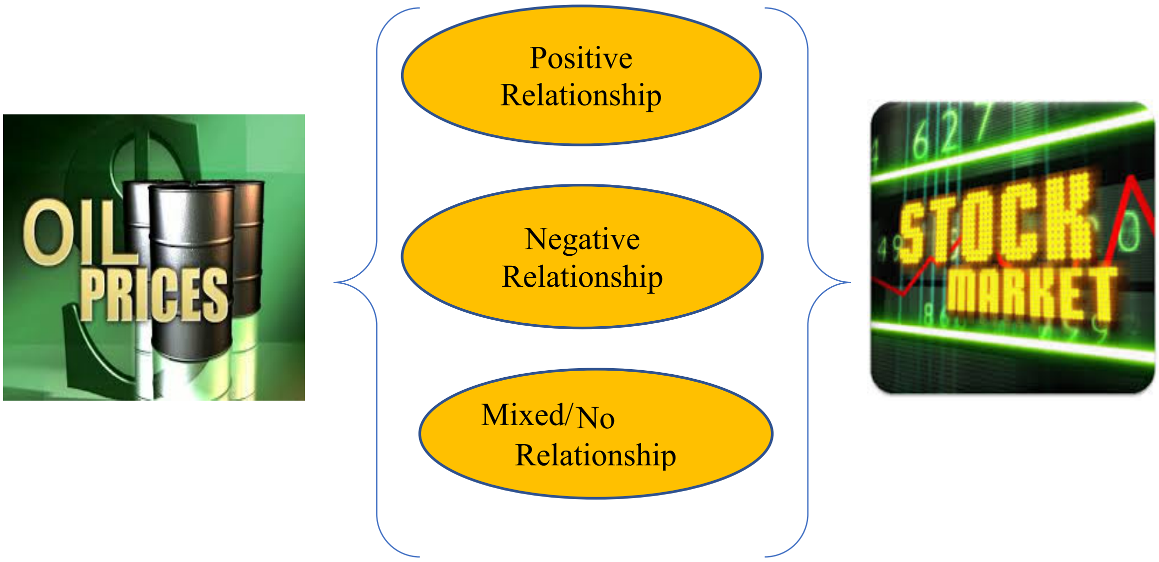
According to Sehgal and Kapur (2012), many modern activities (manufacturing or transportation) grind to a halt when the supply of oil stops. This explains why changes in crude oil prices have drawn the attention of academicians and energy market participants. Separate studies noted that oil price fluctuations affect the world economy in many different and significant ways (Rafiq, Salim and Bloch 2009; Lee, Lee and Ratti 2001). For instance, soaring crude oil prices increase the production costs of goods and services and the costs of transportation. Thus, consumers, governments and practitioners are greatly concerned about the volatility of crude oil prices and its possible negative economic effects, such as those on business cycles (Mork 1994); macroeconomics (Rafiq, Salim and Bloch 2009; Lee, Lee and Ratti 2001); and inflation (Hamilton and Herrera 2004; Hooker 2002).

Tang, Wu and Zhang (2010) investigated how and the extent of oil price shocks on the Chinese economy using a structural vector auto-regression model on variables like WTI spot crude price, consumer/producer price index, the real rate of return for industrial companies, real interest rate, real investment towards industry, and real industrial added value between February 1998 to August 2008. They concluded that an increase in oil prices negatively affects investment and output, and they further posited that an oil price increase affects the inflation rate and interest rate positively.

2.4.1 Oil Prices and the Stock Market

Oil price changes are often considered essential in explaining or understanding stock price fluctuations and stock market returns, although the direction of the relationship remains ambiguous.

Figure 2.6 Conceptual Framework of Oil Prices and Stock Market



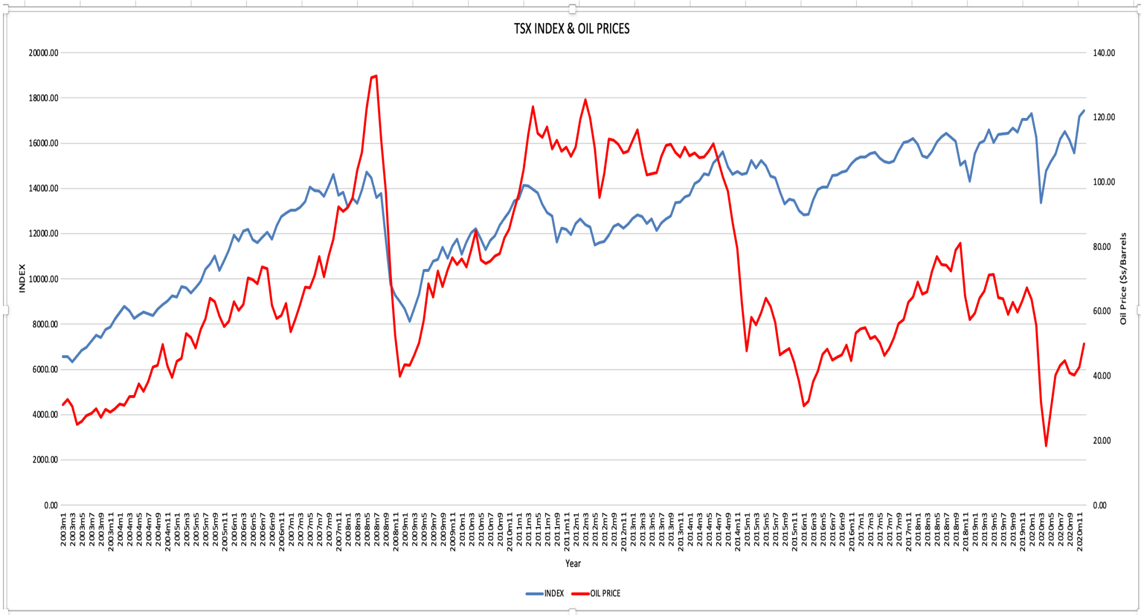
Source: Author's visual representations

Research results on the relationship between oil prices and stock market performance can be classified into three broad findings, as shown in Figure 2.6 above.

- A representative sample suggested that oil price shocks have a positive relationship with stock market performance (Mokni and Youssef, 2019; Tursoy and Faisal, 2018; Alzyoud, Wang and Basso, 2018; Silvapulle, Smyth, Zhang and French, 2017; Soyemi, Akingunola and Ogebe, 2017; Li, Cheng and Yang, 2017; Donayre and Wilmot, 2016; Gupta, 2016; Ghosh and Kanjilal, 2016; Chen and Lu, 2015; Narayan and Narayan, 2010).
- Some research studies, however, affirmed that there is a negative relationship between oil price shocks and stock market performance (Hamdi *et al.*, 2019; Hu *et al.*, 2018; Tursoy and Faisal, 2018; An *et al.*, 2018; Joo and Park, 2017; Rafailidis and Katrakilidis, 2014; Cunado and Perez de Gracia, 2014; Basher, Haug and Sadorsky, 2012; Jammazi and Aloui, 2012; Miller and Ratti, 2009).
- Contrary to the two broad findings above, some other research studies concluded that changes in oil prices have mixed or no impact on stock market returns (Hatemi-J, Shayeb, and Roca, 2017; Mohaddes and Pesaran, 2017; Tsai, 2015; Reboredo and Rivero-Castro, 2014; Mollick and Assefa, 2013; Jammazi and Aloui, 2012; Masih, Peters and De Mello, 2011; Fayyad and Daly, 2011; Arouri and Nguyen, 2010; Apergis and Miller, 2009).

Figure 2.7 S&P TSX Index and Oil Prices

January 2003 to December 2020 (Monthly)



Source: Author's visual representations from Appendix A.2

Figure 2.7 above illustrates the dynamic nature of Brent crude oil price and the corresponding movement of the S&P/TSX Index between 2003 and 2020, exhibiting no stable pattern. The pattern exhibits positive, negative or no correlation at different points. Over the years, some perspectives explained the various factors that affect stock market performance. In recent times, however, an emphasis has been placed on the importance of oil price movement on stock performance. The reason for such attention on oil is due to its significant importance for most of the economies in the world (Nandha and Faff, 2008). Oil serves as a vital input in the production of many other commodities. Households and industries in any society have extensive use for goods and services that contain oil and its elements.

Empirical works on the nexus between oil prices and the stock market started with the pioneer studies of Chen *et al*. (1986) and Jones and Kaul (1996). These research works were the first to find that oil price shocks constitute a risk factor for stock returns. After that, other studies detailing the link between oil price shocks and stock market returns emerged. For instance, Hamilton (1983) found a negative relationship between oil price shocks and real activity. `He further affirmed that between World War II and 1972, all but one of the U.S. recessions were preceded by an increase in the price of crude oil. Hulten, Robertson and Wykoff (1989) reaffirmed Hamilton's position while examining the link between energy price increase, U.S. capital stock, and reduction in the growth rate of output per worker.

Oil prices are often mentioned as an important economic factor, even though there is no reason to believe that innovations in oil prices should have the same degree of influence as interest rates or industrial production (Chen, Roll and Ross 1986). They further claimed that it is often argued that oil prices must be included in any list of the systematic factors that influence stock market returns and pricing and that the oil price jump in 1973 presaged a structural shift in the macro variables. Studies by Balcilar, Gupta and Wohar (2017); Lin, Fang and Cheng (2014); Naifar and Dohaiman (2013); Hong, Torous and Valkanov (2007); and Kling (1985) suggest that there is a relationship between oil prices and stock market returns. They examined the independent influence of oil prices on asset pricing and returns and concluded that, in contrast to Kling (1985), oil price changes do not affect asset prices. Hence, economists often consider changes in crude oil prices as an important factor in understanding stock price fluctuation.

Theoretically, the channels through which oil prices impact stock market performance include fiscal – household income due to revenue from the oil used to finance government spending as a net oil exporter; monetary - discount rate through inflation and interest rate; output – aggregate output through income and production effect; stock valuation - firm's expected cash flow; and uncertainty in the real economy due to oil price volatility. A wealth of literature proposed channels through which changes in oil price may directly impact stock performance as cash flow.

According to Huang, Masulis and Stoll (1996), the oil price could impact stock prices and returns directly through its effects on cash flows or indirectly through macroeconomic values that could impact the discounted cash flow or information that affects the cash flows. This reaction applies since company share prices equal the expected present value of discounted future cash flows at any given point. They further affirmed that (i) investment - high energy costs could either increase the production cost or reduce consumer spending; (ii) interest rates – when interest rates are high, bonds become more attractive than stocks. (iii) Due to high oil prices, central banks increase interest rates to reduce inflation during inflationary periods. This move subsequently leads to a fall in the price of stocks; (iv) exchange rate – provides an indirect link between oil prices and stock prices. Oil is usually priced in U.S. dollars (USD). A change in U.S. dollars relative to other currencies automatically impacts oil prices, as oil becomes more or less expensive depending on the exchange rate.

While examining stock market efficiency, Jones and Kaul (1996) focused on the extent to which stock prices change in response to oil price changes by using a cash-flow/DVM (i.e., whether changes in stock prices reflect current and future real cash flows). They concluded that oil prices could predict stock returns and output on their own. They further affirmed that U.S. and Canadian stock prices react to oil price shocks, while those of the UK and Japan were inconclusive. They reported a stable and negative relationship between oil price changes and aggregate stock returns, i.e., oil prices affect aggregate stock market returns. Kilian and Park (2009) expanded the above by viewing the effect of oil price on U.S. stock return from the driving force for the change in oil price in relating U.S. stock returns to measures of demand and supply shocks in the global crude oil market.

However, this study maintained that some research results differ from Chen, Roll and Ross (1986). Huang, Masulis and Stoll (1996) used a VAR approach to investigate the efficiency of the relationship between oil futures and U.S. stock (S&P 500). Nymex returns on daily data from 09 October 1979 to 16 March 1990 found no negative relationship between stock returns and changes in the price of oil futures but observed a significant link between stock returns of selected U.S. oil companies and oil prices. They provided evidence in favour of causality effects from oil futures prices to stock prices. Although it was affirmed that oil futures do not have much impact on broad-based stock return indices, oil futures do lead to some individual oil company stock returns. In addition, they affirmed that changes in oil prices have little immediate effect on the general economy compared to the immediate impact on stock prices. Kaul and Seyhun (1990) and Sadorsky (1999) reported a negative effect of oil price volatility on stock prices. Sadorsky applied an unrestricted VAR with GARCH effects to American monthly data and showed a significant relationship between oil price changes and aggregate stock returns.

The decline in U.S. stock prices in 1974 cannot be explained by the 1973–1974 oil price increase, according to Wei (2003). He further analysed the effect of oil price shocks on stock return in Norway since 1980 using the VAR model and affirmed that monetary policy is an essential driving force behind stock prices. Bittlingmayer (2005) also affirmed that oil price changes associated with war risk and those associated with other causes exhibit an asymmetric effect on the behaviour of stock prices.

Kilian and Park (2009) examined the impact of oil price shocks on the U.S. stock market. They related U.S. stock returns to measures of demand and supply shocks in the global crude oil market while building on a structural decomposition of fluctuations in the real price of oil. They used a structural vector autoregression (SVAR) model based on monthly data from January 1973 to December 2006. Variables such as world crude oil production, the real price of crude oil imported by the U.S. (an indicator of real global activity) and some selected U.S. stock markets were employed. They concluded that economic forces that drive crude oil prices also drive stock prices and that different oil price shocks impact the stock market differently. They further posit three oil price shocks: aggregate demand, precautionary demand, and supply-side shocks. Their study affirmed that stock market returns do not respond to supply-side oil price shocks. They observed positive or negative impacts on stock market returns during aggregate and precautionary demand oil price shocks. In summary, the findings of their study have complemented and reinforced Kilian's (2009) evidence on the response of U.S. real GDP growth and consumer price inflation to demand and supply shocks in the crude oil market.

An oil price increase or decrease could affect the stock market due to the uncertainty that such an increase or decrease could create in the financial world, irrespective of whether the demand or supply-side causes an oil shock. According to Kilian (2009), precautionary demand shocks occur due to the uncertainty of future oil supply based on the expectations of future oil demand. Aggregate demand-side shocks occur due to the global business cycle's fluctuations, and supply-side shocks are exogenous shocks that occur due to a reduction in crude oil availability. He concluded that the stock market could respond positively to demand-side oil price shock and negatively if the shock originates from the supply side.

Tang, Wu and Zhang (2010) investigated how and the extent of oil price shocks on the Chinese economy using a structural vector auto-regression model on variables like WTI spot crude price, consumer/producer price index, the real rate of return for industrial companies, real interest rate, real investment towards industry, and real industrial added value between February 1998 to August 2008. They concluded that an increase in oil prices negatively affects investment and output. They further posited that oil price increase positively affects the inflation rate and interest rate. Alzyoud, Wang and Basso (2018) analysed the impact of oil prices on the exchange rate and stock market returns in Canada using the vector error correction model on monthly data from 1986 to 2015. They concluded that there was no cointegration among the three variables: oil price, exchange rate and stock market returns. Using the regression analysis, they further affirmed that oil price and exchange rate, including their variations, significantly and positively impact the Canadian stock market returns.

Masih, Peters and De Mello (2011) examined the importance of oil price fluctuations/volatility and stock market performance in South Korea. They utilised VAR, VECM and Markov switching models to capture the stochastic properties and long-run dynamics between the macro economy, the stock markets, monetary policy instruments, and the oil price movements. They found no evidence of a long-run relationship between the variables and the system despite the fact that oil price movement significantly affects the stock market.

According to Sehgal and Kapur (2012), many modern activities such as manufacturing and transportation, grind to a halt when the supply of oil stops. This explains why changes in crude oil prices have drawn the attention of academicians and energy market participants. Separate studies noted that oil price fluctuations affect the world economy in many different and significant ways (Rafiq, Salim and Bloch 2009; Lee, Lee and Ratti 2001). For instance, soaring crude oil prices increase the production costs of goods and services and transportation costs. Thus, consumers, governments and practitioners are greatly concerned about the volatility of crude oil prices and its possible negative economic effects, such as those on business cycles (Mork 1994); macroeconomics (Rafiq, Salim and Bloch 2009; Lee, Lee and Ratti 2001); and inflation (Hamilton and Herrera 2004; Hooker 2002).

Sehgal and Kapur (2012) used market index data for fifteen sample countries to assess the relationship between oil price shocks and stock market performance. The countries were classified into four groups based on their economic strength and oil-exporting/-importing status to verify if the testable relationship varies across different economic settings. Using daily data from 1 January 1993 to 31 March 2009, the study employed the generalised least squares (GLS) procedure. The researchers concluded that there seemed to be no information leakage and exploitation of that information for any of the sampled markets. They further concluded that it is predominantly the fast-growing Asian emerging economies with high oil consumption levels that are responsive to oil price shocks. Strong positive stock market returns in these economies, irrespective of the direction of oil price changes, probably highlight the bullish nature of these markets and the investors therein. The positive market exuberance seems to be linked to the high growth story, and hence, oil price changes do not seem to be dampening investor optimism in these emerging markets.

Oil prices are believed to correlate negatively with the financial markets, indicating that stock prices decrease as oil prices increase (Naifar and Al Dohaiman, 2013). With an increase in oil prices, many firms must spend more money to manage their activities due to increased production costs. This consequence is because firms ship their products by land, air, or sea, and where oil is a significant factor in transportation costs, such firms encounter increased production costs. This high cost of production could reduce the company's profit and the dividends it pays to shareholders, meaning the company's stock price may drop.

Fowowe (2013) investigated the relationship between oil prices and returns on the Nigerian Stock Exchange. Daily data from 12 December 2001 to 31 August 2011 on stock return proxies by the Market Index of the Nigerian Stock Exchange (NSE All-Share Index) and oil prices were examined. He employed Chan and Maheu’s (2002) GARCH-ARJI model. The empirical results show a negative but insignificant effect of oil prices on stock returns in Nigeria. This outcome is similar to results found in other studies (Arouri, Lahiani and Nguyen 2011; Hammoudeh and Choi 2006). Possible explanations for this result could be because the banking sector dominates the stock exchange and there are too few oil-related firms to warrant a channelling of high oil prices to the stock market, or because of the high transactions costs on the stock exchange, which discourages investment, or because of low liquidity on the stock exchange.

Lin, Fang and Cheng (2014) investigated the relationship between oil price shocks and mainland China's stock market. The study utilised monthly data from January 1997 through December 2008. Variables observed include (i) the rate of change in global oil production, (ii) the rate of change in global real (economic) activity, (iii) the rate of change in China's real imported oil price, and (iv) China's stock index return. Econometric techniques such as the structural VAR and Impulse Response Analysis/Variance Decomposition were used. The study found that oil price shocks on weighted Shanghai and Shenzhen stock returns (CNR) have mixed effects. This outcome contrasts the traditional view that higher oil prices necessarily cause lower stock prices. The study found that only an oil-specific demand (OSD) shock has significant (and positive) effects on China's stock returns.

The above findings of Lin, Fang and Cheng (2014) contrast with those who found that the OSD shock is driven by the precautionary demand for crude oil, which negatively affects the stock market (Kilian 2009; Kilian and Park 2009). One probable reason for the positive effect on China's stock market is that the positive expectation effect of its rapid economic growth outweighs the negative effect of the precautionary demand-driven effect. Thus, the effect of an OSD shock on the H-shares index (Hong Kong) is insignificant. On both the CNR and proxy China stock return (HKR), the study found that the effects of global supply shock (GOP) and global demand shock (GRA) are not significant. Again, this finding contrasts in part with that of Kilian (2009) and Kilian and Park (2009), as they had concluded that only global demand shocks had statistically significant (and positive) effects on the U.S. stock market.

Similarly, Cunado and Perez de Gracia (2014) examined the impact of oil price shocks on stock market returns for twelve oil-importing European economies (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Spain, Portugal, and the U.K.). The study employed VAR and vector error correction models (VECM) on monthly data from February 1973 to December 2011. The study constructed an alternative oil price shock specification that considers world oil production and world oil prices to disentangle oil supply and oil demand shocks. The study found that the response of the European real stock returns to an oil price shock may differ significantly depending on the underlying causes of the oil price change. The results suggest a negative and significant impact of oil price changes on most European stock market returns. Furthermore, it was found that oil supply shocks mostly drive stock market returns.

Using structural dynamic factor models and VAR techniques to study the effects of different real commodity price shocks on a set of macro-variables in Canada, Charnavoki and Dolado (2014) observed that negative commodity-specific shocks and positive global demand achieved higher commodity prices. However, only negative commodity-specific shock led to the expenditure effects and Dutch disease. Alternatively, positive global demand shocks stimulated real output and real spending in the Canadian industry.

Kang, Ratti and Yoon (2015) examined how structural oil price shocks in the U.S. affect stock returns and volatility. The study utilised daily data on volatility and return to construct covariance volatility and return at monthly frequency. The normalised squared return was used to proxy daily volatility, while the stochastic volatility model was used to determine conditional volatility. The study found that positive shocks to oil demands (aggregate and market-specific) negatively influence the covariance of volatility and return. On the other hand, oil supply disruption is accompanied by positive covariance of stock volatility and returns.

Donayre and Wilmot (2016) used a threshold vector autoregression (TVAR) to examine the asymmetric effect of oil price shocks on the Canadian economy. They argued that asymmetry was significant during recessions but not during expansions. They further observed that the decline in inflation rates due to the negative impact of oil price shocks was more significant than the increase in inflation rates after the positive oil price shocks, particularly during periods of low output growth.

Bastianin, Conti and Manera (2016) examined the impact of oil price shocks on stock market volatility in G7 countries (Canada, Germany, France, Italy, the UK, Japan and the U.S.) utilised monthly observations between February 1973 and January 2015. The study ascertained the underlying causes of oil price shocks and examined the impacts of oil supply-side and demand-side shocks on stock volatility. The study used reduced-form VAR and found that stock market returns do not respond to supply-side shocks in oil prices. However, demand-side shocks have a substantial impact on stock volatility in the G7 stock markets.

Joo and Park (2017) examined the relationship between oil prices (West Texas Intermediate and Dubai crude oil prices) and the U.S., Japan, Korean and Hong Kong stock market indexes using the Vector Autoregression-Dynamic Conditional Correlation-Bivariate Generalised Autoregressive Conditional Heteroscedasticity (VAR-DCC-BGARCH)[2]-in-Mean model. They concluded that oil price uncertainty negatively affects stock returns significantly.

Liu *et al*. (2017) investigated volatility spillovers between oil price shocks and stock market returns in the U.S. and Russia. The study gathered monthly data on WTI crude oil prices, the MICEX index (Russia) and the S&P 500 (U.S.) index between Jan. 2003 and Dec. 2014. Wavelet-based GARCH–BEKK (Baba-Engle-Kraft-Kroner) method was used as a technique for analysing the spillover features. The observations were grouped into three

[2] Multivariate GARCH model that is parsimonious and flexible.

sub-periods, pre-crisis, crisis and post-crisis periods. The study found that spillovers differ across wavelet scales in terms of direction and strength. In sum, the study found that linkages between the oil and stock market in the U.S. are dwindling in the long-run, and the linkage between oil and stock market returns in Russia is closing in all time scales. This conclusion implies that the U.S. and Russian stock indices indicated an opposite trend with falling oil prices in the post-crisis period.

According to Coronado, Jiménez-Rodríguez and Rojas (2018), oil and stock prices are closely related. The interactive link between oil prices and stock markets in South Asian countries (Bangladesh, India, Pakistan and Sri Lanka) was examined by Alamgir and Amin (2021). They used a nonlinear Panel autoregressive distributed lag ARDL model on monthly data from January 1997 to May 2018. They conclude that both negative and positive oil price changes tend to impact stock prices in the long-run significantly. They further affirmed that the South Asian countries examined do not follow the Efficient Market Hypothesis (EMH) as higher oil prices stimulate stock prices. Similarly, Bani and Ramli (2019) used Auto-Regressive Distributed Lag (ARDL) model to estimate the short-run and long-run relationship between crude oil prices and Malaysia indices on monthly data from 2007-2016. Their study concludes that there is a negative and significant long-run relationship between oil prices and the stock indices examined and that crude oil prices are cointegrated with both indices.

In a recent study, Ahmed and Huo (2020) investigated the interactions between the commodity market, global oil price and the Chinese stock market. The study used a trivariate VAR-BEKK-GARCH model and found a significant and one causality running from the oil market to the Chinese stock market. This upshot suggests a significant dependence of the stock market on the global oil market. Other findings from the study indicate a strong unidirectional returns interaction from the stock market in China and the global oil market to key indicators in the Chinese commodity market. In particular, substantial return causation runs from the Chinese stock market to copper/aluminium futures and from the global oil market to copper, silver, and aluminium markets - however, no causation between oil shocks and the gold market, suggesting the safe-haven role of gold. The study also found a bidirectional shock between stock markets and oil price shocks; and that the Chinese stock market reacted to volatility spillovers from the oil market. For the commodity market, significant volatility spillovers and unidirectional shock run from the stock market and oil market to the commodity market; no spillover effects from a commodity market to either the oil market or the stock market, indicating potential benefits from diversification of the Chinese commodity market.

Salisu and Gupta (2020) investigated how the stock market responded to oil price shocks in BRICS countries (India, Brazil, China, Russia, and South Africa). They employed a variant of Generalised Autoregressive Conditional Heteroskedasticity (GARCH), Mixed Data Sampling (MIDAS). Oil price shocks were divided into four variants: shocks from economic activity, oil consumption, oil supply and oil inventory. The study found that stock market volatility in BRICS countries responds to oil shocks positively and negatively, depending on the economic size, oil consumption profile, oil production, financial system and regulation efficiency, and the market share distribution across firms.

Sharif, Aloui and Yarovaya (2020) analysed the interaction between an outbreak of disease (Covid-19 pandemic), oil price shocks and stock market returns in the U.S. The study also attempted to provide insights into how economic policy uncertainty and geopolitical risk affect stock market volatility. Thus, daily data of the number of confirmed Covid-19 cases in the U.S.), oil price (proxied by WTI benchmark crude oil price), U.S.-GPR (geopolitical risk index), U.S.-EPU (news-based index) and Dow Jones 30 index between 21 January 2020 and 30 March 2020 were gathered. The wavelet-based Granger causality and coherence wavelet method was employed. The study found that Covid-19 impacted more U.S. geopolitical risk than economic uncertainty. This uncertainty is occasioned by the reactions of the Federal Reserve to the pandemic. Furthermore, the study found that the oil slump has the highest impact on the stock market returns in the U.S. when compared to the Covid-19 pandemic, GPR and EPU. Another finding is that the Covid-19 outbreak negatively affects oil prices through its impact on travel restrictions.

Escobari and Sharma (2020) ascertained how stock returns responded asymmetrically to movements in oil prices. The study utilises monthly observations gathered between January 1974 and October 2016. The stock price was proxied by S&P 500 index. A structural VAR model using a first-order Markov switching process was employed. The study found strong asymmetries suggesting that oil price shocks drive economic recessions. Lin and Su (2020) explored the relationship between oil price movements and stock markets. The study employed a scientometric analysis using 1342 empirical publications. The study confirmed the trends of the stock market and oil price interaction.

Kose and Ünal (2020) evaluated the impact of shocks in oil prices on the stock markets of the Caspian Basin (Kazakhstan, Iran, and Russia). Monthly observations of the stock market index, oil price, industrial production, inflation, and exchange rates were gathered from March 2005 to June 2018. The data were analysed using the structural vector autoregression (SVAR) model. It was found that negative shocks in oil prices directly influence stock markets in the sampled countries. This impact was found to be more significant than that of positive oil price shocks, and it constitutes the largest source of variations in stock prices.

Benlagha (2020) examined how the Qatar stock market reacted to the oil price crisis. Monthly observations on oil prices and stock market returns were gathered between August 1998 and June 2018. The data were decomposed into pre-and post-oil price shocks and the 2017 political crisis among the Qatari blockade (Gulf Cooperation Council members). These data were analysed using Copula Statistical Technique. The study found significant correlations between stock markets in the sampled countries, oil prices, and the blockade crisis. The study stressed that the degree of correlation was time-varying and differed among member countries. Other findings from the study indicated that the global financial crisis in 2008 had a more significant effect on stock prices in those countries than the political crisis and oil price shocks.

From the above review, it is explicit that oil price shocks could impact stock market returns or otherwise. Because of this double-edged impact of oil prices, the study tests the hypothesis that *oil price shocks do not impact stock market performance*.

2.4.2 Stock Market Sectors and Oil Prices

Some research work has been done on the effect of oil price shocks on the performance of the stock market's economic sectors as the use of aggregate stock data masks heterogeneity. The U.S. stock market anticipated oil price changes, especially after 1972 (the first oil price crisis). However, the aggregate stock indices of matured markets tend to be more diversified. Sadorsky (2001) concluded that stock returns of the Canadian oil and gas index are positively sensitive to oil price increases while using a multifactor framework to analyse the determinants of Canadian oil and gas stock returns. Using the monthly crude oil price index combined with S&P's data, Kling (1985) concluded that crude oil price increases are associated with stock market declines. He also reaffirmed that crude oil prices had a significant lagging effect on the stock return of selected industries like air transport, automobile, and domestic oil industries. This outcome is because current and past crude oil prices contained valuable information for predicting future values of the stock prices that were not contained in the current or past values of the stock prices.

Hammoudeh and Li (2005) exhibited oil price growth being priced in the returns demanded by investors in U.S. oil and transportation industries. They found similar evidence concerning the stock markets in Mexico and Norway. Through a sector-based analysis of companies listed on the London Stock Exchange, El-Sharif *et al*. (2005) investigated the relationship between oil prices and stock returns. Their empirical findings displayed that a significant positive association between oil prices and oil-related stock returns is present. They further confirm that the price of crude oil affects equity values positively in the oil and gas sector in the UK. However, the strength of such an association varies extensively across sectors, reflecting the need for macroeconomic and political factors to be considered in the analysis, an argument similarly supported by Faff and Brailsford (1999). This arguement was later reaffirmed by Nandha and Faff (2008), as they examined the extent to which oil prices influence various global equity prices. They concluded that an oil price increase negatively impacts equity returns for all sectors except the mining and oil and gas sectors. Boyer and Filion (2007) observed a positive association between energy stock returns and oil and gas price appreciation.

Kilian and Park's (2009) study of the U.S. stock market also affirmed that the impact of oil price shocks on industry-level stock returns is driven by shifts in the final demand for goods and services and not by domestic cost or productivity shocks. Their study further concludes that automobile and retail sectors respond negatively and significantly to precautionary demand shocks; the gold, silver and mining industries respond positively to demand-specific oil price shocks, whereas the petroleum and natural gas sector remains largely unaffected.

Arouri and Nguyen (2010) examined the linkage between oil prices and stock market performance at the aggregate and sector levels using the Dow Jones (DJ) Stoxx 600 and twelve European sectors (automobile and parts, financials, food and beverages, oil and gas, health care, industrials, basic materials, personal and household goods, consumer services, technology, telecommunications, and utilities. They carried out the Granger causality test and used the quasi-maximum likelihood (QML) method on weekly data from 01 January 1998 to 13 November 2008. They observed a significant relationship between most sector returns in Europe and oil prices, although they differ greatly depending on the activity sector. The nature and sensitivity of the reaction of stock returns to oil price shocks change considerably across sectors.

To investigate the relationship between U.S. industry sector stock returns and oil price changes, Elyasiani, Mansur and Odusami (2011) examined returns of thirteen U.S. industries using four significant types of industries: oil-related (oil extraction, petroleum refinery); oil-substitute (coal, electric and gas utility); financial (depository institutions and insurance); and oil-user (building, chemical, plastic, metal, machinery, transportation equipment, air transportation). They modelled an autoregressive GARCH technique on daily Nymex from 11 December 1998 to 29 December 2006. They found evidence that oil price movements may directly affect the profitability of the oil-substitute and oil-related industries. However, the effects on oil-consuming industries are more likely to be impacted via indirect channels, including asset substitution and oil return volatility. They further affirmed that oil price fluctuations constitute a systematic asset price risk at the sector level because 69% of the sectors analysed show statistically significant relationships between oil futures return distribution and excess industry return. They finally concluded that the effects of fluctuations in oil futures returns are dissimilar across sectors because the level of oil futures return affects more sectors than the volatility of oil price return for the oil-substitute and oil-related industries. At the same time, the reverse holds for the oil-user sectors. On the other hand, financial sectors are affected by the changes in oil futures return and the volatility of oil price return.

Employing the quasi-maximum likelihood (QML) GARCH model, Arouri (2011) investigated the short-term links between oil prices and sector stock returns in Europe. He used weekly stock market indices from 1 January 1998 to 30 June 2010 for Brent oil crude price, Dow Jones Stoxx 600, and twelve European sector indices, namely automobile and parts, financials, food and beverage, oil and gas, health care, industrials, basic materials, personal and household goods, consumer services, technology, telecommunications, and utilities. He concluded that changes in oil prices affect stock prices asymmetrically and that not all sectors are equally dependent on oil. His sectoral results affirmed that an increase in oil prices negatively affects the stock price of the automobile and parts and the foods and beverage sectors. While the automobile and parts sector indicates that a higher oil price is associated with lower automobile manufacturer returns, the impact on the food and beverage sector was due to the direct effect of an increase in oil prices on food production, transportation, and commercialisation costs. There was a strong negative relationship between changes in oil prices and the financial sector and a strong positive link between oil price changes and oil and gas sector stock returns. Changes in oil prices recorded a negative asymmetric short-term effect on healthcare stock returns. Weak causality from oil to stock returns was observed for the industrial sector. He further reported an asymmetric positive short-term reaction of basic materials sector stock returns to oil price changes. An increase in oil price affects both demand for and supply of personal and household goods sector negatively. Both technology and telecommunications sectors indicate a negative short-term link between their respective stock returns and changes in oil prices. Lastly, changes in oil prices have a weak negative effect on the utilities sector's stock return, but both increases and decreases have asymmetric effects.

Mohanty *et al*. (2011) investigated oil price exposure to stock markets of Gulf Cooperation Council (GCC) countries (Bahrain, Kuwait, Oman, Qatar, UAE, and Saudi Arabia) at the country and industry levels. They argued that oil price changes would significantly affect GCC countries' economies and the stock market through its effect on marginal production cost and likely shift in consumer expenditures (cost-side effect and demand-side effect, respectively). From the country-level analysis, using the linear factor pricing model to estimate the sensitivity of stock returns to macroeconomic risk factors, they confirmed the existence of a significant and positive relationship between oil price increase or decrease and stock market returns for the selected countries except for Kuwait. The twenty selected industries also confirmed that twelve industries have significant and positive exposure to oil shocks. Finally, they concluded that the response of industry sector returns to oil price shocks differ significantly across GCC countries and their industries.

Arouri, Foulquier and Fouquau (2011) examined the long-run impact of oil prices on sector stock market returns in European countries. The study obtained data from the Dow Jones (DJ) Stoxx 600 and twelve European sector indices. These include Financials, Automobile and Parts, Oil and Gas, Food and Beverages, Industrials, Health Care, Basic Materials, Consumer Services, Personal and Household Goods, Technology, Utilities and Telecommunications. The data were drawn from quoted European companies of Austria, Finland, Belgium, France, Denmark, Germany, Iceland, Greece, Ireland, Luxembourg, Italy, the Netherlands, Portugal, Norway, Spain, Switzerland, Sweden, and the United Kingdom. Weekly sector indices covering 1 January 1998 and 13 November 2008 were obtained. Cointegration tests were carried out. The study found that stock performance differs significantly according to the sector and that oil price shocks impact sector stock performance in an asymmetric fashion. This outcome means a sudden rise in oil prices has a more significant impact on stock performance than a fall in oil prices. Overall, the study found a negative link between oil prices and sector stock market returns in the long-run.

Li, Zhu and Yu (2012) examined the dynamic relationships between oil prices and selected sectors like mining, agriculture, utilities, manufacturing, transportation, construction, wholesale and retail (WandR), IT, real estate, financials, media and conglomerates, social services, of the Chinese stock market using panel cointegration and the Granger causality framework on monthly data from July 2001 to December 2010. They conclude that the Granger causality between oil prices and the interest rate is bidirectional in the short-run. They further confirm no short-run Granger causality between the interest rate and industry sector stocks or between oil prices and industrial sector stocks. Cointegration exists between these sectors' oil prices, interest rates, and stock prices, with three or four breaks in different sectors. Contrary to theoretical expectations, they observed that increased real oil prices positively impact industry sector stocks in the long-run. They further observed the existence of a unidirectional, long-run and short-run Granger causality relationship running from oil prices and industry sector stocks to the interest rate between July 2001 and October 2005. However, only a unidirectional, long-run Granger causality ran from industry sector stocks to oil prices and from industry sector stocks to the interest rate between December 2005 and June 2007.

Fan and Jahan-Parvar (2012) extended Driesprong, Jacobsen and Maat (2008) study to investigate statistically significant oil price predictability in equity returns. Fan and Jahan-Parvar investigated the impact of oil prices on U.S. industry-level returns using a basic regression model for average monthly value-weighted returns on forty-nine U.S. industry-level portfolios and spot prices of WTI crude oil and Nymex light sweet crude from January 1979 to January 2009 (360 observations). Their findings refined Driesprong, Jacobsen and Maat (2008) results, who affirmed that oil price predictability is concentrated in a relatively small number of industries, as returns of about 20% of the industry-level sample can be predicted using logarithmic differences in WTI spot prices as a predictor. The predictability almost disappears with Nymex light sweet crude.

The wavelet multi-resolution methodology was employed by Reboredo and Rivera-Castro (2014) to examine the relationship between Brent oil prices, stock market returns in Europe

(Dow Jones Stoxx Europe), and the U.S. (S&P 500) at the sectoral and aggregate levels. They explored the chemical, automobile and parts, oil and gas, banks, industrial goods, utilities, telecommunications, and technology sectors. Using daily data from 1 June 2000 to 29 July 2011, they concluded that oil prices led stock prices and vice versa for higher frequencies with the onset of the financial crisis. For lower frequencies, oil and stock prices led each other in a complex way. Lead and lag correlations had both positive and negative significant values for the aggregate and industry sector levels. They further concluded that contagion and positive interdependence between oil and stock prices were evident in Europe and the U.S. at the aggregate and sectoral levels after the crisis. The wavelet cross-correlation analysis provided no evidence of under-reaction or over-reaction in the pre-crisis oil and stock markets. Oil price changes did not affect stock market returns, either at the aggregate level or sectoral level during the pre-crisis period, except for oil and gas company stocks, which were positively affected by oil price movements.

Wang and Zhang (2014) examined the impact of negative and positive oil price shocks on four major industries in China's commodity markets (grains, metals, petrochemicals and oil fats). They captured the jump behaviour in four commodity markets in China and WTI spot prices using the ARJI-GARCH (autoregressive conditional jump intensity model combined with the generalised conditional heteroskedasticity) model on daily data from 8 October 2001 to 30 November 2011. They concluded that the global oil market has a feature of volatility clustering. Negative oil price shocks affect all four markets more than a positive shock, with the petrochemical industry having the most significant effect and the grains market having the most negligible effect. They also affirmed that the asymmetric effects of oil price shocks exist in the four markets.

The link between oil prices and seven sector stock indices in Tunisia (automobile and parts, banks, basic materials, utilities, industrials, consumer services and financial) was examined by Hamma, Jarboui and Ghorbel (2014). They used a BEKK representation of a bivariate GARCH on weekly data from 2 April 2006 to 12 July 2012 (339 observations) and two crude oil prices (WTI and Brent). Their sector results confirmed that the volatility of the automobile and parts sector is indirectly affected by the unexpected oil market news and the past conditional variance of the oil market. They concluded that unexpected changes in oil prices significantly affect the conditional volatility of the returns of the aggregate Tunisia index. They further affirmed the existence of significant shock and volatility spillover across the oil and Tunisian sector stock markets. However, the intensity of volatility interactions varies from one sector to another.

While the banking sector is well-developed and still integrated with the developed market, there was a bidirectional shock spillover between the banking sector and the oil market, according to Hamma, Jarboui and Ghorbel (2014). The basic materials sector is affected by the volatility of the oil returns and the unexpected oil market news. The utility sector return volatility is affected by unexpected oil market news and the oil market's volatility; these firms' performance depends on oil price changes. The volatility of the industrial sector is indirectly affected by the unexpected oil price news and the past conditional variance of oil prices. The volatility of consumer sector returns is directly affected by its news and volatility and indirectly affected by the unexpected news and the past conditional variance of oil prices. Like the industrials sector, the financial services sector volatility reacts significantly to unexpected oil price shocks. While rising financial stock prices often indicate higher oil consumption due to increased production activity, oil price increases tend to affect consumer and investor confidence and demand for financial products.

Caporale, Hunter and Ali (2014) investigated the time-varying impact of oil price uncertainty on ten Chinese stock market sectors - telecommunications, healthcare, consumer services, basic materials, financials, consumer goods, oil and gas, industrials, technology, and utilities. They use weekly data from 1 January 1997 to 24 February 2014 (except for technology and oil and gas, which the samples start on 13 May 1998 and 27 June 1997). Employing the bivariate VAR-GARCH-in-mean model, multivariate Q-statistic and cointegration, they affirmed the existence of considerable dependence of industry sector stock returns on oil price fluctuations during periods characterised by demand-side shocks in the Chinese stock market. Their industry sector findings confirmed that oil price volatility affects stock returns positively during periods characterised by demand-side shocks in all cases except the financial, consumer service, and oil and gas sectors. The financial and oil and gas sectors negatively respond to oil price uncertainty during periods with supply-side shocks. Contrary to the above and during periods with precautionary demand shocks, the impact of oil price uncertainty appears to be insignificant.

The time-varying correlation between oil price shocks and stock market returns for the U.S. and China's five key sectors (metal and mining, oil and gas, retail, technology, and banking) were examined by Broadstock and Filis (2014) using the Scalar-BEKK model for monthly data from January 1995 to July 2013. They concluded that the U.S. and Chinese stock markets respond differently to varying oil price shocks over time, although the U.S. stock market seems more responsive to oil price shocks than the Chinese stock market. Furthermore, the impact of oil prices on the selected U.S. and Chinese stock market sectors differs widely. They suggested that investors be aware of the different sector's different behaviour towards oil price changes.

Aye *et al*. (2014) investigated the impact of uncertainty in oil prices on manufacturing production in South Africa. The study utilised monthly data ranging from February 1974 to December 2012. A bivariate GARCH-in-mean VAR model with a full information maximum likelihood technique was employed. Oil price uncertainty was measured using a conditional standard deviation of U.S. crude oil imported acquisition cost. The study found that uncertainty in oil prices impacted negatively and significantly on manufacturing production in South Africa. The study also found that the response of manufacturing production to negative and positive oil price shocks was asymmetric.

AL-Risheq (2016) sought to establish the effect of oil prices on the industrial production of 52 developing countries. Balanced panel data on price, industrial output, Foreign Direct Investment, trade openness index, terms of trade, exchange rate and real interest rate between 1970 and 2012 were obtained for 52 countries. The study employed a fixed-effects panel data regression technique. The study found that oil price movements have a negative and strong effect on industrial production. Other studies with similar findings include Okoye, Mbakwe and Igbo (2018).

Yasmeen *et al*. (2019) investigated the short-run and long-run impact of oil price shocks on real sector performance in Pakistan. The study identified four key sectors of the nation's economy. These include manufacturing, agriculture (livestock), transport and communication and electricity. The primary aim of the study was to investigate the linkages of each sector to oil price fluctuation. Time series data (annual) concerning the sampled sectors were obtained. The data covered a span of forty-one years (1976 to 2017). A multivariate linear regression model under the framework of Autoregressive Distributed Lag (ARDL) was employed. The study found that oil price shocks negatively affect agriculture (livestock), manufacturing and electricity sectors in the short and long-run.

However, a positive and significant impact was recorded on communication and transportation.

In a related study, Catik, Kisla and Akdeniz (2020) evaluated the impact of oil prices and exchange rates on Turkey's twelve sectoral stock market returns. Sectors considered include banking, basic materials, chemicals, electricity, food and beverage, metal goods and machinery, industrials, services, non-metallic mineral products, textiles and leather, transportation, wood, and paper and print. Estimation results of the ordinary least squares (OLS) multifactor model with endogenous structural breaks using daily data from 3 January 1997 to 9 August 2018 affirmed that the impact of oil prices on sectoral returns varied substantially over time. Oil price shocks significantly affected basic materials, chemicals, electricity, metal goods and machinery, and transportation, with transportation being the most adversely affected, followed by basic materials.

Nwosu *et al*. (2020) assessed the impact of shocks in oil prices on the real sectors (agricultural, industrial, building and construction, wholesale and retail trade and services sectors) of the Nigerian economy. Sectors such as agriculture, industry and manufacturing were selected. The study also controlled for macroeconomic variables of the money supply, and annual time series data on these variables between 1981 and 2018 were obtained. The study utilised the Vector Autoregressive (VAR) model as well as the impulse response functions. Following the estimation of data, the study found that shocks in oil prices only caused temporal growth in the agricultural sector. However, the sector followed a negative growth from the 4th year. Similarly, oil price shocks depress both industrial activities. Overall, the study found a negative and significant impact of oil price shocks on the performance of the real sector in Nigeria.

Mensi *et al*. (2021) investigate the asymmetric return spillovers between WTI crude oil futures, gold futures and ten sector stock indexes of China using the generalised vector autoregression (GVAR) model. The sectors examined while using daily data from 4 January 2005 to 15 May 2020 include consumer discretionary, consumer staples, energy, financials, health care, industrials, information technology, materials, telecommunications services, and utilities. Their result shows substantial time-varying spillovers. Consumer discretionary and industrials sectors are the principal recipients and contributors of total spillover in the system, and the material sector is a net contributor to spillovers. Oil futures and consumer staples, energy, financials, health care, information technology, telecommunications services, and utilities are net receivers of spillovers. The spillover effect between WTI crude oil futures and the sector stock of markets in China is higher than its counterpart between the gold futures and sector stock index.

All the empirical studies detailing the relationship between oil price shocks and sector stock market performance reviewed above yielded results suggesting that shocks in oil prices affect all sectors of an economy. This relationship can be explained using the classic supply-side effect, which postulates that an increase in oil prices indicates a reduction in the availability of an input to production, leading to increased production costs, a reduction in output, and a decline in economic activity. Thus, due to the need for more empirical works detailing the impact of oil price shocks on the individual sectors of the Canadian economy, this study tests the hypothesis that *sectors of the Canadian stock market do not respond to oil price shocks differently*.

2.4.3 Macroeconomic Variables and the Stock Market

The recent surge in oil prices has generated much interest in the relationship between oil prices, financial markets, and the economy. WTI crude oil was $29.42 per barrel by the end of 2002 and increased persistently to $133.93 per barrel by June 2008 before it started dropping to $37.72 by the end of 2015 and negative $37.63 per barrel on 20 April 2020. In theory, the value of a stock equals the discounted sum of expected future cash flows, as explained earlier. The discounted cash flows would ordinarily reflect economic conditions like inflation, interest rates, production costs, income, economic growth, investor and consumer confidence. These economic conditions are subsequently affected by macroeconomic events that are likely to be influenced by changes in oil prices. Oil price fluctuations may have effects on several economic conditions, such as the terms of trade and wealth transfer from oil consumers to oil producers, the essential production input availability and investment costs (supply-side effects), firms' production structures and unemployment, interest rates, monetary policies, consumption opportunities, inflation, costs and consumer demand and confidence (demand-side effects; Jones, Leiby and Paik 2004; Hamilton 1983). Thus, oil price changes could affect stock market returns by affecting the discount rate and expected earnings. Reduced energy costs would reduce household costs and leave more money for individuals to spend on other things. This fallout would keep inflation and interest rates at lower levels.

The transmission mechanism through which oil prices impact the stock market is by way of real economic activity. Oil prices have a direct impact on GDP, investment, interest rate, and exchange rate, and the impact will be transmitted to the stock market through the supply and demand channels and macroeconomic indicators (Taghizadeh-Hesary *et al*., 2019; Naifar and Al Dohaiman, 2013; Ogiri *et al*., 2013; Jimenez-Rodrıguez and Sanchez, 2005; Cunado and Perez de Gracia, 2003; Yang, Hwang and Huang, 2002; Mussa, 2000; Mork, 1994). The fundamental principle that distinguishes the theoretical and empirical work on oil price shocks between earlier literature and more recent literature is that earlier literature predominantly treated oil price shocks as exogenous, while later literature considered oil price shocks as endogenous. Oil price shocks have recently been considered endogenous within the causal model because macroeconomic variables determine or influence changes in oil prices. Barsky and Kilian (2002) observed this reverse causality in their research and subsequently established the basis for a fresh approach to understanding the relationship between oil price shocks and macroeconomic variables. Some empirical works analysing the impact of macroeconomic variables and oil price shocks on stock market performance have been developed and discussed.

Exchange Rate and the Stock Market

Research evidence regarding the relationship between exchange rate and stock performance has suggested that changes in the exchange rate affect stock price movements. A recent publication by Huang, Wang, and Zhang (2021) uses time-varying parameter vector autoregression (TVP VAR) on quarterly data from Q3 2005 to Q4 2019 to investigate the effects of exchange rate fluctuations on stock market returns from BRICS (Brazil, Russia, India, China and South Africa) countries. They assumed that exchange rate fluctuations affect the stock market through a country's current or financial account. Their investigation shows similarities and differences in the direction, duration, and extent of exchange rate changes on the countries' stock market returns. Hence, they conclude that the impact of exchange rate shocks on the stock markets of the BRICS countries varies over different periods.

For instance, Okechukwu *et al*. (2019) investigated the effect of exchange rate among macroeconomic variables like exchange rate, interest rate and inflation on stock market performance in Nigeria. The study utilised monthly time series data generated between 1995 and 2014, and GARCH (1.1) techniques were employed. The study found that exchange rate and inflation rates positively and significantly impact stock market returns following the data analysis. Interest rate, on the other hand, has a negative impact on stock market returns. Similarly, Mahapatra and Bhaduri (2019) examined the impact of the exchange rate on the Indian stock market, estimating a two-factor arbitrage pricing model on monthly data from January 2005 to January 2016. Their result affirmed that stock returns react significantly to exchange rate fluctuations post-crisis period. The exchange rate risk factor was a prominent determinant of Indian stock market returns.

Alzyoud, Wang and Basso (2018) analysed the impact of oil prices on the exchange rate and the stock market in Canada using VECM and the non-linear Cobb-Duglas function on data from 1986 to 2016. They concluded that both oil prices and exchange rates significantly influence the Canadian stock market. Sikhosana and Aye (2018) investigated the asymmetric volatility spillovers between exchange rate fluctuations on South Africa's stock market index. They estimated multivariate exponential generalised autoregressive conditionally heteroskedastic (EGARCH) model alongside other asymmetric GARCH models (GJR GARCH and APARCH) using monthly data from January 1996 to April 2016. Their findings affirmed a bi-directional volatility spillover and asymmetric effect between the exchange rate and stock market index in the short-run. They further confirmed that the adverse shocks in the exchange rate market have a more significant impact on volatility in the stock market. In contrast, positive shocks in the stock market have a more significant impact on transmitting volatility to the exchange rate market. Similarly, Mitra (2017) examined the short and long-run association between exchange rate and total stock value in the U.S. and South Africa between 1979 and 2014 while testing for unit root, Johansen cointegration, and the VECM estimates. The study observed a significantly positive long-run association between stock transactions and exchange rates in South Africa.

The causality between the exchange rate and stock market performance in Pakistan was assessed by Suriani, Kumar, Jamil and Muneer (2015). Monthly stock price data were collected from the KSE-100 index between January 2004 and December 2009. Data on the rate of exchange between the Pak rupee and the U.S. dollar was also obtained. The Granger causality techniques were employed, and the study found no causal relationship between the country's exchange rate and stock price. Also, Zubair (2013) evaluated the causality between monetary variables like exchange rate and money supply and stock market index before and during the 2007/2008 global financial crisis in Nigeria. The study used monthly time series data for the period 2001–2011. Johansen's cointegration and Granger-causality tests were carried out. The study found that the All-Share Index (ASI) stock market performance proxy positively responds to money supply and exchange rate.

Yousuf and Nilsson (2013) examined the effect of USD and EUR exchange rates on stock market performance in Sweden. The study covers a span of 10 years (2003-2013) and employed a bivariate technique (Pearson's correlation coefficient) and the GARCH (1,1) model. The study found an insignificant correlation between the exchange rate and stock market performance in Sweden. The GARCH model, on the other hand, revealed that exchange rate movements adversely affect the future performance of the stock market.

Mao's (2013) research assessed the relationship between stock prices and exchange rates in the UK. The study utilised unbalanced panel data of non-financial firms in the UK between 1990 and 2011. In particular, the study sought to assess sources of foreign exchange exposure for the listed non-financial companies in the UK. The study decomposed foreign exchange betas at the firm level into a discounted rate and cash flow components under the return decomposition framework of Campbell and Shille (1988). The study used panel data estimation techniques and found that: (i) variance in cash flows is the primary driver of stock prices as it accounted for over 80 percent of the total variance, (ii) decomposition increases significance levels of foreign exchange exposures, indicating that cash flows, as well as discounted rate news, are sensitive to foreign exchange rates (iii) exposure to foreign exchange through the discounted rate channel outweighed the effect through the cash flow channel.

Basher, Haug and Sadorsky (2012) observed the relationship between oil prices, exchange rate, and emerging markets' stocks using a SVAR model on monthly data from January 1988 to December 2008. They affirmed that exchange rates respond to movements in oil prices and that most of the dynamic interaction takes place in the short-run as a positive oil price shock leads to an immediate drop in the trade-weighted exchange rate.

Mun (2012) evaluated the combined response of stock and exchange rate markets to macroeconomic shocks in the economies of the U.S. and Japan. The study obtained monthly data between December 1984 and December 2006. These data were analysed using the VAR-CARCH-M model. The study found that macroeconomic shocks occasioned by the foreign exchange movement decreased the linkage between stock and foreign exchange markets in both U.S. and Japan. Alagidede, Panagiotidi and Zhang

(2011) investigated the relationship between stock and foreign exchange markets in Canada, Australia, Japan, the UK and Switzerland. Monthly data between January 1992 and December 2005 were obtained. The study used the Hiemstra-Jones test and Hsiao's version of the Granger causality test and found a causal relationship between exchange rate and stock prices in Canada, the UK and Switzerland.

Similarly, Ehrmann Fratzscher and Rigobon (2011) examined the interdependence of money markets, stock markets and exchange rates in the Euro area. The study employed a simultaneous model as well as the Cholesky decompositions framework. It was found that stock prices are negatively affected by exchange rate depreciation in the Euro area.

The impact of oil prices on Vietnam's stock prices was modelled by Narayan and Narayan (2010) while using daily data from 2000 to 2008 on variables such as the nominal exchange rate, stock prices, and oil prices. The study employed the Johansen cointegration procedure to capture the long-run association among the variables and the VECM to capture the short-run dynamics. The study found that stock prices, oil prices, and nominal exchange rates are cointegrated, and oil prices have a positive and statistically significant impact on stock prices. Rising oil prices accompanied the growth of the Vietnamese stock market. However, increasing foreign portfolio investment inflows that were estimated to have doubled from US$0.9 billion in 2005 to US$1.9 billion in 2006 marked the stock market boom. The study also observed changes in preferences from foreign currencies and domestic bank deposits to stocks and local market participants. There was a rise in leveraged investment in stock and investments on behalf of relatives living abroad. These internal and domestic factors were more dominant than the oil price rise on the Vietnamese stock market, as the earlier result is inconsistent with theoretical expectations.

Bjørnland (2009) analysed the effect of oil price shocks on stock returns in Norway using a structural vector autoregressive (SVAR) model on monthly data from 1993 to 2005. He concluded that the Norwegian economy responded to higher oil prices by increasing aggregate demand and wealth, which led to a fall in the unemployment rate, a small exchange rate appreciation, a gradual inflation rate rise, and an increased interest rate due to economic activity. He further affirmed that a 10% increase in oil price resulted in a 2.5% increase in stock returns in the short-run. After that, the effect of oil prices on stock returns gradually dies out.

Exchange rate movements may also influence oil prices and subsequently impact stock market returns. Based on the law of one price, exchange rate movements can affect oil prices (Bloomberg and Harris 1995). Oil as a commodity is internationally traded and relatively homogeneous. Since international oil prices are denominated in U.S. dollars, where the U.S. dollar appreciates against a country's local currency without changes in oil prices, the local revenue from oil for such an oil-exporting country would increase. Hence, increasing oil revenue and available funds and positively impacting stock market returns. Where the U.S. dollar weakens compared with other currencies, other things being equal, foreigners will be willing to pay more U.S. dollars for oil, i.e., they pay less for oil because of the weaker U.S. dollar. This reaction affirms Akram's (2009) findings that a weaker dollar leads to higher commodity prices.

In sum, the empirical studies reviewed above yielded mixed results. This outcome implies that there may be location differences in the interaction between exchange rate, oil prices and stock market performance. Given the growing integration between stock markets and foreign exchange markets with the widespread utilisation of hedging, among others, this study expects a relationship between the two variables. In this regard, the study assumes that exchange rate depreciation, for instance, increases the international competitiveness of a country. This impact, in turn, increases foreign demand, sales and the value of (exporting) firms. The study tests the hypothesis that *the exchange rate does not impact stock market performance* from the above discussion.

GDP and the Stock Market

Many studies have proven a positive link between economic performance and stock prices in developed and developing countries. Researchers affirmed that oil price increases result in slower GDP growth and possible recession, higher unemployment rates and higher price levels (Kilian 2008b; Jones, Leiby and Paik 2004; Brown and Yücel 2002). For instance, Haider and Tariq (2018) examined the impacts of GDP growth, interest rate, inflations, import, export and unemployment on stock indices of the Bombay Stock Exchange (BSX) and Pakistan Stock Exchange (PSX). The study solely relied on secondary data generated between 1990 and 2016. Data gathered were analysed using regression and correlation statistics. The results of the data analysis showed a significant relationship between the selected macroeconomic variables and PSX and BSX 100 indices.

In a related study, Wahyudi *et al*. (2017) investigated the impact of macroeconomic variables such as gross domestic products (GDP), inflation, exchange rate, interest rate, crude oil price, wages and primary commodity price on the composite index in the South-East Asia Countries (Indonesia, Philippine, Malaysia, Thailand and Singapore). Panel data were obtained and analysed using threshold autoregressive conditional heteroscedasticity. The study found that GDP, inflation, and interest rates negatively impact the composite index in all the selected countries except Thailand. Other findings from the study include crude oil prices positively impacting Indonesia, Singapore, and Malaysia stock indexes; similarly, primary commodity prices positively impacted the composite index in Singapore and negatively in Thailand and the Philippines. Wages have a positive and statistically significant impact on the composite index in all countries.

Giri and Joshi (2017) examined the impact of some selected macroeconomic variables on stock prices in India. The study obtained annual time series data on the chosen variables between 1979 and 2014. Both long-run and short-run relationships were examined using the ARDL bounds testing and the VECM. The study found a positive and significant relationship among economic growth (GDP), exchange rate, inflation rate and stock prices in the long-run. However, the crude oil price negatively influences stock prices in the long-run, suggesting that an increase in the price of oil, for instance, creates an inflationary expectation among investors, which affects stock prices adversely. In terms of the short-run, the study found one-way causation running from GDP and foreign direct investment (FDI) to stock prices in India.

Furthermore, Olubiyi, Babalola and Ayemidotun (2017) empirically examined the link between Gross Domestic Product and the stock market index in Nigeria from 1996 to 2015. The study decomposed Nigerian stock market operations into Alternative Securities Market (ASeM), Main Board (MB), Exchange Traded Fund (ETFs) and Premium Board (PB). The study employed an OLS regression model and found a positive and statistically significant relationship between GDP and the prices of stocks quoted on the ETFs and MB.

Algahtani (2016) provided empirical evidence for establishing the effect of oil price shocks on Saudi economic activity from 1970 to 2015 using the VAR and VECM. He found that, in the long-run, there is a positive and significant relationship between oil prices and GDP. Boonyanam (2014) evaluated the impact of some selected macroeconomic variables on stock prices in Pakistan. Time series data between 1998 and 2009 were obtained. The study employed a multivariate regression model and found that gross domestic product (GDP) and exchange rate positively and significantly impact stock prices. However, the consumer price index (CPI), a proxy for the inflation rate, has a negative and statistically significant impact on stock prices. Furthermore, the study also showed that exports, Foreign Direct Investment (FDI), money supply (M_2), and oil prices did not significantly impact stock prices.

Similarly, Hsing (2013) examined the impact of macroeconomic variables (GDP, the ratio of the government's budget deficit to GDP, Money supply (1), domestic interest rate, the exchange and inflation rates on the stock index in Germany and Croatia. The study utilised quarterly data between Q3 1997 and Q1 2010 and the EGARCH model was employed. The study found that GDP and the ratio of M1 to GDP positively and significantly affect the Croatian stock market. In contrast, stock prices in Croatia were negatively impacted by the budget deficit ratio to GDP, interest rate, exchange and inflation rates.

Al-Abedallat and Al-Shabib (2012) examined the impact of gross domestic product (GDP) and investment on the stock market index in Jordan. The study utilised monthly Amman stock exchange indexes, GDP, and total investment data between 1990 and 2009. A multiple regression model was employed to analyse the relationship. The study found that the Amman stock exchange stock prices were positively and significantly influenced by GDP and total investment. Similarly, Reddy (2012) evaluated the impact of Real Gross Domestic Product, Inflation Rate and Interest Rate on stock prices of listed firms between 1997 and 2009 in India. The study employed OLS regression analysis. The results show that a unit increase in GDP has a positive and significant impact on stock prices.

Olomola (2006) used the VAR model for the Nigerian economy and found that oil price shocks may not influence GDP in the short-run. However, as the shocks continue, the impact becomes evident. Contrary to previous empirical results that oil price shocks significantly affect output, exchange rate, inflation rate, and money supply, he affirmed that positive oil price shocks do not have a remarkable effect on Nigeria's output and inflation. However, he found that oil price shocks significantly affect the real exchange rate with the variance decomposition approach. The shocks had a 48% impact in the first quarter and 33% and 32% in the eighth and tenth quarters. He further argued that oil price shocks could result in a wealth effect that might cause real exchange rates to appreciate and subsequently squeeze out the tradable sector.

Hamilton (1983) documented a strong correlation while examining the relationship between crude oil price changes and U.S. gross national product (GNP) growth. Though he did not conclude that oil shocks cause recessions, he concluded that oil shocks contributed to at least some of the U.S.'s recessions before 1972, as the correlation was statistically significant and non-spurious. Mork (1989) extended Hamilton's results to affirm that his results continue to hold when the sample is extended to include the oil market collapse considering the effects of price controls. He confirmed the negative relationship for the U.S. Hamilton (2003) defined *oil price shock* as a net oil price increase, which is the log change in the nominal price of oil relative to its previous three-year high if positive or zero otherwise. Kilian (2009) expanded Hamilton's work and identified three types of oil shocks: oil supply shock (unpredictable innovations to global oil production), oil market-specific shock, and a global demand shock.

Given the above empirical review, this study expects a positive relationship between GDP and stock prices. Thus, this study tests *the hypothesis that GDP does not impact stock performance*.

Inflation Rate and the Stock Market

The insidious effects of rising inflation are identified in extant literature. To ascertain the impact of inflation on stock market returns, Eldomiaty *et al*. (2019) conducted a study that explicitly examines how inflation and interest rates impact stock prices in the U.S. The study employed quarterly data on inflation, interest rate and stock prices of non-financial firms quoted in NASDAQ100 and DJIA30 from 1999 and 2016. Econometrics methods of Johansen cointegration, Granger causality and vector error correction model were employed. The study found that cointegration exists between the stock prices and changes in stock prices due to inflation and exchange rates. They affirmed that the inflation rate negatively correlates with stock prices while the real interest rate is positively associated with stock prices. Changes in interest and inflation rates significantly influence stock prices.

Sathyanarayana and Gargesa (2018) investigated the relationship between inflation and stock returns using monthly data from March 2000 to March 2017 in fourteen selected countries. Using the Pearson correlation coefficient and linear regression, they found a negative correlation coefficient between inflation and stock returns in Austria, Belgium, Canada, Chile, China, France, Indonesia, Ireland, Japan, Mexico, Spain, and Turkey. The negative correlation coefficient is statistically significant in Austria, Belgium, Canada, Chile, China, France, Indonesia, and Japan, while that of Ireland, Mexico, and Turkey were statistically insignificant. There was a positive correlation coefficient and statistically insignificant relationship between inflation and stock returns in Brazil. Their study further recorded a long-run causality from inflation to Indian stock returns with no short-run causality from inflation to the stock index.

In a related study, Kwofie and Ansah (2018) examined how inflation and exchange rates have impacted stock prices in Ghana. Monthly data on the inflation rate, exchange rate, and stock market index were obtained between January 2000 and December 2013. The study employed Bounds testing within the autoregressive distributed lag (ARDL) framework. Error correction parameterisation of the ARDL was also carried out. The study found a significant relationship between stock market returns and inflation in the long-run. In the short-run, this relationship was not significant. Other findings include a strong link between exchange rate and market returns in the long-run and short-run. Ahmadi (2016) examined the impact of inflation and output growth on stock returns in Iran. The study generated monthly data on the stock returns of quoted firms on the Tehran Stock Exchange. The EGARCH-M framework was employed, and it found a significant relationship among the variables. The risk-return relationship changes as the economy moves from one regime to another, considering the significant crises of April 2005 and February 2014.

Hosseini, Ahmad and Lai (2011) carried out a comparative study on how macroeconomic variables impact stock market indexes in India and China. The study gathered monthly panel data on industrial production, crude oil price, inflation and money supply between January 1999 and January 2009, and a vector error correction model was employed. The study found that the stock market in China responds positively and significantly to crude oil prices, inflation rate and money supply in the long-run while industrial production depresses stock prices. In India, the stock index was impacted positively by money supply and oil prices, and the impact of inflation and industrial production on the Indian stock index was negative.

The relationship among the CPI, industrial production, ATHEX General Composite Index[3] and Brent oil prices in Greece was investigated by Filis (2010) using monthly data from January 1996 to June 2008 (150 observations over 12.5 years). He employed the multivariate VAR model and vector error correction (VEC) model to test cointegration and error correction. The study concluded that oil price and stock market exercise a significant positive effect on the Greek CPI in the long-run. However, oil prices and industrial production lead the Greek stock market in the short-run. Additionally, oil price shocks cause a negative effect on the Greek stock market, and industrial production causes a positive effect. Limpanithiwat and Rungsombudpornkul (2010) examined the impact of inflation on stock prices in Thailand. Monthly data on the variables between January 2000 and March 2010 were gathered. The Vector autoregression (VAR) model was employed. The study found that inflation has no significant impact on stock price movements.

Farzanegan and Markwardt (2009) analysed the relationship between oil price shocks and some macroeconomic variables by applying a VAR model to the Iranian economy and observed that positive and negative oil price shocks significantly increased inflation. They further observed a strong positive relationship between positive oil price changes and industrial output growth and a marginal impact of oil price changes on real government expenditures. The Dutch disease syndrome indicated that oil price shocks resulted in a decline in real effective exchange rate appreciation. Quayes and Jamal (2008) analysed the impact of inflation on stock market operations in the U.S. with annual time series data of stock price, dividends, population ratio for the 45–65 age group, interest rate and inflation rate from 1950 to 2000 were obtained. A multivariate regression model was employed, and the study found that inflation negatively and significantly affects stock prices as it decreases the real value of stock prices.

Kilian (2009) affirmed that the persistent increase in oil prices (WTI) during the 1975 to 2007 period was mainly driven by increasing and strong global demand for crude oil, especially by firms in China, India and other emerging markets. During the same period, oil prices were increasing, and the U.S. dollar fell against other major traded currencies and simultaneously, stock prices of the emerging markets increased. Unexpected inflation erodes the real value of investments like stocks and bonds (Basher, Haug and Sadorsky 2012). Rising oil prices are often perceived as inflationary by central banks and

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[3] Reliable measure of companies within the segment of the Athens Exchange with market capitalisation value above $10billion.

policymakers. They subsequently respond to inflationary pressures by raising interest rates, consequently affecting the discount rate used in the stock pricing formula, i.e., interest rates could affect oil prices through a connection with inflation.

The supply-side effects are related to crude oil being a primary input for production (Jimenez-Rodrıguez and Sanchez, 2005). Consequently, an increase in oil price would lead to a rise in production costs, which then induces firms to lower output. Oil price changes also entail demand-side effects on consumption and investment, and consumption is impacted indirectly through its positive relation with disposable income. The more the shock is perceived to be long-lasting, the stronger the magnitude of this effect.

In addition to the previously discussed impacts of oil prices on supply and demand, Jimenez-Rodrıguez and Sanchez (2005) affirmed that oil price changes influence foreign exchange markets and inflation, indirectly affecting real activity. A high oil price triggers inflation that affects consumers and ultimately drives down the stock market due to increased production costs, resulting in lower cash flows. Moreover, oil prices have an adverse impact on investment by increasing firms' costs. Moreover, in response to unanticipated changes in market forces, regulations are often introduced and reformed. Regulators utilise the monetary policy mechanism to curb the effects of oil prices on aggregate demand and inflation.

Papapetrou (2001) showed that oil price is an essential factor in explaining the stock price movements in Greece. A positive oil price shock tends to depress real stock returns through its effect on output, mainly industrial production and employment. Higher oil prices will lead to subsequent recessions in oil-consuming countries because of the negative correlation between oil prices and economic activities (Yang, Hwang and Huang 2002). Cunado and Perez de Gracia (2003) explored the effects of oil price decreases or increases on industrial production and consumer price indices in fourteen European countries. They concluded that oil prices have permanent effects on inflation and, in the short-run, asymmetric effects on production growth rates.

According to Omran and Pointon (2001), inflation is associated with rising input prices, declining purchasing power of consumers, and falling corporate revenues and profits. This outcome ultimately retards economic growth. Based on the assumption that the demand for oil in net oil-importing countries is price inelastic and that if the price elasticity is greater than one, an increase in oil prices will lower total expenditure on oil, and the demand for U.S. dollars would fall in such oil-importing countries, Golub (1983) and Krugman (1983) argued that the movements in oil prices should affect exchange rates. An increase in oil prices would generate a current account surplus for oil-exporting countries and current account deficits for an oil-importing country. Thus, reallocating wealth between a net oil-importing and a net oil-exporting country could subsequently impact exchange rates. Where net oil-exporting countries' increased demand for dollars is less than the reduction in the demand for dollars by oil-importing countries, there will be an excess supply of dollars. The dollar would depreciate.

An increase in oil prices has implications for asset prices and financial markets through its effect on economic activity, corporate earnings, inflation, and monetary policy (Mussa, 2000). Change in oil price affects transportation costs through freight, which eventually affects the cost of production, affecting the product price and sales margin (the bottom line). In addition, trucking, airline, and shipping companies consider oil as an expense; thus, a rising oil price would have a negative effect, as they require oil to operate. However, in practice, companies usually do not maintain their prices when the production cost goes up or down, and they tend to adjust their product or service price to reflect the change in production cost. Empirical results from the U.S. and Canadian stock markets support this viewpoint. Basher and Sadorsky (2006) and Nandha and Faff (2008) evinced a similar viewpoint. Basher and Sadorsky (2006) concluded that an oil price shock would affect the inflation rate. The central bank adjusts monetary policy (interest rates) to manipulate price levels, thereby influencing cash flow and stock prices.

An increase in oil prices would impact the price levels and, subsequently, inflation. However, the magnitude of the impact would depend on the extent to which consumers seek to offset the decline in their real incomes through higher wage increases and the degree of monetary tightening. In contrast, producers seek to restore profit margins. These responses could subsequently create a wage/price spiral. Where an oil price increase is rapid and unexpected, this will raise inflation and unemployment rates and reduce investment levels. This outcome will cause further change in real national income and may magnify the direct reduction of real national income, a loss of real purchasing power. This, in turn, will lead to lower real wages, profits and consumption levels. However, the wrong policies can magnify adjustment problems to become a severe threat to economic growth and stability (Pindyck and Rotemberg, 1984). Mork (1994) affirmed that an increase in oil prices spurs inflation, leading to recessions. Oil price decreases dampen inflation but does not necessarily boost real activity. When financial sectors are battered with bad news, liquidity flies to the more accessible bet markets, such as a commodity markets. Where oil takes a higher share of the economy, a change in oil price could impact the economy.

The central banks of most countries are saddled with the responsibility to curtail any effect that changes in oil prices may have on aggregate demand and inflation. They use interest rates to control inflation. If interest rates are high, the cost of borrowing will become high and less attractive. This aftereffect curtails the expansion of the money supply and subsequently impacts funds available to investors. Sadorsky (1999) estimated a VAR model for the U.S., including interest rates, real oil prices, industrial production, and aggregate real stock returns from 1947–1996 using monthly data. He concluded that oil price shocks have a negative and statistically significant impact on stock returns, as changes in the price charged for credit that significantly influence the level of corporate profits subsequently affect the price investors are willing to pay for equities. Movements in interest rates will affect the relationship between funds competing for financial assets. Lastly, some stocks are purchased on margins, and a change in the cost of carrying margin debt will influence investors' desire and ability to speculate.

From the empirical reviews above, it is noted that there is no consensus on the impact of the inflation rate on stock market performance. While some empirical studies suggest that the inflation rate does not significantly impact stock prices, others observed that inflation leads to a reduction in stock prices. Against this backdrop, this study adds to the debate by testing the hypothesis that *the inflation rate does not impact stock market performance*.

Interest Rate and the Stock Market

In every economy, interest rates are usually set with the primary objective of influencing savings and investment. As a rule, rising interest rates are expected to retard economic performance as borrowing becomes more expensive while saving becomes more attractive. This aftermath would mean less household and business spending. The decrease in spending (investment and consumption) would impact revenues and profits, causing a fall in stock prices. The reverse is the case when the interest rate is set low. Some empirical studies have laid credence to this fact. For instance, Wang (2020) explored the role of interest rate in the volatility spillover among crude oil and indices from international stock markets of the U.S., Europe and Japan using daily data from May 2007 to March 2019.

The study uses a vector autoregressive model and concludes that interest rates negatively affect volatility spillover. Its role stems from its ability to impact short-term spillovers. In contrast, and the long-run, a low-interest rate serves as the primary driver of volatility spillovers, and the effect of interest rates is significantly positive but relatively limited.

Schrey, Hafdísarson and Wendt (2017) ascertained the impact of interest rate on the stock prices of firms listed on the Icelandic stock market. The study employed monthly stock observation between 2009 and 2017. Constant mean returns and market models were employed in addition to the OLS regression model. The study found that unanticipated interest rates have a negative and statistically significant impact on stock returns. This finding is consistent with Amarasinghe (2015), who examined the causal link between interest rates and stock prices in Colombo. Monthly data on the study variables between January 2007 and December 2013 were obtained. A multivariate OLS regression model, as well as the Granger Causality test, was applied. The study found that interest rate has a negative and significant impact on stock returns, with causality running from the interest rate.

Naifar and Al Dohaiman (2013) found evidence of significant symmetric dependence between crude oil prices and the short-term interest rate during the financial crisis. They also confirm that monetary policies' sensitivity to crude oil prices is related to current market characteristics, as the central banks' aim is to stabilise output growth. Central banks are predicted to react with a reduction in interest rates that could temporarily offset the losses in real GDP and increase inflationary pressures. They affirmed significant symmetric upper and lower tail dependence before the financial crisis regarding the relationship between the GCC stock index and inflation rates. That is, crude oil prices and inflation rates are linked with the same intensity. However, they found symmetric dependence between crude oil prices and the short-term interest rate during the subprime financial crisis.

Reddy (2012) evaluated the impact of real gross domestic product, inflation rate and interest rate on stock prices of listed firms between 1997 and 2009 in India. The study employed OLS regression analysis and the results show that a decrease in inflation and interest rates leads to an increase in stock prices. In a related study, Alam and Uddin (2009) investigated the impact of interest on stock prices. The study uses monthly observations gathered from 15 developed and developing countries (Australia, Canada, Bangladesh, Colombia, Chile, Jamaica, Germany, Japan, Italy, Malaysia, South Africa, Mexico, Philippines, Venezuela and Spain). The data covered January 1988 and March 2003. Panel data estimation techniques were employed. The study found that interest rate has a negative and significant impact on the share price in all the countries sampled.

Conversely, Vaz, Ariff and Brooks (2008) examined the impact of official announcements regarding changes in the interest rate on stock returns of financial institutions in Australia. The study utilised weekly data covering 1990 and 2005 and employed the OLS regression model. The study observed that a public notice regarding the increase in the official interest rate positively impacts banks' stock returns in Australia.

Panda (2008) ascertained if interest rate matters for stock market performance. The study employed a monthly average of stock prices between April 1996 and June 2006 in India and the ARDL regression models. The study found a long-term link between stock prices and interest rates in India. Specifically, the study found that interest rates negatively impact stock prices in the long-run but positively in the short-run. This finding is consistent with Zhang and Liang (2007), who investigated the impact of swap spreads in the U.S. interest rate market and relied on monthly data between June 1998 and March 2007. Data gathered were analysed using a multivariate Generalized Autoregressive Conditionally Heteroscedastic (GARCH) model with Error Corrections Terms (ECM). The study found that the movement of the interest rate swap spread negatively impacted the slope of the yield curve of Treasury Securities and positively to stock market volatility. However, the study found that swap spreads in the U.S. market had a negative and strong correlation with default premiums. It was concluded that adverse movements of interest rate swap spread relate to the movement in the business cycle.

Chen, Roll and Ross (1986) proposed that stock returns are theoretically dependent on expected cash flows discounted by interest rates. The spread between long- and short-term interest rates, expected and unexpected inflation, industrial production, and the spread between high- and low-grade bonds should systematically affect stock market returns. This study tests the hypothesis that *interest rate does not impact stock performance* based on the above development.

Money Supply and the Stock Market

Over the years, the impact of money supply on stock markets has continued to be debated. There seems to be no consensus among scholars that unexpected changes in money stock in an economy lead to an increase or decrease in stock performance. Pierce *et al*. (1974) explained the link between oil prices and macroeconomic variables, arguing that an increase in oil prices would increase money demand. Since policymakers cannot increase the money supply to match the rising money demand, the increase in the money supply would subsequently lead to a higher interest rate and slower economic growth. Dohner (1981) further argued that increases in oil prices would reduce the world's total consumption demand and subsequently decrease real interest rates. The decrease in the real interest rate would stimulate investment growth and partially offset the decline in consumption. Overall, the aggregate demand would be unchanged.

Stock price volatility prompted Dhakal, Kandil and Sharma (1993) to re-examine the interaction between the money supply and stock prices. They conclude that an increase in the money supply might result in inflationary expectations, thereby increasing the interest rate. An increase in interest rate implies an increase in the discount rate and hence reduced stock prices. This outcome contradicts Ratanapakorn and Sharma (2007), who suggest that an increase in the money supply may reduce the interest rate and discount rate due to excess liquidity and subsequently increase stock prices because discount rates are low. Despite the above arguments, Mukherjee and Naka (1995) affirmed that the impact of money supply on stock prices is inconclusive. An increase in the money supply may positively or negatively affect the discount rate.

As postulated in the Quantity Theory of Money, a rise in the aggregate money supply would be accompanied by a decrease in interest rate. This aftereffect would make returns on fixed-income securities, such as bonds and treasury bills, which are substitutes for stock, go down, causing an increase in stock prices. This study reaffirms the theory considering that few empirical works have laid credence to this fact. The relationship between U.S. and Canada stock market sector returns (energy, financials, real estate, industrial, healthcare, consumer discretionary and consumer staples) and macroeconomic variables (industrial production, money supply and long-term interest rate) were examined by Bhuiyan and Chowdhury (2020). Modelling an unrestricted VAR and VECM on monthly data from January 2000 to April and June 2018, they conclude that money supply generally has a positive relationship with the indices. Pícha (2017) observed the impact of money supply on stock market performance in the U.S. The study is anchored on the portfolio balance channel. Johansen cointegration and VECM were employed. The study found that money supply has a positive influence on S&P 500 index with six months lag.

In contrast, Li (2012) investigated whether Central Banks' expansionary monetary policy of increasing money stock in European countries impacts the stock market. The study proxied stock market performance with market capitalisation and employed cointegration and Vector Error Correction models. The study found that market capitalisation is negatively impacted by money supply in the long term. However, in the short term, market capitalisation reacted positively to the money supply. Sirucek (2012) evaluated the impact of changes in the money supply on the U.S. stock index using the Dow Jones Industrial Average. The study employed monthly data covering 1967 and 2011. The dynamic Granger test was conducted to verify if money supply affects the Dow Jones Industrial Average. The study found that the stock index and money supply have a positive relationship.

Similarly, Bissoon *et al*. (2016) investigated the extent to which monetary policies affect stock markets. The study sampled five open economies with developing stock markets between 2004 to 2014 and employed random effect panel regression and panel vector error correction model. The study found that money supply directly impacts stock return both in the long-run and short-run.

Hosseini, Ahmad and Lai (2011) carried out a comparative study on how macroeconomic variables impact stock market indexes in India and China. The study gathered monthly panel data on industrial production, crude oil price, inflation and money supply between January 1999 and January 2009, and a vector error correction model was employed. The study found that the Chinese stock market responded positively and significantly to the crude oil price, inflation rate, and money supply in the long-run while industrial production depresses stock prices. In India, money supply and crude oil prices positively impacted the stock index, and the impact of inflation and industrial production on the Indian stock index was negative.

Maskay (2007) examined how changes in the money supply affect stock prices in the U.S. Changes in the money supply were decomposed into anticipated and unanticipated changes. A multivariate OLS regression model was employed. The study found that increasing money stock leads to an increase in stock prices. Furthermore, the study found that anticipated change in money stock has a higher impact on the stock market than unanticipated change. From the above, this study addresses the gap by testing the hypothesis that the *money supply does not impact stock performance*.

2.4.4 Business Cycle, Oil Prices and the Stock Market

According to Cooley (1995), business cycles are sometimes referred to as the 'trade cycle' or economic cycle. They consist of four phases: expansion, peak, contraction, and trough. These phases represent fluctuations in the economic activity that a country experiences over a period, sometimes referred to as the cyclical nature of economic growth. For investment decisions, investors and business managers analyse the economy's performance while using the country's business cycle as a tool to measure GDP.

The C.D. Howe Institute Business Cycle Council in Canada defines the business cycle as alternate economic growth and recession periods. The business cycle is defined in terms of periods of expansion (boom) or contraction (recession). The institute performs a similar function as the National Bureau of Economic Research (NBER) in the U.S. Business cycles. Cross and Bergevin (2012) defined a *recession* as a pronounced, pervasive, and persistent decline in aggregate economic activity. During the expansion periods, the economy is growing in real terms (i.e., excluding inflation), as evidenced by increased indicators like employment, industrial production, sale, and personal incomes.

On the contrary, the economy is contracting, as measured by decreases in the above indicators during the recession periods. The expansion is measured from the previous business cycle's trough to the current cycle's peak, while the recession is measured from the peak to the trough. Economic booms are caused by a monetary policy that is too 'loose'. For example, interest rates are too low, and this encourages consumer spending and economic growth. Likewise, economic downturns occur when the economy runs out of steam or the monetary authorities seek to reduce demand to prevent inflationary pressures.

Canada recorded twelve business cycles from 1926, according to the C.D. Howe Institute Business Cycle Council. Categories of severity are assigned from 1 to 5, as detailed below.

Table 2.1 Historical Chronology of Recessions in Canada

Monthly Peak (Quarterly)	Monthly Trough (Quarterly)	Peak–Trough (Qtrs.)	Category (1 to 5)
April 1929 (1929: Q2)	February 1933 (1933: Q1)	16	5
November 1937 (1937: Q3)	June 1938 (1938: Q2)	4	5
August 1947 (1947: Q2)	March 1948 (1948: Q1)	4	2
April 1951 (1951: Q1)	December 1951 (1951: Q4)	4	3
July 1953 (1953: Q2)	July 1954 (1954: Q2)	5	4
March 1957(1957: Q1)	January 1958 (1958: Q1)	5	3
March 1960 (1960: Q1)	March 1961 (1961: Q1)	5	3
December 1974 (1974: Q4)	March 1975 (1975: Q1)	2	2
January 1980 (1979: Q4)	June 1980 (1980: Q2)	3	1
June 1981 (1981: Q2)	October 1982 (1982: Q4)	7	4
March 1990 (1990: Q1)	April 1992 (1992: Q2)	10	4
October 2008 (2008: Q3)	May 2009 (2009: Q2)	4	4

Source: Adapted from Cross and Bergevin (2012)

A review of existing literature revealed a focus only on a fluctuation in economic activity rather than the complete business cycle, thus evaluating either contraction or expansion periods. Furthermore, the existing literature concentrates on the global economy rather than the relationship between the oil price and stock market returns. Volatility transmission across capital markets is of increasing interest to the financial community and the increasing trend of financial globalisation worldwide. Therefore, it is imperative to evaluate the effect of oil prices on stock returns during different business cycles using Canada as a case. Market situations and geographical proximity play a vital role in explaining the intensity of shock spillover since the latter tend to be more critical during crisis periods than normal (or tranquil) ones (Arouri, Lahiani and Nguyen, 2011).

According to the NBER, the U.S. recorded eleven business cycles from 1945 to 2009, with the average length of a cycle lasting about sixty-nine months, or a little less than six years. The average expansion during this period lasted 58.4 months, while the average contraction lasted only 11.1 months. The business cycle is effectively used to position one's investment portfolio. During the early expansion phase of the business cycle, cyclical stocks in the commodities and technology sectors tend to outperform. During the recession, sectors like health care, consumer staple and utilities, classified as defensive groups, usually outperform because of their stable cash flows and dividend yields. The default mode of the economy is typically an expansion, with contractions being much shorter and less common. The last expansion was determined to have commenced in June 2009, when the Great Recession of 2007–2009 reached its trough. Economists' views usually differ on why contractions occur even when there is a clear business cycle. While the 2001 U.S. contraction was preceded by an absolute mania in dot-com and technology stocks, the 2007–2009 recessions followed a period of unprecedented speculation in the U.S. subprime mortgage market.

Hamilton (1983) tests if oil price changes precede recession in the U.S. economy. He affirmed that seven of the eight post-war recessions in the U.S. were preceded by a dramatic increase in crude oil prices, i.e., a spike preceded most U.S. recessions in oil prices. He concluded that despite these numbers, it does not indicate that oil shocks caused these recessions. However, oil shocks contributed to some U.S. recessions after World War II. Hamilton (1989) investigated a general equilibrium model of unemployment and the business cycle where labour specialisation has a significant role. He established that the unemployed labour force borne out of an oil price increase could not be immediately transferred to other sectors due to frictions in the labour market. As a result, the falling employment rate resulted in an economic recession.

While worldwide recessions characterised the mid-1970s and early 1980s, many researchers observed a global boom from 1972 to 1974 and a lesser extent, between 1978 and 1980 (Darmstadter and Landsberg, 1976). There has been a global boom in commodity markets since the early 2000s, driven by strong economic growth worldwide, particularly in Asia. While evaluating the U.S. business cycle, Bernanke, Gertlet and Watson (1997) argued that oil price shocks do not cause a recession. However, the shocks could lead to the application of macroeconomic policies that would cause a recession. The Federal Reserve in the U.S. responded to higher oil prices by increasing interest rates to control inflation. However, Hamilton and Herrera (2004), Hoover and Perez (1994) and Davis and Haltiwanger (2001) modified Bernanke, Gertlet and Watson (1997) by confirming that oil shocks are more important than monetary contraction. According to Kilian (2009), more direct evidence of how the global business cycle affects industrial commodity markets must be provided.

The study of Kilian and Park (2009) stressed that if an unanticipated global economic expansion drives higher oil prices, there will be persistent positive effects on cumulative stock returns within the first year. This outcome is because the stimulus emanating from a global business cycle expansion initially outweighs the drag on the economy induced by higher oil prices. They made the above submission while examining the impact of oil price shocks on the U.S. stock market between 1975 and 2006. Monthly data include world crude oil production (the real price of crude oil imported by the U.S.), an indicator of real global activity, and some selected U.S. Stock market variables were employed. Recessions can extract a tremendous toll on stock markets. Most of the major equity indexes worldwide endured declines of over 50% in the 18 months of the Great Recession of 2007–2009, which was the worst global contraction since the 1930s depression (Islam and Verick (2011). Global equities also underwent a significant correction in the 2001 recession, as Nasdaq Composite was among the worst hit when it plunged almost 80% from its 2001 peak to its 2002 low.

Precautionary demand shocks, caused by wars or terrorist attacks and aggregate demand-side shocks caused by fluctuations in the world business cycle (housing market boom, Asian crisis, global financial crisis and Chinese growth) tend to influence the correlation between oil and stock market prices in much greater extent compared to supply-side shocks originated by OPEC's production cuts or hurricanes (Filis, Degiannakis and Floros 2011). These authors further affirmed that economic crises or booms trigger a stronger positive link between oil prices and stock markets, and non-economic crises trigger a stronger negative link between oil prices and stock markets, on the other hand. The correlation increases positively (negatively) in response to important aggregate demand-side (precautionary demand) oil price shocks, which are caused due to global business cycle fluctuations or world turmoil like wars. However, the time-varying correlation does not differ for net oil-importing and net oil-exporting economies. Supply-side oil price shocks do not influence the relationship between the two markets. The lagged correlation results show that oil prices exercise a negative effect in all stock markets, regardless of the origin of the oil price shock. The only exception is the 2008 global financial crisis, where the lagged oil prices exhibited a positive correlation with stock markets. Finally, they concluded that the oil market is not a haven for offering protection against stock market losses in periods of significant economic turmoil.

In assessing the relationship between oil price shocks and stock market performance on daily data between 1 January 1993 to 31 March 2009, Sehgal and Kapur (2012) used market index data for fifteen sample countries. The sample countries were classified into four categories based on their economic strength and net oil-exporting/-importing status to verify if the testable relationship varies across different economic settings and employed the GLS procedure. Furthermore, the study quarantined the estimation process for abnormal global economic events, such as (a) the Asian market crisis (1997–1998), (b) Telecom Bubble (1999–2000), (c) World Trade Centre Bombing (2001), (d) Second Iraq War (2002), and (e) the more recent global economic crisis of 2008. Following the estimation of results, the study found no significant pre-event returns for any sample capital market for negative and positive shocks. On a post-event basis, the study found that four economies, India, South Korea, Indonesia, and the U.S., provided significantly positive returns in response to negative oil price shocks. Further, it was observed that the Chinese economy also responds to these negative shocks, but in a lagged manner. Three sample countries, India, Russia and Indonesia, provided significant and positive post-event returns in positive oil price shocks.

Mollick and Assefa (2013) used GARCH and MGARCH-DCC models on daily data from January 1999 and December 2011 to examine U.S. stock returns (S&P 500, Dow Jones, Nasdaq, and Russell 2000) based on a range of information, including equity VIX volatility, interest rates, inflation expectations, USD/Euro exchange rates and gold prices. They concluded that stock prices react differently depending on the specific period: bear or bull, as the variables' relationship may vary. They observed that U.S. stock returns were negatively and slightly affected by oil prices and the USD/Euro before the financial crisis. After the financial crisis, the reverse was the case, as the U.S. stocks responded positively to oil prices and a weaker USD/Euro. In addition, U.S. stocks respond positively to inflation expectations of worldwide recovery. They reaffirmed Engle's (2004) earlier findings that volatility was higher in a bear market in October 1987, while low volatility was recorded after the 1987 crash. However, the volatility began to rise as stock prices appreciated.

Similarly, Brayek, Sebai and Naoui (2015) examined the relationship between oil prices and the U.S. dollar exchange rate. The study employed monthly crude oil prices and nominal exchange rates expressed in USD between January 2000 and April 2014. The study utilised a copula approach and the DCC-MGARCH model. The study period was divided into sub-periods: pre-crisis, crisis and post-crisis to identify a possible impact and interdependence between oil prices and exchange rates during the global financial crisis. Following the estimation of results, the study found that oil prices and exchange rates are independent during the pre-crisis period. However, evidence of this impact and a positive dependence between the variables were reported after the crisis onset. In addition, the study found that oil prices influenced exchange rates and vice versa during the crisis period but not during the pre-crisis period. Thus, the study recommended that economic policy reactions could potentially minimise the macroeconomic consequences of oil shocks transmitted through supply and demand.

Donayre and Wilmot (2016), who used a TVAR to examine the asymmetric effects of oil price shocks on the Canadian economy, argued that asymmetry was significant during recessions but not apparent during expansions. They further observed that the decline in inflation rates due to the negative impact of oil price shocks was more significant than the increase in inflation rates after the positive oil price shocks, particularly during periods of low output growth.

The study of Balcilar, Gupta and Wohar (2017) investigated the impact of permanent and transitory shocks within the framework of typical cycles and trends on stock and oil prices in the U.S. The study employed a dataset covering 150 years, from September 1859 to July 2015, obtained from Global Financial Data and seasonally adjusted using the X-13 procedure of the U.S. Census Bureau. The study examined the short- and long-run co-movement of oil and stock prices using the restricted VECM. Also, the study performed a multivariate variance decomposition analysis of monthly data on the WTI oil price and the S&P 500. The study found that (log) oil price and (log) S&P 500 share a common stochastic trend for their entire sample, but a typical cycle only exists during the post-World War II period. Complete and post-World War II samples have different common feature estimates regarding the impact of permanent and transitory shocks as measured by the impulse responses and forecast error variance decompositions. The study also found that in the short-run, oil is driven mainly by cycles (transitory shocks), and permanent shocks mainly drive the stock market, but permanent shocks dominate in the long-run for both oil and the stock market.

Zhu *et al*. (2017) examined the effect of oil price shocks on stock returns using the two-stage Markov regime-switching model. Their results indicate that oil supply and demand shocks have a statistically insignificant impact on stock returns in a low-volatility regime and a statistically significant impact in a high-volatility regime. That is, the effect of supply and demand shocks varies between low-volatility and high-volatility regimes. The relationship between the business and stock market cycles in China was further examined by Si, Liu and Kong (2019) using wavelet analysis on quarterly data from Q1 1992 to Q1 2018. They conclude that the stock market cycles lead the business cycle during expansion while positively correlated. On the other hand, there is a negative correlation when the business cycle leads the stock market cycle.

Sharif, Aloui and Yarovaya (2020) evaluated how Covid-19 -induced economic recession affects oil price shock and stock market returns in the U.S. The study also attempted to provide insights into how economic policy uncertainty and geopolitical risk affect stock market volatility. Thus, daily data of the number of confirmed Covid-19 cases in the U.S., oil price (proxied by WTI benchmark crude oil price), US-GPR (geopolitical risk index), US-EPU (news-based index) and Dow Jones 30 index between 21 January 2020 and 30 March 2020 were gathered. The wavelet-based Granger causality and coherence wavelet method was employed. The study found that Covid-19 impacted more on U.S. geopolitical risk than economic uncertainty. This uncertainty is occasioned by the reactions of the Federal Reserve to the pandemic. Furthermore, the study found that the oil slump has the highest impact on the stock market returns in the U.S. when compared to the Covid-19 pandemic, GPR and EPU. Other finding includes the Covid-19 outbreak negatively affecting oil price through its impact on travel restrictions.

Despite Kilian and Park's (2009) arguement that oil price and the stock market will have a positive correlation at the onset of the business cycle, the role of the period of boom and recession in oil price and stock market nexus remains unclear. Therefore, this study tests the hypothesis that *the business cycle does not explain the congruent interface between oil prices and the Canadian stock market*.

2.4.5 Oil Prices and the Stock Markets of Net Oil-Exporting & Net Oil-Importing Countries

A country whose oil import value is higher than its value of oil export over a given period is classified as a net oil-importing country and vice versa. Some researchers argued that oil price variations have strong and negative consequences for net oil-importing countries

(Nandha and Faff, 2008; Jimenez-Rodriguez and Sanchez, 2005; Sadorsky, 1999). Their arguement is based on the fact that high oil prices would reduce oil supply, thus leading to a decrease in economic output, as oil is a significant input to production. This outcome would subsequently lead to a decrease in the total output of goods and services for such a country. Likewise, some researchers hold a contrary position.

Oil prices boost overall growth as it boosts the asset price and aggregate wealth. In an abundant oil country, asset prices may be an important transmission channel of wealth. A higher oil price for an oil-exporting country implies the transfer of wealth from an oil-importing country to an oil-exporting country. The medium and long-term effects of the wealth effect would be determined by how the oil-exporting government uses the extra income from an oil price increase. For example, this would increase the domestic economy level, where such excess funds could be used to purchase goods and services locally. An increased level of domestic economic activity would increase the overall wealth and demand (for labour and capital), thus providing colossal investment and business opportunities in the overall economy. However, the overall increased activity could increase inflation (Haldane, 1997).

Most oil-exporting countries' economies are usually dependent on revenue generated from oil exports, so they are susceptible to changes in oil prices (Bjørnland 1998). Thus, an oil price increase is considered good news for net oil-exporting countries. The International Monetary Fund estimates that a $5 increase in the price of oil per barrel would provide an increase in global earnings of $65 billion for an oil-exporting country (Mussa 2000).

Higher oil prices in oil-exporting countries generate additional income and wealth, which would lead to higher economic activity (Jimenez-Rodrıguez and Sanchez 2005; Bjørnland 2000, 1998). Nevertheless, there is no empirical evidence of the effect of changes in oil prices on the macroeconomic performance of such countries. The above analysis of higher economic activity due to high oil prices applies to Norway and not the UK and Canada. Hammoudeh and Aleisa (2004) discovered the importance of the oil factor for stock prices in certain oil-exporting economies. They examine the oil sensitivity at the aggregate level for five Gulf markets, including Saudi Arabia. They concluded that only the Saudi market has a bidirectional causal or mutual predictive relationship with daily oil price changes. However, their results confirmed that the stock returns of the smaller oil exporters like Kuwait and Oman have no causal relationship with oil price changes. Bjørnland (2009) highlighted the effect of higher oil prices on Norway's economy (a net oil-exporting country) from two perspectives: positive income and wealth effects and adverse trade effects.

Oil prices would affect stock and asset prices because higher oil prices reduce the purchasing power of domestic households as consumers have lower discretionary income for other goods due to the increased cost of energy (Kilian 2009). Through the wealth channel, such asset prices would influence consumption and investments by the Tobin Q effect and eventually increase the firm's ability to access internal and external funds to increase investment. In Tobin's general equilibrium model of the financial sector, he emphasised stock return as an essential link between the real and financial sides of the economy. Minsky (1986) illustrated how stock returns would respond to changes in the model's monetary and fiscal policy variables. Tobin's theoretical analysis suggests that both money growth and budget deficits may significantly impact stock returns. With assumptions based on the closed economy and each sector constrained by its net worth, and members free to choose their balance sheet based on the past accumulation of assets and current asset prices, Tobin confirmed the sum over all assets of responses to a change in any rate of return r_k as zero for any sector:

$$\sum_{i=1}^{n} \frac{\partial f_{ij}}{\partial r_k} = 0 \qquad (2.12)$$

Where each asset's rate of return = r_i (i = 1, 2………..n) and j represents each sector (j = 1, 2………..m), to have a net demand for each asset, f_{ij}, which is a function of the vector r_i, and possibly of other variables.

Over time, individuals may save or make capital gains or losses. Thus, the sum of assets changes due to changes in wealth while equal to one:

$$\sum_{i=1}^{n} \frac{\partial f_{ij}}{\partial W_j} = 1 \qquad (2.13)$$

High oil prices increase production costs for goods and services within the economy, given the relative price of energy inputs. That is, there will be both a direct and indirect impact on financial markets. Actual and anticipated changes in economic activity affect equity prices, bond valuation, and currency exchange rates. Following the oil price increase, such economic activity includes corporate earnings, inflation, and monetary policy (Mussa, 2000). Oil prices also affect stock prices through the cash flow of oil-related firms (Bjørnland, 2009). Asset prices may influence consumption through a wealth channel and investments through the Tobin Q effect and subsequently increase the firm's ability to fund operations. The study hypothesises that an oil price increase, for example, in an oil-exporting country such as Norway, boosts aggregate wealth and stock returns and boosts the country's overall wealth. Thus, policymakers in countries like Norway would respond to curtail the effects of oil prices that result in higher inflation or changes in aggregate demand.

With an increase in oil prices, net oil-importing countries would reduce their demand for non-oil traditional goods, thus creating a negative stimulus for net oil-exporting countries. However, the positive wealth and negative trade effects remain uncertain (Bjørnland 2009). Barsky and Kilian (2004) showed that exogenous political events in the Middle East are one of the several factors driving oil prices. In addition, oil price shocks are not necessary or sufficient to explain stagflation in real GDP and the implicit GDP deflator. Jimenez-Rodriguez and Sanchez (2005) focused on the relationship between oil prices and GDP growth in terms of VARs. They affirmed that the real GDP growth of oil-importing economies is negatively affected by increases in oil prices in both linear and nonlinear models. Kilian (2008) equally suggested that there are no two oil price shocks that are alike. He affirmed that most oil price increases or decreases had been driven by a combination of strong global demand for industrial commodities (including crude oil) and expectation shifts that increase precautionary demand for crude oil specifically. These expectation shifts reflect the market's perception of the likelihood of a future shortfall in oil supply. Wei (2003) found that with a 10% increase in oil prices, stock returns increase by 2.5%, and the economy responds to higher oil prices due to increased aggregate wealth and demand.

While considering oil prices as potentially endogenous in an economy, Apergis and Miller (2009) used the VEC and VAR models. The study investigates how the explicit structural shocks characterising the endogenous character of oil-price changes affect stock prices across eight countries (Australia, Canada, France, Germany, Italy, Japan, the UK, and the U.S.). They conclude that different oil-market structural shocks play a significant role in explaining the adjustments in stock market returns, though the magnitude of such effects is small. In Australia, the oil supply and global aggregate-demand shocks do not explain stock returns significantly, whereas it is a contrary position in Canada at a weaker level of significance. The idiosyncratic demand shocks Granger causes the stock market returns, but the oil supply and global aggregate-demand shocks do not lead to the stock market returns.

Filis, Degiannakis and Floros (2011), while investigating the correlation between oil prices and the stock market, conclude that the time-varying correlation between oil and stock prices do not differ from net oil-importing and net oil-exporting economies. Especially where fluctuations in the global business cycle cause the aggregate demand-side oil price shocks, they are expected to influence all stock markets in the same manner. However, time-varying correlations change in response to the origin of oil price shocks in periods of world turmoil or changes in the phase of the global business cycle. In agreement with the findings of other researchers, oil prices do not affect stock prices (Miller and Ratti, 2009; Lescaroux and Mignon, 2008; Blanchard and Gali, 2007).

Using SVAR on monthly data from January 1999 to December 2011, Wang, Wu, and Yang (2013) investigated oil price shocks and stock market activities. They analysed data from net oil-importing countries (the U.S., China, Japan, France, Germany, the UK, Italy, Korea and India) and net oil-exporting countries (Saudi Arabia, Norway, Kuwait, Venezuela, Mexico, Russia and Canada). They observed that the stock market's duration, magnitude, and direction of response to oil price shocks depend highly on whether the country is a net oil importer or a net oil exporter. The effects of aggregate demand uncertainty on stock markets in net oil-exporting countries are much stronger and more persistent than in net oil-importing countries. The level of importance of oil to the national economy also determines its effect on stock market returns. The study concludes that there is no significant nonlinear relationship between changes in oil prices and stock market returns for most countries in their sample.

While investigating the impact of oil prices on stock market returns from the Gulf Cooperation Council (GCC), Naifar and Al Dohaiman (2013) used Markov regime-switching models on daily data from 7 July 2004 to 10 November 2011. They conclude that oil price volatility impacts both oil-exporting and oil-importing countries. The GCC economies significantly depend on oil, and such GCC economies were characterised by high volatility of exports, significant uncertainty and, eventually, government revenues. Oil price fluctuations have substantial effects on stock markets and macroeconomic variables in GCC economies and considerably affect the government budget. They affirmed that Markov switching models could offer a helpful framework to capture the unstable nature and time-varying links between stock market returns and oil price variables. Regime-switching models may explain oil price sensitivity and financial market returns in crisis and tranquil regimes to oil price shocks. They further concluded that the relationship between oil price volatility and GCC stock market returns is regime dependent, except for the Oman market, where investors ask for the lowest premium during the low volatility state of oil prices.

Evidence from net oil-exporting and net oil-importing economies abounds that the oil price movement plays an essential role in stock and general economic performance. Existing studies indicate that a general increase in oil prices favours oil-exporting countries' stock markets more than their oil-importing counterparts. A demand-led rise in oil prices would favour stock markets across the globe by stimulating the aggregate economy. In contrast, the supply-driven surge in oil price shocks carries a less significant role in explaining fluctuations in stock returns (Basher, Nechi and Zhu, 2014). Empirical works on the relationship between oil price movement and stock performance have been developed in net oil-exporting and net oil-importing countries. For instance, Berument, Ceylan and Dogan (2010) examined how oil price shocks affect productivity growth in sixteen selected Middle East and North Africa (MENA) countries, including net oil exporters. They concluded that a standard deviation shock in oil prices had a statistically significant positive effect on the growth of several major net oil-exporting economies like Algeria, Iran, Iraq, Kuwait, Libya, Oman, Qatar, Syria, and the United Arab Emirates. Recent research efforts have also laid credence to this fact.

Khalfaoui, Sarwar and Tiwari (2019) analyse the volatility spillover between oil prices and stock markets for oil-importing countries (the United States and China) and oil-exporting countries (Saudi Arabia and Russia) using DCC and cDCC GARCH models on daily data from January 2010 to December 2016. They observed that oil asset is relatively more critical for oil-exporting countries than for oil-importing countries. Oil-importing countries are severely affected by lagged oil price shocks compared with the lag effect of oil price shocks on oil-exporting countries.

In corroborating this view, Mokni (2020) examined how oil price shocks affected the stock markets of some selected oil-importing and oil-exporting countries. The study sampled Russia, Norway and Canada as oil-exporting countries, while oil-importing countries include the USA, China and Japan. A time-varying asymmetric quantile regression model was employed using weekly data from 01 April 2000 to 31 December 2018. The study found that the stock markets respond to oil price shocks in time-varying and heterogeneous dimensions. During the financial crisis, the study observed that the two markets were highly dependent. Other findings from the study affirm that the oil price and stock market relationship is asymmetrical.

Chikir, Guesmi, Brayek and Naoui (2020) compared the interrelationship between oil prices, stock markets, and exchange rate movements in oil-importing and oil-exporting countries of Australia and Canada, France, Japan, Mexico, Norway and the UK. They use daily data from 4 January 1990 to 3 March 2017. The asymmetric GARCH family models and vine copulas approach was applied. Their study affirmed that the dependence between the stock markets and WTI was significantly positive for all sub-periods, and the impacts were statistically significant for most countries.

Furthermore, Hashmi, Chang and Bhutto (2021) examined the effect of oil prices on stock markets in oil-exporting countries (Russia, Mexico, Venezuela and Norway) and oil-importing countries (India, China, Japan and South Korea). They model the quantile ARDL on daily data from 25 September 1997 to 20 March 2020. Their study concludes that no long-run cointegration exists for both oil-exporting and oil-importing countries. They further affirmed that stock prices in both oil-exporting and oil-importing countries asymmetrically respond to oil price shocks.

As indicated above, most studies concluded that oil price shocks affect the stock markets of oil-exporting and oil-importing countries. Some authors argue that the correlation between oil prices and stock markets of oil-exporting and oil-importing countries differs. At the same time, other studies affirm that there is no cointegration between oil prices and the stock markets of oil-exporting and oil-importing countries. It was argued that an increase in oil price leads to a positive wealth effect through the excess income gained from the increased oil price for an oil-exporting country. An increase in oil prices for an oil-importing country leads to a reduction in disposable income, with households left with fewer funds to spend on other goods and services besides petroleum products. In a final analysis, positive aggregate and precautionary demand shocks are shown to result in a higher degree of co-movement among the stock markets in net oil-exporting countries but not among those in net oil-importing countries. Thus, the study tests the hypothesis that *oil price shocks do not affect stock market performance in net oil-exporting countries differently from net oil-importing countries*.

2.5 Summary of Literature and Research Gaps

This chapter reviewed the theoretical and empirical literature on oil prices and the stock market relationship. The chapter presented the theories and approaches that have been majorly used in oil price shocks, macroeconomic indicators and stock performance literature. This review would help in rejecting or failing to reject the predefined hypotheses. In this regard, the chapter begins with the exploration of theoretical literature on Classical, Neoclassical, Keynesian and New-Keynesian Theories. The study further identifies some other relevant theories of stock market performance and oil prices. These include the Financial Instability Hypothesis, EMH, DVM, CAPM, APT and Hotelling's Theory on Price.

Following the literature review, it became apparent that only some theories can fully explain the association among the study variables. Many of these theories overlap as they explain the interactions between oil prices and stock performance from different perspectives. The study is anchored on the theoretical underpinning of the New-Keynesian theory of Sticky Price, the CAPM and the APT. The Sticky Price model's central thesis is that market imperfection leads to price rigidities occasioned by menu costs. In other words, the cost of market analysis is required to find the right price, the cost of bringing the new price to the notice of customers, and the cost of losing customer goodwill, among others. This price stickiness impedes investors' ability to predict and interpret corporate revenue and profit, which has significant implications for stock valuations. In sum, the model postulates that stock performance (returns) and corporate income should be higher for those firms with stickier prices when there are macroeconomic shocks.

The critical stance of oil in the global economy and increased exposure of economies of both oil-importing and oil-exporting countries to oil price shocks have reignited interest in the topic. Many of the previous studies that compare the impact of oil price shocks on stock markets in both oil-exporting and oil-importing countries mostly rely on the country or region-specific aggregate stock indices (Chikir, Guesmi, Brayek and Naoui, 2020; Mokni, 2020; Nandha and Faff, 2008; Jimenez-Rodriguez and Sanchez, 2005; Bjørnland, 2000, Sadorsky, 1999; Haldane, 1997; Huang, Masulis and Stoll, 1996; Jones and Kaul, 1996;

Gisser and Goodwin, 1986; Burbidge and Harrison, 1984). One fundamental problem of exploring the oil price-stock market nexus using aggregate stock market indices is underestimating the heterogeneity of relationships across different economic sectors. Therefore, it is necessary to know the dynamics of oil price movements and sectoral stocks in the New Keynesian Model. Few studies (Yasmeen, Wang, Zameer and Solangi, 2019; Okoye, Mbakwe and Igbo, 2018; AL-Risheq, 2016; Aye, Dadam, Gupta and Mamba, 2014) focus on the oil prices and sectoral stock linkage and employed VAR among other regression analyses.

Zivot and Wang (2006) classified the VAR model as one of the most successful, flexible, and easy-to-use models for analysing multivariate time series. They viewed the model as a natural extension of the univariate autoregressive model to dynamic multivariate time series. They point out that the VAR model has proven to be especially useful for describing the dynamic behaviour of economic and financial time series and forecasting. However, Granger and Swanson (1997, p. 364) held a contrary opinion concerning the contemporaneous correlation among the residuals of a VAR. They confirmed that where such contemporaneous correlation is present, IRF's and forecast-error variance decompositions are easily interpretable only after the residuals of the VAR have been orthogonalised. They further affirmed that the one argument against the robustness of VAR results has been that this orthogonalisation involves the subjective specification of a structural model of the errors. Thus, this research addresses the gap identified in previous studies by considering composite sectoral indices analysis using the EGARCH model. The model is one of the common approaches to price movements (volatility) studies as recent empirical studies of Emir (2021), Zhou (2021), Mohsin *et al*. (2020), Yıldırım and Celik (2020), Tache and Darie (2019) and Sikhosana and Aye (2018) validated the effectiveness of the EGARCH model in similar studies.

Secondly, most of the recent studies on the oil-stock nexus are conducted in seclusion from the business cycle. According to Sharif, Aloui and Yarovaya (2020), oil price shocks and the business cycle are somewhat interconnected, and both have a combined effect on stock returns. It is worth mentioning that shocks in the oil price are expected to impact inflation, relative prices, real incomes, and employment (Kang and Ratti, 2013). These adverse impacts of shocks in oil prices would affect aggregate economic activities, leading to a decline in investment and stock market activities. Therefore, there is a combined influence of oil shocks and the business cycle on stock returns. Despite its economic significance, empirical literature detailing both oil price shocks and the business cycle is limited. This study would narrow this gap as it seeks to assess the interface of the business cycle on oil price shocks and stock market performance using the Markov switching process.

Thirdly, most of the previous studies overlook heterogeneity, heteroskedasticity and volatility clustering that is inherent in stock prices. The review observed that the nonlinear effect of shocks in oil prices is not considered, as evidenced by the analytical techniques employed. According to Reboredo and Ugolini (2016), stock price reactions to shocks in oil prices are complex. Similar findings are also noted by studies of You, Guo, Zhu and Tang (2017); Peng, Zhu, Guo and Chen (2018); and Chang *et al*. (2020). Thus, it is crucial to ascertain how oil price shocks affect stock returns while considering the heterogeneity, heteroskedasticity and volatility clustering features. This fallout underlines the GARCH approach, which analyses the impact of independent variables on the conditional distribution of the dependent variable. The GARCH approach has been acknowledged as a more suitable econometric tool for evaluating the link between oil price shocks and stock returns (Reboredo and Uddin, 2016; Broadstock, Cao and Zhang, 2012; and Lee and Zeng, 2011).

Finally, most of the existing studies assume that the effect of an exogenous increase in the price of oil is the same, regardless of the economic framework of countries. A likely concern is that the impact of oil price shocks on net oil-exporting countries' economies may differ from those of net oil-importing countries. For instance, earnings from oil exports largely determine public revenues, expenditures and general aggregate demand in most oil-exporting countries (Bjørnland 2009; LeBlanc and Chinn 2004; Hooker 2002). The increasing oil revenues, public spending, and aggregate demand are expected to induce both public and private expenditures (including investments) that, in turn, boost transactions on stock markets (Arouri and Nguyen, 2010; Chiou and Lee, 2009; Hammoudeh and Li, 2008; Keynes, 1936). Despite this apparent relationship, research on the impact of oil price shocks and stock markets in net oil-exporting countries has continued to lag. In sum, previous research studies fail to combine various strands of the phenomenon for a holistic view, robust outcome and the ability to broaden the understanding of the nexus. For this type of research, and to the best of the researcher's knowledge, previous studies did not verify outcomes using qualitative research methods using primary data but adopted different quantitative techniques.

Chapter Summary

The chapter clarifies the various thesis concepts after considering many opinions by different scholars. While the study considers ten countries with an emphasis on Canada, this chapter also reviewed the performance of the Canadian economy. A review of previous empirical studies and the development of hypotheses follow this discussion. Gaps in the literature being bridged by the present study were also identified in this chapter. The methodology is discussed in the next chapter.

Chapter 3 Methodology

3.1 Introduction

In the previous chapters, the study explained many issues that trigger the imperativeness of this present investigation. More important are the research questions identified in the general introduction chapter, the subsequent literature review and its limitations. *Research* is an empirical and systematic investigation designed to contribute to instrumental knowledge. Research methodology is the systematic and theoretical analysis of the methods applied to a field of research. It is a systematic process that includes identifying, designing, doing and describing an investigation into research problems for findings to increase knowledge (Maylor and Blackmon, 2005). This chapter explains and justifies the methodology used in this research, as methodologies demonstrate branches of knowledge and strategies of inquiry that influence research choices (Patton, 2015, cited in Mwangi and Bettencourt, 2017). The explanation and justification are a systematic approach that provides a comprehensive framework for conducting this study while analysing the theoretical methods adopted and applied in the thesis. Social science scholars have used different methodologies and approaches in examining the relationship between variables. This chapter introduces various research philosophies discussed in the different research areas. It comprises the philosophical approach, theoretical analysis of the methods and principles related to the knowledge. In different words, this chapter explains and justifies the methods used in the study. Furthermore, different paradigms and approaches are compared to justify the best methodology for the current study.

The methodologies were structured to explain certain variables or critical economic indicators that enable the appreciation of some variance in the impact of oil prices on stock market performance. This approach allowed the researchers to observe "causality" where it exists and explain why causality is experienced. The reflective practitioner theory was engaged in data analysis because it allows for the impetus of “paying critical attention to the practical values” (Bolton, 2010). The reflective experience provides descriptions, feelings, evaluation, analysis, conclusions, and an action plan (Argyris and Schön, 1978).

3.2 Research Philosophy

Social scientists have developed various research paradigms for explaining social behaviour (Babbie, 2014). Research paradigms are principles or structures for observation and understanding that shape what researchers see and how researchers understand what they see (Babbie and Mouton, 1998). Blaikie (2010) referred to research paradigms as traditions, philosophical hypotheses, or assumptions. These philosophical assumptions consist of a stance towards the nature of reality (ontology), how the researcher knows what he or she knows (epistemology), and (methodology) the methods used in the process (Creswell, 2014; Taylor and Medina, 2013). Philosophical theories distinguish the road map of an investigation.

Research philosophy is concerned with how data about an event or a phenomenon should be obtained, analysed, and interpreted. Gemma (2018) viewed research philosophy as what the researcher perceived as truth, reality, and knowledge. According to Blumberg, Cooper and Schindler (2005), research philosophy involves issues regarding knowledge development or the world's workings and the nature of that knowledge. The authors aver that knowledge development depends on theory (the underlying reasoning) and data (observation/information). When applied to this study, the concept of research philosophy clarifies the research design/plan, approach/method, data collection and analysis methods. Overall, research philosophy usually involves what is real and how researchers learn anything in the world, such as realism, positivism, interpretivism, objectivism, functionalism, pragmatism, and radical humanism. Crossan (2013) opined that the four main research paradigms are interpretivism, pragmatism, positivism and post-positivism. However, Ryan (2018) viewed positivism, interpretivism, and critical realism theory as the three main philosophical research paradigms used to guide research methods and analysis. Practical implications impact the choice of research philosophy.

The choice of a research philosophy varies from one study to another. However, the researcher's choice is determined by the nature of the phenomenon of study. According to Howell (2013), critical realism, outlined by the Frankfurt School (Bronner, 2011), values modified subjectivity and assumes that the researcher is manipulated by power structures while being influenced by their own experience and perceptions. The object and subject of a study are linked, and the researcher constitutes part of the object of inquiry. The ontology of critical realism is based on relativism. Hammersley (2013) opined that critical researcher undertakes their studies considering the social, economic, political, and cultural context. The critical inquiry aims to identify, contest, and help solve "gross power imbalance" in society in order to contribute to the system inequalities and justice as social and economic exclusion (Taylor and Medina, 2013).

The pragmatic consideration of the phenomenon being examined determines the choice between positivist, interpretive, or both research philosophies. In selecting a suitable research philosophy and methodology, Saunders, Lewis and Thornhill (2019) stressed the need for researchers to be guided by their study objectives and questions. Thus, in line with this study's objectives and questions, the study seeks to enrich knowledge on how oil price shocks impact stock market performance. In addition, the study compares the implications of oil prices on the stock markets of net oil-importing countries to those of the net oil-exporting countries.

Concentrating on Ryan's (2018) view of philosophical research paradigms and the above views on critical realism theory, this study draws a deeper view of positivism and interpretivism. The trajectory of this work showcases a combined approach based on philosophical theories as an instrument of engagement in the investigation of the phenomenon of the impact of oil prices on stock market performance. Hence, the work of positivism and interpretivism are combined to explain the philosophical basis for this investigation. The combined approach expands the variation and allows the opportunity to leverage the strengths and weaknesses of both positivism and interpretivism research philosophy. This research is among the few studies that evaluate research philosophy while investigating the phenomenon.

The interpretivism research paradigm believes that the human experience of the World is subjective and not objective and shaped by human experience in describing situations (Cronje, 2013). Knowledge is viewed as flexible, personal, novel, and subjective. Interpretivism researcher provides empirical confirmation that data about a phenomenon is gathered through subjective perspective and analysed by observing various participants included in the phenomenon. The interpretivist maintains that descriptive research is based on words and models of behaviour. Data gathering can only be constructed from human experience, which requires an account to come to conclusions regarding the question of how and why, which are examined through an investigation. Hence, the researcher is engaged with the subject. Aliyu *et al*. (2014) opined that interpretivism replaces positivism due to their view of truth or reality as a social construct or composition of the mind's inner feelings. Interpretivist research is conducted utilising critical methodologies like grounded theory or a case to gain the insider's authentic information about the object of research (Tuli, 2010).

Valuable data collection tools like interviews or questionnaires allow the researcher to investigate things that cannot be observed promptly. This study administered a questionnaire to verify and triangulate the outcome of data obtained from secondary sources. Data obtained through surveys significantly enhances quantitative positivistic work quality even where such field data is not massive (Ittner, 2014). Interpretive research has unique advantages. It is helpful for theory construction and is also appropriate for studying unique or context-specific processes and providing answers to relevant research questions. However, this research paradigm also has its set of challenges. Interpretive research is often time and resource intensive. With the use of small data, the credibility of participants, bias or knowledge of the phenomenon could give misleading, false or premature conclusions. The ontological view of interpretivism is subjective and not objective (Mack, 2010). This subjective nature causes biased research outcomes based on the researcher's views, interpretations, or cultural preferences.

Developed as a truth-seeking paradigm by Auguste Comte's criticism of metaphysics, the positivist paradigm formed the foundation for the subsequent development of social sciences (Babbie, 2014). Positivists assume that reality is relatively independent of the context, abstracted from their contexts, and studied in a decomposable functional manner using objective techniques such as standardised measures. Hence, the outcome of positivist research is considered reliable (Antwi and Hamza, 2015). It is established on the ontological principle and doctrine that reality and truth are independent of the viewer and observer (Aliyu *et al*., 2014). Positivist research selects cases randomly from a population for the fundamental goal of generalisation and applies statistical procedures that are employed heavily in such research.

According to Uddin and Hamiduzzaman (2009), positivism as a research philosophy argues that studies and other kinds of philosophical inquiry in humanities should follow the methods of natural sciences. This arguement would mean that knowledge could only be obtained through the affirmation of theories. In this regard, proponents of positivism believe that knowledge should be based on data gathered objectively from observable experience and that only analytic statements should be regarded as accurate (Davis, 2007). The key strength of the approach is its reliability and validity of research results while aiming to generalise the outcome. The positivist researcher believes that data gathering is sacrosanct to the natural. Despite the strength of reliability and validity, the accuracy of the data collected should be carefully reviewed to avoid random answers by respondents.

In addition, the use of the paradigm to measure intention, attitudes, and thoughts-related phenomena poses a challenge (Hammersley, 2013).

Given the above, the study aligns with the philosophical assumption of positivism and interpretivism, while the positivist paradigm was supplemented with the interpretivist paradigm. In contrast to interpretivism, the concept of positivism suggests the use of scientific methods to investigate the study of social science problems. The study uses empirical evidence alongside the opinions of individuals/groups to describe how shocks in oil prices affect stock market performance. Thus, the predefined research objectives or questions posed in the introductory chapter would be achieved or answered using empirical evidence and participants' opinions. According to Hammersley (2013), understanding the phenomenon should be measured and supported by evidence. Pham (2018) opined that applying certain paradigms in a research study is essential in delivering reliability, validity, relevancy, and oriented development to ensure the best quality of research studies. While each of the above paradigms has advantages and disadvantages, they contribute to the study in a unique way by providing a holistic framework and view.

3.3 Research Strategy

Walliman (2011) and Bailey (1994) affirm research methods or strategies as the means and tools that researchers engage while administering any form of research. As a tool, the research strategy helps us to evaluate the research problem. Effective research strategies contain; straightforward research questions, objectives and hypotheses, the study population, approaches, resources for data collection, and the study limitation(s) that could affect the generalisation of the study outcome. These limitations may include time, data availability, study coverage, or location (Saunders *et al*., 2018).

Many tools are utilised to administer different enquiries (Walliman, 2011; Cohen, Manion and Morrison, 2007), while the researcher is responsible for selecting the most appropriate tool for their research (Wilkinson and Birmingham, 2002). All methods selected must complement each other so that the outcome is appropriate to the phenomenon under study and adds value to the literature (Jonker and Pennink, 2010). Such methods should have more strengths and fewer weaknesses when compared with other methods that could have been employed (Almalki, 2016; Tashakkori and Teddlie, 2010; Buchanan and Bryman, 2009; Wilkinson and Birmingham, 2003).

Based on the above, this study used a multiple regression approach to investigate the relationship between oil prices, macroeconomic variables, and stock market performance. Data were analysed using descriptive statistics (frequency table, charts, and percentage) and econometrics techniques. Computer-aided software, such as EViews, was used for data presentation and estimation. An effort was also directed toward strategy experimentation. This strategy was used to study the probability of a change in an independent variable causing a change in the dependent variable. In addition, a questionnaire-based survey approach was adopted, and statistical tests using SPSS statistical software were conducted to verify the outcome of the multiple regression approach. The study conforms with Denzin's (1978) confirmation that methodological data triangulation incorporates various methods in a research study.

3.3.1 Estimation Techniques

Econometric methods used by previous studies are driven by the hypothesis being examined and the stock index proxy (aggregate, sectoral or firm-level stock market index). A research hypothesis is considered a tentative generalisation whose tenability is to be tested based on the compatibility of its implication with empirical evidence and previous knowledge (Emaikwu 2013). Authors commonly employ VAR and GARCH models to identify the effect of oil prices on stock market performance (Sardosky, 1999; Charnavoki and Dolado, 2014; Bastianin, Conti and Manera, 2016; Joo and Park, 2017; Ahmed and Hoo, 2020; Salisu and Gupta, 2020; Escobari and Sharma, 2020; Kose and Unal, 2020; and Mensi *et al*., 2021). In investigating time-varying relationships, most studies employ GARCH or Markov regime-switching models, as the EGARCH model allows for asymmetric effects between negative and positive returns on the asset. Scholtens and Yurtsever (2012) used the dynamic VAR model to examine oil price shocks on European industry stock market performance because it is a straightforward way to model dynamic relations between economic variables without making many assumptions. However, Kilian and Vigfusson (2009) criticised VAR models as misspecified, leading to inconsistent parameter estimates and incorrect and exaggerated outcomes.

Angelidis, Degiannakis and Filis (2015), Chen (2010) and Aloui and Jammazi (2009) employed the Markov regime-switching model to examine the relationship between oil prices and the stock markets. While Chen (2010) observed that an increase in oil prices leads to a higher probability of a bear market emerging, Aloui and Jammazi (2009) conclude that increasing oil prices significantly impact stock returns volatility and the transmission probability across regimes.

The econometric approach is divided into two parts. The first part employs conditional volatility to analyse its behaviour over a period. This approach helps to ascertain if volatility breaks during oil price shocks. Secondly, the study uses the Markov switching process to assess the congruent interface of the business cycle in terms of oil price shocks and the stock market relationship. In addition, Impulse response functions were used to examine how the stock market responds to shocks from the independent variables. The study applied four statistical techniques to check the consistency of findings from the econometric approach. Given the data quantum, descriptive statistics like mean, median, maximum, minimum, standard deviation, skewness, kurtosis, and Jarque–Bera were calculated to explore the fundamental characteristics and nature of variables in this analysis.

Unit Root Test

It is noteworthy that this study makes use of time-series data for empirical analysis. According to Gujarati (2003), variables in the regression model must be stationary, especially those of long-run economic analysis. Non-stationary variables can result in a spurious regression (Brook, 2014), as findings obtained from non-stationary data may exhibit a relationship between variables where an actual relationship does not exist. This study tests for the stationarity of each time-series variable used in the model to avoid spurious regression estimates or ending with type I or II errors. The unit root test is the standard approach for investigating the stationarity of time-series economic data despite Nyamongo and Misati's (2010) criticism that unit root testing was unnecessary and complicated due to its inability to exploit prior knowledge of the growth status in a time series. Econometricians have developed different techniques for doing this. The Levin, Lin and Chu (2002) panel unit root test for stationarity is used as they consider pooling cross-section time series data to generate more powerful unit root tests. Their test procedures evaluated the hypothesis that each individual in the panel has integrated time series. Moreso, their pooling approach yields higher test power than performing a separate unit root test for each variable, as it allows for individual-specific intercepts and time trends.

Conditional Heteroskedasticity Approach

When analysing asset volatility, reference is made to the time-varying volatility, also known as 'conditional heteroscedasticity', which is typical of stock returns, and the 'conditional variance' of the data. The concept of 'conditional heteroscedasticity' refers to nonconstant volatility caused by previous volatility. It was first introduced by Engle (1982). The author applied the autoregressive conditional heteroscedastic (ARCH) and GARCH (to allow for lagged conditional variances) models to analyse the conditional variance of the time series.

Thus, the asymmetrical model was employed to empirically evaluate the link between stock returns and conditional risk, such as shocks in oil prices. Although studies have suggested the superiority of specific models over others or certain distributional assumptions over others (Brooks, 2002), evidence has shown that the efficacy of varying models may be due to some underlying properties of data. It is because of the above that an asymmetrical model was employed. The standard ARCH introduced by Engle (1982) and its GARCH (Generalised autoregressive conditional heteroscedastic) by Bollerslev (1986) assumes that positive and negative events or news have the same impact on stock returns. Thus, the ARCH model specifies the average security returns as a linear function of a time-varying conditional variance and risk. Accordingly, the standard ARCH model's time-varying conditional risk and variance is denoted as a function of squared past error terms from the mean equation.

Some studies compared the outcome of standard ARCH models with GARCH models and concluded that GARCH models are superior to the standard ARCH model (Tse, 1998; Brooks, 2002, Emrah, 2020). For instance, Emrah (2020) evaluated the performance of GARCH models using data on the Nasdaq-100 index. The study found that the forecasts from GARCH models are more realistic than other competitive models. In corroborating this view, Ayşen, Perihan and Tolga (2021) proposed a robust GARCH (1,1) model estimation while considering the non-negativity constraint. The study concluded that the proposed method was more efficient in terms of accuracy when compared to other techniques for measuring asset volatility.

Similarly, Settar, Fatmi and Badaoui (2021) evaluated a class of conditional GARCH models in analysing the impact of crisis periods on option pricing. The study observed that conditional GARCH models offer more flexibility, accommodating a few empirically important characteristics of asset returns. Their finding is consistent with Almisshal and Emir (2021), who modelled the volatility of EUR and USD exchange rates against TRY (Turkish Lira) between 2005 and 2019. The study employed the symmetric (GARCH) and asymmetric (EGARCH) models to ascertain factors that influence exchange rate returns in terms of volatility clustering and leverage effect. The study found that the most effective models for measuring volatility include the symmetric GARCH (1,1) and the asymmetric GJR-GARCH (1,1) models. Thus, it was concluded that GARCH and GJR-GARCH models are the most effective and appropriate models for forecasting future patterns for EUR and USD.

It is pertinent to note that a wide range of other scholars has shown that events, news, and incidents do influence the decision to invest in the stock market (Fama *et al*., 1969; Vega, 2006; Maierhofer, 2011; Neuhierl, Scherbina and Schlusche, 2013; and Lee, Chen and Hartmann, 2015). According to early work by Black (1976), stock returns are usually asymmetric: significant positive returns are preceded by negative returns (leverage effect), and these returns tend to exhibit higher frequency and long memory (existence of strong correlations between unrelated observations) than time series of macroeconomic variables. Thus, it was argued that a significant decrease in stock prices would not be accompanied by a decrease in the value of debt, which would raise the debt-to-equity ratio, suggesting that the conditional variance/risk for asset returns should be modelled using an asymmetric model.

To affirm that the GARCH model is inadequate in accounting for volatility clustering and leverage effect, the study begins by specifying the general form of the model as follows:

$$r_t = \mu_i + \sum_{i=1}^{k} a_i \, r_{t-1} + \delta_i \sqrt{h_{t-i}} + \varepsilon_t \quad , + \varepsilon_t \; / \; I_{t-1} \sim N(O, h_t^2) \qquad 3.1$$

$$h_t = \omega + \sum_{i=1}^{p} \alpha_i \, \varepsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j h_{t-j} \, , \omega > 0, \left|\alpha_i + \beta_j\right| < 1 \qquad 3.2$$

Equation 3.1 is the mean equation. Given the previous month's information set I_{t-1}, the current error term ε_t, has a mean equal to zero (0) and variance of h_t. The model is assumed to be serially uncorrelated (Nelson and Startz, 2007). The current and lagged returns are represented by r_t and r_{t-1}, respectively. $\sqrt{h_{t-i}}$ denotes the conditional standard error. The coefficient, δ_i, represents the linkage between asset returns (r_t) and the conditional risk denoted by $\sqrt{h_{t-i}}$. This process implies that if δ_i turns positive and significant, investors would be rewarded with more returns for taking higher risks in line with portfolio theory.

Equation 3.2 represents the GARCH (p, q) variance equation. In this equation, h_t represents the conditional variance of the random term, ε_t the constant is denoted with ω while α_i and β_j are the coefficients of the lagged squared error term generated from the mean equation and the lagged conditional variance, respectively. It is worth mentioning that the GARCH model assumes that when the condition $\omega > 0, \alpha_i > 0, \beta_j > 0$ is met/satisfied, h_t is always positive. Thus, the condition ($|\alpha_i + \beta_j| < 1$) presented in equation 3.2 is required for the GARCH model to be stationary. Otherwise, the variance would become unstable, and shocks (for example, oil price volatility) would become explosive (Brooks, 2002).

From the above equations, some drawbacks were identified. According to Nelson and Startz (2007) and Ma, Nelson and Startz (2007), GARCH would become weak if α_{ii} is too small, leading to upward biased t-tests and understatement of standard errors, which, in turn, lead to wrong inferences (for example persistent volatility even when it is not). Similarly, Brooks (2002) argues that the GARCH model does not capture volatility asymmetry, a regular stock market feature. As indicated by some empirical evidence like Fama *et al*. (1969), Agrawal, Srivastav and Srivastava (2010), Shapira, Berman and Ben-Jacob (2014) and Lee, Chen and Hartmann (2015), the decision to invest in the stock market is influenced by events, news and incidents among others. According to early work by Black (1976), stock returns are usually asymmetric: significant positive returns are preceded by negative returns (leverage effect), and these returns tend to exhibit higher frequency and 'long memory' (existence of strong correlations between unrelated observations) than time series of a macroeconomic variable. Thus, it was argued that a significant decrease in stock prices would not be accompanied by a decrease in the value of debt, which would raise the debt-to-equity ratio.

Li, Ling and McAleer (2002) also noted that the impact of unexpected events (positive or negative), such as oil price shocks, on financial assets like stock returns is asymmetric. Gong and Zhuang (2017) also laid credence to the fact that assets in financial markets, such as stocks, tend to exhibit features of leptokurtosis, clustering properties, asymmetry, and heteroskedasticity effect. In this regard and given the identified weaknesses of the GARCH model, it becomes necessary to extend the GARCH with an asymmetry component {a situation where a negative shock (unexpected drop) increases volatility more than a positive shock (unexpected increase)}. The study, therefore, employs the Exponential Generalised autoregressive conditional heteroscedastic (EGARCH) model proposed by Nelson (1991). The model (EGARCH) utilises the same mean equation as (3.1) and re-specifies the variance equation by introducing an additional term to carter for asymmetry. The variance equation is specified as follows:

$$\log(h_t) = \omega + \sum_{j=1}^{p} \beta_j \log h_{t-j} + \sum_{k=1}^{m} \gamma_k \frac{\varepsilon_{t-k}}{\sqrt{\sqrt{h}_{t-k}}} + \sum_{i-1}^{q} \alpha_i \left[\!\left[\frac{\varepsilon_{t-i}}{h_{t-i}} - E\left(\frac{\varepsilon_{t-i}}{\sqrt{h_{t-i}}}\right) \right]\!\right] \qquad \ldots\ldots 3.3$$

If volatility is asymmetric, then. $\omega > 0,\ |\alpha_i + \beta_j| < 1;\ \gamma_k < 0,$

α_i and β_j are as previously defined, and the asymmetry coefficient is denoted by $g_{\ k}$. If $g_{\ k} < 0$ and significant, volatility is assumed to be asymmetric (Brooks, 2002).

Empirical studies such as Mohsin *et al*. (2020) have validated the effectiveness of the EGARCH model. They assessed the volatility of stock returns arising from market risk, exchange rate and interest rate in Pakistan. The HAC (Heteroskedasticity and Autocorrelation Consistent) covariance matrix, the GARCH and the EGARCH models were employed. Monthly stock data of 13 listed banks between 1 January 2009 and 31 December 2019 were obtained. The study found that the EGARCH parameter is significant with the HAC covariance matrix estimation, indicating heteroskedasticity and asymmetry clustering. More specifically, the study found that the EGARCH model has positive market risk and low interest and exchange rates, confirming that market returns significantly influence the volatility or sensitivity of stock returns.

In a related study, Zhou (2021) investigated how trends in global financial markets affected Bitcoin's exchange rate movements between 2011 and 2018. The study employs the EGARCH framework and found that fundamental events (for example, Bitcoin-related, regulation-related and news events) play critical roles in Bitcoin's exchange rate movements. Specifically, the study found that news coverage and uncertainty in the global financial markets are the most significant driving force in Bitcoin's exchange rate volatility.

Similarly, Yıldırım and Celik (2020) employed the GARCH and EGARCH models to assess asymmetry and volatility in the stock markets of 12 countries (Argentina, Egypt, Indonesia, Pakistan, Qatar, South Africa, Russia, Mexico, Brazil, India, and Turkey). The study used monthly market indices from January 2013 to November 2019. The results of the EGARCH model reveal that asset returns volatility is high in India and Indonesia but relatively lower in Egypt and Argentina. The EGARCH model also found the leverage effect and asymmetric volatility in stock return indices for all countries except Argentina. Other findings from the model are that negative shocks are most substantial in Pakistan, South Africa, Qatar, and India but lower in Russia. Other studies that applied EGARCH in similar research work include Hsing (2013), Ahmadi (2016), and Sikhosana and Aye (2018).

Tache and Darie (2019) also validated the efficacy of the EGARCH when they tested if different specifications of the GARCH models usefully predict volatility on the Forex market. The asymmetric GARCH model (Exponential GARCH) for GBP/USD exchange rate was compared with the volatility between June 2016 and September 2019. The study found that the GBP/USD exchange rate slump to a 31-year low was associated with a significant political crisis in the UK and concluded that the EGARCH model effectively predicts volatility. Another study with similar findings includes Sita (2019).

Given that stock data are characterised by fat tails (Kovačić, 2008; Tache and Darie, 2019; and Yıldırım and Celik, 2020), *the Generalised Error Distribution (GED)* is employed to account for this phenomenon in the estimation of the above models. The log-likelihood function under the GED is specified as follows:

$$l_t = -\frac{1}{2}\log\frac{r(1/v)^3}{r(3/v)(v/2)^2} - -\frac{1}{2}\log\sigma_t^2 - \left(\frac{r(3/v)(r_t - \theta r_{t=1})^2}{\sigma_t^2\, r(1/v)}\right)^{v/2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.4$$

Where r = is the gamma function. The thickness of the tail is described by v {a positive ($v > 0$) parameter}.

The EGARCH model is estimated in three folds in line with the study objectives.

i. To ascertain how the Canadian stock market sectors (consumer discretionary, consumer staples, energy, financials, health care, industrials, information technology, materials, real estate, telecommunications, and utilities) respond to oil price shocks.

ii. To examine the impact of macroeconomic variables (exchange rate, inflation rate, interest rate and money supply) and oil prices on the Canadian and German stock markets using an aggregate stock index.

iii. To examine the impact of oil price shocks on stock market performance in a net oil-importing country compared with a net oil-exporting country using data for the sampled countries.

Once the three models were estimated, the next step involved estimating the Impulse response function to measure the responsiveness of the endogenous variables to shocks arising from stochastic disturbance. The analysis is a helpful tool for determining the direction, magnitude, and time frame in that the variables within the system are affected by a shock at another variable. The function also traces such effects to illustrate how the disturbance of any variable impacts other variables and how it feeds back to the first variable itself, mapping out the dynamic response path of a variable due to a one standard deviation shock to another variable. This study focuses on how the stock market index responds to oil price shocks, and the impulse response function was analysed after a shock was applied to the oil price.

Markov Switching Model

Following the works of Lo and Piger (2005) and Escobari and Sharma (2020) to model how the business cycle explains the congruent interface between oil prices and the Canadian stock market, this study divided the dynamics of stock returns into two additive components, as shown below:

$$Stock_t = Stock_t^p + Stock_t^T \qquad 3.5$$

Where:

$Stock_t$ = logarithm of stock price

$Stock_t^p$ = stochastics (permanent component)

$Stock_t^T$ = transitory component

The permanent component is specified using the random walk.

$$Stock_t^p = \mu_t + Stock_{t-1}^p + v_t \qquad 3.6$$

Equation 3.6 above controls for a potential trend and permanent shocks to stock prices. Under this random walk specification, the autoregressive term is restricted to a coefficient that is equal to 3.5. This outcome makes shocks (v_t) to have a permanent effect on stock price, while the forecasting function would have a time-varying drift term denoted by μ_t,

$$\mu_t = \mu_{t-1} + \gamma_t \qquad 3.7$$

This study assumes that the innovations μ_t and v_t are normally and i.i.d. (independent and identically distributed) random variables.

Thus, the analysis of how the logarithm of the stock price responds to the logarithm of the oil prices under different business cycles is specified using the autoregressive process below.

$$\Phi(L) \cdot \text{Stock}_t^{\text{T}} = \lambda_0(L) \cdot oil_t + \lambda_1(L) \cdot oil_t \cdot S_t + \varepsilon_t \qquad 3.8$$

$$\Phi(L) = \sum_{k=0}^{K} \Phi_k \cdot L^k;\ \Phi = 1;\ \lambda_i(L) = \sum_{j=0}^{J} \lambda_{j,i} \cdot L^j \qquad 3.9$$

S_t, an indicator variable (stock price) in equation 3.8 represents the regime changes of stock prices in response to oil prices. Like previous innovations, ε_t is assumed to be i. i.d. random variable, which follows a normal distribution. In general, the model captures how shocks in oil prices affect the transitory component of stock performance under different regimes while modelling the dynamism in its permanent component.

According to De la Torre, Galeana-Figueroa and Alvarez-Garcia (2018), Markov switching models are popular in time series analysis because they model the random behaviour of the breaks in several regimes or states in the data sample. Retrospective studies of the Markov Switching model have shown that negative oil price shocks substantially impact economic performance more than positive shocks, suggesting an asymmetric relationship (Cologni and Manera, 2009). For instance, Bastianin, Conti, and Manera (2016) evaluated the impacts of demand and supply shocks on stock returns volatility for G7 countries. The study found that oil supply shocks did not impact the volatility of stock returns. This outcome contrasts with demand shocks that significantly impact stock returns' volatility in all the G7 stock markets.

Similarly, Roubaud and Arouri (2018) assessed the interactions between oil prices, stock returns and exchange rates under economic policy uncertainty. The study employed a multivariate MS-VAR (Markov switching vector autoregressive) model. A non-linear relationship was found between oil prices, stock returns, and currency. This relationship among the study variables changes from one regime to another, but it tends to be more assertive during volatile periods; oil shocks play a significant role in transmitting shocks to stock returns and exchange rates.

Zhu, Su, You, and Ren (2017) investigated the asymmetric impacts of shocks in oil prices on stock market returns. The study uses a two-stage MS (Markov regime-switching) approach. The study found that demand and supply shocks in oil price have an insignificant impact on stock prices during a low-volatility regime but a significant impact on stock returns during a high-volatility regime and demand-side shocks in oil price tends to influence stock prices more than supply-side shocks. Other studies with similar findings include Park and Ratti (2008), Abhyankar, Xu and Wang (2013), Gil-Alana and Yaya (2014), Luo and Qin (2017), Benramdane (2017), and Ferreira *et al*. (2019).

Naifar and Al Dohaiman (2013) affirmed that Markov switching models could offer a helpful framework to capture the unstable nature and time-varying links between stock market returns and oil price variables. Regime-switching models may explain oil price sensitivity and financial market returns in crisis and tranquil regimes to oil price shocks. Given the above, this research work evaluates explicitly how the business cycle explains the congruent interface between oil prices and the Canadian stock market using the Markov regime-switching approach.

Impulse Response Function

The impulse response function measures the time profile of the effect of a shock arising from stochastic disturbance on the responsiveness of the endogenous variables to the shocks. In a related study, Kozachenko and Rozora (2016) considered a time-invariant continuous linear system in which the impulse response function from observations of responses of a SISO (single-input single-output) system to certain input signals was estimated. Their study used the theory of the square-Gaussian process to test the hypothesis on IRFs and construct two criteria for testing the hypothesis on the shape of the impulse response function. They conclude that it is possible to test the hypothesis on the shape of the impulse response function. The analysis is a valuable tool for tracing a single shock's direction and determining the magnitude and time frame that the variables within the system are affected by a shock at another variable. The function also traces such effects to illustrate how the disturbance of any one variable impacts another variable and how it feeds back to the first variable itself, mapping out the dynamic response path of a variable due to a one standard deviation shock to another variable. As this study focuses on how the stock market index responds to oil price shocks, the impulse response function needs to be analysed after applying a shock to the oil price. Nwosu *et al*. (2020) and Balcilar, Gupta and Wohar (2017) used the approach in their studies.

3.3.2 Statistical Techniques

Research questions, variables observed, and the number of groups define a statistical technique's validity (Pallant, 2013). The statistical technique adopted in this study includes the parametric logistic regression model and non-parametric techniques like Mann-Whitney U, Spearman's rho correlation and Kruskal-Wallis test. These statistical techniques were used to verify the hypotheses tested based on the findings using secondary data.

In line with this study objective, the Mann-Whitney U Test tests for differences between two independent groups on a single, ordinal variable with no specific distribution and continuous measure (Mann and Whitney, 1947, cited in Najab and McKnight, 2010). Estimated using SPSS 20, the Logit regression Model is used to model dichotomous outcome variables. It is a popular model because it can classify and draw relationships between dichotomous or dummy dependent and independent variables (Kambeu, 2019). Non-parametric Spearman's rho correlation test based on ranks was used to measure the strength of the association between stock market performance and oil prices as it establishes whether the two variables are independent. The test was proposed by Kruskal and Wallis (1952) to test more than two independent samples and examine if samples come from the same distribution or population. Although the test is often used on small sized data (Guo, Zhong and Zhang, 2013), its major challenge is the non-confidential data information.

3.3.3 Approach and Hypotheses

Saunders *et al*. (2018) grouped the research approach into deductive and inductive approaches. The inductive approach uses extrapolation from experience to support conclusions or arguments reached (Lucaites and Gilbert, 2011). This approach contrasts with the deductive approach, which requires the analyst to analyse existing theories that support the phenomenon or issue under investigation and then find empirical evidence. It involves starting from theory (general) to observations (specific). The deductive approach moves from a general premise to a particular conclusion (Mingers, 2012) and involves testing hypotheses to confirm, modify or refute principles (Gray, 2014). The research questions/hypotheses were developed based on the theoretical and empirical framework discussed in the preceding chapter. Hence, the study utilises the appropriate analytical techniques to test the following hypotheses while adopting the deductive process.

Table 3.1 Statement of Hypotheses

H_{01}	*Sectors of the Canadian stock market do not respond to oil price shocks differently.*
H_{02}	*Exchange rate, Inflation rate, Interest rate, Money supply and Oil price shocks do not impact the Canadian stock market.*
H_{03}	*The business cycle does not explain the congruent interface between oil prices and the Canadian stock market.*
H_{04}	*Oil price shocks do not affect stock market performance in net oil-importing countries differently from net oil-exporting countries.*

3.4 Research Design

Designs are rooted inside methodology, and research methods are techniques used to accomplish research. According to Crotty (1998) and Saunders *et al*. (2018), a research design is a plan for answering research questions to achieve the research objective. This explanation is consistent with that of Vogt (1993). The author viewed research design as the procedures/plans for carrying out empirical studies to gather valid findings in his early work. The research design and approach were guided by the aims and objectives of the study, as the study aims to test pertinent theories highlighted in the earlier chapter while establishing the causal link between variables. The emphasis of the research design is to explain the relationship between variables and study if one causes an effect on the other (Creswell, 2014).

Generally, the purposes of every empirical study are classified into descriptive, explanatory, and exploratory. According to Saunders et al. (2018), descriptive research uses observed data to characterise or describe a particular event or phenomenon. This approach solely depends on showing the issue's patterns, trends, and frequencies under investigation. The explanatory, also known as causal analysis, seeks to evaluate the causality/relationship between two or more variables (dependent and independent variables) regarding a particular phenomenon. On the other hand, exploratory research provides patterns, relationships, insights, and ideas about the phenomenon. This research is explanatory, and from the predefined research questions and objectives in the introductory chapter, it is evident that the purposes of this thesis are (i) To describe (descriptive purpose) the extent to which oil price shocks have an impact on stock performance and (ii) To test/explain (explanatory purpose) the nexus between oil price shocks and stock performance.

Almalki (2016) classified the approach to connecting research into quantitative, qualitative, and combined methods. Creswell (2014) considers these three approaches as' strategies of inquiry'. Qualitative and qualitative research methods dominate the human and social sciences as the paradigms seek answers for a social phenomenon (Smith, 2018). Crossan (2013) opined that triangulation of modern research methods is commonly observed despite the vast distinction between quantitative and qualitative research methods. The study uses quantitative research methods with some qualitative additions for triangulation and statistical techniques to verify the outcome. Understanding the phenomenon is more vital than selecting a single data collection philosophy.

3.4.1 Quantitative Research

Quantitative research has long been controlled and conventionally based on the modestly positivist approach and strategies to the philosophy, composition, and research methodology (Babones, 2016; Aliaga and Gunderson, 2002). It involves explaining a social phenomenon by collecting numerical data that are analysed objectively. According to Aliaga and Gunderson (2002), it entails the collection and analysis of information that are investigated using mathematically based methods. It consists of using measurable data to reveal patterns in research. Rovai, Baker and Ponton (2014) classified quantitative research as a deductive approach in research design that maintains an empiricist paradigm (Creswell, 2014).

Quantitative research design often establishes a causal (cause-effect) relationship and the association between variables. Bhawna and Gobind (2015) classified quantitative research into descriptive, causal, and experimental. While descriptive research examines the situation in its current state, causal research examines the cause and effect in the relationship between independent and dependent variables. They further affirmed that experimental research entails measuring outcomes from the treatment of intervention in a study group. Correlation does not necessarily imply causality. The relative truth about inferences regarding causal relationships is mainly concerned with the accuracy of causal inferences. An affirmation that the observed changes can be attributed to the cause and not to other possible alternative explanations for the outcome.

3.4.2 Qualitative Research

The qualitative research method, viewed as a countermovement to the positivist paradigm by Smith (2018), is a vast and complex methodology that concerns analysing how people interpret their experiences and the World they live in. Bhawna and Gobind (2015) affirmed that qualitative research is field research. It emphasises exploring and understanding the perspective that individuals or groups ascribe to a social or human subject or problem (Creswell, 2014; Holliday, 2007). For instance, Utting (2009) used a thorough qualitative analysis to investigate the effect of fair-trade coffee on farmers' livelihoods in Nicaragua. Tobias, Mair and Barbosa-Leiker (2013) likewise examined the relationship between entrepreneurship, economic advancement, and conflict reduction using Rwandan coffee farmers as its case. Haugh and Talwar (2016) illustrated the value of the qualitative approach while investigating the relationships between social entrepreneurship, empowerment and social change using female entrepreneurs in India.

According to Campbell (1975), qualitative research is often criticised as biased, small-scale, anecdotal, and lacking rigour; however, it is unbiased, in-depth, valid, reliable, credible, and rigorous when adequately carried out. The major qualitative research methods mainly discussed, termed as qualitative traditions, are classified into 1) Ethnography – the study of culture. 2) Phenomenology – focus on people's subjective experiences and interpretations of the World. 3) Grounded theory – developed by Glaser and Strauss (1967) as a theory rooted in an observation about the phenomena of interest, and 4) case study (Holloway and Todres, 2003; Smith, Bekker and Cheater, 2011; Bhawna and Gobind, 2015; and Jamali, 2018). Trochim, Donnelly and Arora (2016) affirmed the widely used methods in qualitative measurement as participant observation, direct observation, unstructured interview, case studies, focus groups and unobtrusive methods.

3.4.3 Triangulation of Quantitative and Qualitative Research Designs

This research involves collecting, analysing, and blending quantitative and qualitative research approaches to investigate the research problems. Denzin (1978) identified four types of triangulations – data, investigator, theory, and methodological triangulation.

Johnson, Onwuegbuzie, and Turner (2007) stated that a researcher applies combined methods to attain a broad purpose of breadth and depth of understanding and corroboration. Creswell and Clark (2011) affirmed that the approach enables more understanding to be formulated when compared with a study that adopted a single approach. Triangulation and integration of quantitative and qualitative approaches provide opportunities for convergence and corroboration of results (Greene, Caracelli, and Graham, 1989). Therefore, this study adopted a data triangulation design as it provides a more holistic view, according to Tonkin-Crine *et al*. (2016). In considering the research design, the study was evaluated to exhibit a relationship among the variables, and that cause happened before the effect, that is, does oil prices cause movement in the stock market?

As this research study involves collecting and analysing quantitative and qualitative data and is designed to fulfil a descriptive and explanatory purpose, a combined approach was implemented to address the research questions and compare outcomes. Denzin (1978) affirmed that data triangulation involves the use of different data sources in a study. Hence, the triangulation and combined method of Creswell and Plano Clark (2007) was adopted in this study. The triangulation method was adopted to understand the phenomenon better and improve the quality of quantitative measures. It provides the opportunity to leverage both methods' strengths and weaknesses while increasing this research study's depth, creativity, validity, and richness. The study gathered complementary yet distinctly different numeric data from secondary sources and complemented these with text information from a survey (questionnaire) data for better illustration, clarification, elaboration, analysis, and interpretation. Hence, the final database represents quantitative and qualitative information (Bhawna and Gobind, 2015).

Although Creswell and Plano Clark (2011) highlighted some challenges of combining research methods like time, resources, and skillsets required by the researcher, it is more sensible to gather information from different sources and utilise different methods to work together for an efficient design. Based on the literature reviewed, this study breaks away from the traditional order of using only quantitative analysis to investigate the phenomenon and further strengthens the methodology adopted with the data triangulation method.

3.5 Data Collection

The framework of Kolb and Fry's (1975) experiential learning cycle was used in analysing data collected; this allowed us to form an opinion and provide certain conclusions that formed the basis of our observations. This study adopted secondary data and a questionnaire-based survey as a combined approach for data analysis. A significant amount of data was collected. However, only the relevant section was used in the thesis, while other data will be used for published articles.

3.5.1 Sampling Method

The study population is an element of interest of whom research findings can be generalised. Shafer and Zhang (2012) viewed the population as a group of objects that are the focus of a query while representing an element of interest to the researcher. Thus, it is pertinent to emphasise that this study evaluated the impact of oil price shocks on stock market performance in net oil-exporting and net oil-importing countries while relying on data sourced from primary and secondary sources. Sampling, the process of choosing a limited number of elements from a population (Spiegel and Stephen, 2008) in this study, comprises the process of choosing net oil-importers, net oil-exporters, and financial market professionals as participants for the survey. For the first category of the study population, a purposive sampling method was employed to select the top ten countries from the ranking of net oil-exporting and net oil-importing countries, according to the U.S. EIA classification, while considering data availability for the dataset. The convenience and snowball sampling methods were adopted for the survey participants as randomisation was impossible due to the large population, limited resources and time.

Considering that sampling is a complicated multi-step process and getting into the targets for research is a game of chance and not of skill (Buchanan, Boddy and McCalman, 2013), primary data collection focus on financial market professionals while ensuring a realistic timescale without risking the integrity of the study. The survey targets research subjects of the population that are easily accessible to the researcher. Respondents are from LinkedIn professional networking platforms based on their relevance to the issue while working against sampling bias. The snowball sampling technique, as described by Sharma (2017), was employed while relying on consenting participants. The inclusion criteria comprised a cross-section of participants from diverse geographic locations, identified as analysts, regulators, and investors. The study was further embellished with the views of other investment management professionals like portfolio managers and academics classified as 'others'. In total, sixty-eight questionnaires were returned by respondents, and the responses were included in the sample used to conduct the descriptive statistical analysis.

Table 3.2 Summary of Top Net Oil-Exporting Countries

	PRODUCTION		CONSUMPTION		Mb/d
Country	Mb/d	% World total	Mb/d	% World total	Net Export
Saudi Arabia	12,119	12%	3,079	3%	9,040
Russia	11,391	11%	3,562	4%	7,829
Canada	5,364	5%	2,520	3%	2,844
Iraq	4,616	5%	961	1%	3,655
Iran	4,603	5%	1,822	2%	2,781
United Arab Emirates	3,790	4%	897	1%	2,893
Kuwait	3,058	3%	424	0%	2,634
Nigeria	1,988	2%	452	0%	1,536
Qatar	1,912	2%	268	0%	1,644
Venezuela	1,542	2%	582	1%	960
Total – Top 10	50,383	50%			
World total	100,756				

Source: Adapted from U.S. EIA (2019)

Table 3.2 above evidence the refined petroleum products production and consumption for the world's top net oil-exporting countries as of 2018. While the world records the production of 100,756 million barrels per day (Mb/d), these ten countries were responsible for 50% of the world's production. Despite that United States led the world with 17,910 Mb/d in production, Saudi Arabia recorded the highest net export of 9,040 Mb/d. Russia closely follows the Kingdom of Saudi Arabia with a production of 11,391 Mb/d and consumption of only 3,562 Mb/d. Saudi Arabia and Russia contributed 23% of worldwide production. Hence, this study sampled the stock markets of Saudi Arabia, Russia, the United Arab Emirates, Canada, and Kuwait from these ten countries. The aggregate stock index sampled includes Tadawul TASI (Saudi Arabia), RTS index (Russia), ADX/ADI (United Arab Emirates), S&P TSX (Canada) and KSW(Kuwait). Furthermore, all the Canadian stock market sectors, including consumer discretionary - GSPTTCD, consumer staples - GSPTTCS, energy - SPTTEN, financials - SPTTFS, health care - GSPTTHC, industrials - GSPTTIN, information technology - SPTTTK, materials - GSPTTMT, real estate - GSPTTRE, telecommunications - GSPTTTS and utilities - GSPTTUT were sampled. The selection was based on data availability over the data set to undertake a meaningful comparison.

Table 3.3 Summary of Top Net Oil-Importing Countries

	CONSUMPTION		PRODUCTION		Mb/d
Country	Mb/d	% World total	Mb/d	% World total	Net Import
China	13,888	14%	4,828	5%	9,060
United States	20,512	21%	17,910	18%	2,602
Japan	3,850	4%	121	0%	3,729
India	4,765	5%	1,018	1%	3,747
South Korea	2,567	3%	111	0%	2,456
Germany	2,326	2%	183	0%	2,143
France	1,686	2%	123	0%	1,563
Singapore	1,483	1%	24	0%	1,459
Spain	1,332	1%	78	0%	1,254
Italy	1,272	1%	152	0%	1,120
Total – Top 10	53,681	54%			
World total	100,017				

Source: Adapted from U.S. EIA (2019)

Table 3.3 above exhibits the production and consumption of refined petroleum products for the world's top net oil-importing countries as of 2018. The worldwide consumption stands at 100,017 million barrels per day (Mb/d), and these ten countries are responsible for 54% of the world's consumption. The United States is the highest producer of petroleum products globally, with a production level of 17,910 Mb/d, while the country consumes 20,512 Mb/d. China recorded the second-highest level of refined petroleum product consumption worldwide at 13,888 Mb/d. Alongside the United States, the two countries consume 35% due to industrialisation, vehicle and aircraft consumption, electricity production and heating. This study sampled the SSE Composite Index (China), S&P 500 (USA), NIKKEI 225 (Japan), DAX (Germany) and CAC 40 (France) to model the net oil-importing countries.

3.5.2 Data Description and Types

The empirical study was carried out using monthly data from January 2003 to December 2020, inclusive, to examine any potential responses of stock market performance to oil prices. That covers 216 monthly observations. Monthly data was satisfactory for the empirical analysis, as daily data of some macroeconomic variables were unavailable over a more extended period. Moreso, a considerable number of studies like Aye, Dadam, Gupta and Mamba (2014), Bastianin, Conti and Manera (2016), Liu *et al*. (2017), Alzyoud, Wang and Basso (2018), Escobari and Sharma (2020), Kose and Ünal (2020) and Mokni (2020) utilised monthly data in their analysis. Since GDP data were available at quarterly and annual frequencies, quarterly data from 1990Q1 to 2020Q4 with 124 observations was satisfactory for the empirical analysis of the impact of the business cycle on oil prices and stock market relationship. The choice of the time frame was necessitated because it provided enough data points for impact analysis.

Data types were gathered based on the research goal and suitability for the research questions. It is imperative that integrating multiple data types is used to leverage the rich sources of data relating to the phenomenon. According to Bryman (1988), various techniques allow inferences or 'leads' drawn from one data source to be corroborated by another. Data collected during a study is classified as primary data, and previously collected data for other purposes or studies are classified as secondary data (Trochim, Donnelly and Arora, 2016). Hence, this research collected primary and secondary data to analyse the relationship between the dependent and independent variables. Combining the two data types was a valuable and synergetic strategy, which further increased the validity of the study outcome.

Secondary data compiled from classical sources, in general, are used in the study of similar phenomena. This approach is mirrored in the literature review on oil prices and stock market relationships. Nevertheless, this study lends itself to multiple sources of evidence through data triangulation as it employed a survey by questionnaire to source an additional data type. Although secondary data is an efficient alternative to collecting original primary data, the questionnaire was adopted as a data collection tool from a population of interest, thereby making it possible to generalise results to the population within a degree of error. An electronic survey approach was adopted for the study as it gives access to diverse and international respondents promptly.

According to Van de Ven (2007), a survey is best suited for an objective analysis using standard statistics packages and statistical generalisation. Original data were transferred to more usable variables and analysed from survey returns using qualitative and quantitative methods. The study examined the statistically significant trends and differences in a relatively quick and cost-efficient manner. Triangulation of data must be incorporated in a study as validity is increased based on the convergence of findings across different data types (Miles and Huberman, 1994). Hence, the introduction of the survey by way of data triangulation to the investigation contributes to knowledge.

3.5.3 Data Collection Techniques

This section highlights the systematic techniques and process of information about the phenomenon. The data collection technique followed two phases while combining the quantitative and qualitative approaches. The research plan is closely orthogonal to data collection techniques that allow the researcher to collect information about the study object (Cln, 2013). As earlier stated, the study derived information through existing data points from credible sources to create new data through transformation and cast insight into the phenomenon. Information was also obtained with the use of a questionnaire survey to corroborate data collected from secondary sources. Hence, varying data-gathering techniques and approach was adopted for triangulation. For this type of research and to the best of the researcher's knowledge, this is the first study that added and analysed data from primary sources into highly quantitative techniques for the verification of outcomes.

Primary Data

This study employed a survey to revalidate results obtained from selected cases using quantitative secondary data analysis. The study could not implement an experimental design due to the difficulty in its application to many real-World settings like the investigation of the 'impact of oil prices on stock market performance' phenomenon. More so, experimental design separates a phenomenon from its context and only concentrates on the phenomenon of interest. Due to the nature of some variables, assigning participants randomly is deemed unethical and impractical. It is important to note that quasi-experimental design allows the study of unethical and impractical variables to manipulate, and the design minimises threats to external validity. However, multi-method triangulation is classified as the best means of establishing internal validity as each method offers specific advantages and disadvantages (Yeasmin and Rahman, 2012).

Considering that the research method must be reliable for validity (Creswell and Creswell, 2018; Bryman, 2016; Hair *et al*., 2014), the study adopted the typical instruments the respondents completed to meet the survey requirements. The focus of this study was to collate primary data from a survey research design using a questionnaire administered with a cross-section of financial market professionals. The procedure is discussed in the next chapter. Questionnaires are helpful in collecting specific information (Gillham, 2008) and represent a useful tool used to draw conclusions from a population (Davies, 2007). Respondents are more likely to participate in a survey by questionnaire research as they know what is expected of them and are familiar with the technique. Hence, Greener (2011) recognised the questionnaire as the most common-sense approach for social science research. Based on Cohen *et al.* (2018), the study ensured that the questionnaire had a clear objective to achieve the success of this type of data collection. The questions centred on discussions presented in the literature review section and were formulated to find out more information about the views of financial market professionals on the phenomenon.

Secondary Data

Secondary data were collected and composed from existing databases and secondary sources while considering the degree of reliability, definitions, nature and coverage of such databases and websites. Data were extracted from the World Bank, Statistics Division of the United Nations, EconStats.com, Statistics Canada, Bank of Canada, Yahoo Finance, Bloomberg, and the U.S. Energy Information Administration. Previous studies on the phenomenon utilised secondary data analysis solely.

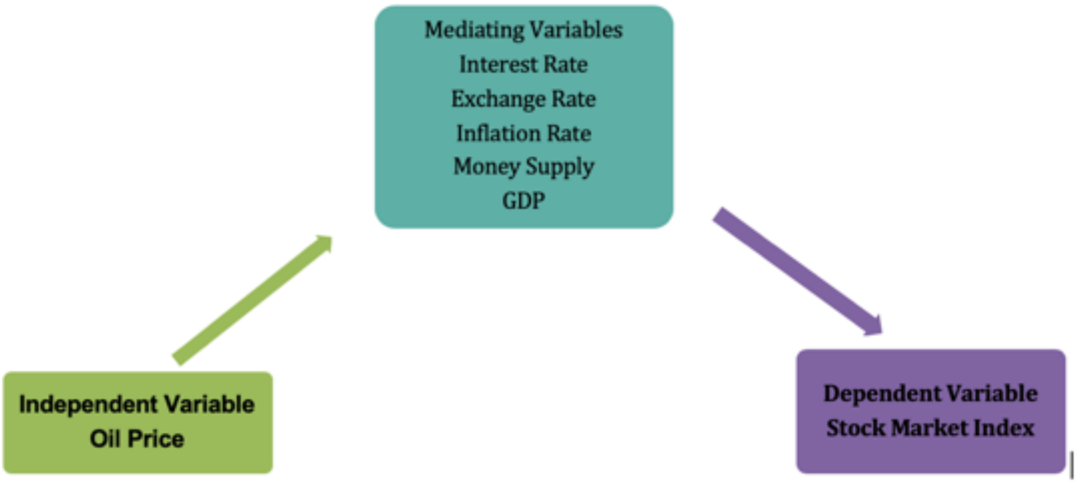
3.5.4 Research Variables and Measurement

The study considered a broad set of variables. The stock market indexes of five of the top-ten net oil-importing countries, five of the top-ten net oil-exporting countries, and eleven sectors within the Canadian stock market (consumer discretionary, consumer staples, energy, financials, health care, industrials, information technology, materials, real estate, telecoms, and utilities) represent the dependent variables. Key country-specific economic indicators such as exchange rate, GDP, inflation rate, interest rate, and money supply were considered the mediating variables based on research studies of Wahyudi, Hersugondo, Laksana and Rudy (2017), Alzyoud, Wang and Basso (2018), Izunobi, Nzotta, Ugwuanyim and Ozurumba (2019), and Bhuiyan and Chowdhury (2020). One of the most critical benchmarks in the World, Brent crude oil, proxied oil prices as independent variables.

Before evaluating the economic modelling, the study describes each of the variables that the study attempts to relate and determine the cause and effect between the selected variables; in other words, the study took the descriptive, relational, and causal forms. This helps to establish their prior behaviours. The models highlighted in the theoretical framework entail that discount rates and future dividend payments determine the stock prices. Ross (1976), Fama (1981), and Bekhet and Matar (2013) identified exchange rate, industrial production, inflation rate and interest rate as major determinants with significant impact on stock market performance. Hence, macroeconomic variables that strongly influence the discount rate and future dividends are included in the study.

The stock market index was the proxy for performance and was classified and classified as the dependent variable. Oil price was classified as an independent variable, and macroeconomic variables such as exchange rate, GDP, inflation rate, interest rate, and money supply are included as mediating variables. The inclusion was justified on theoretical and empirical evidence of their impact on the dependent variable.

Figure 3.1 Research Variables and Description



Source: Author's visual representations

Stock Market Index

Stock market indices were considered a proxy for performance, representing actual tradeable financial assets. Stock market indices, as the dependent variable, were the monthly closing values of the significant share indexes of the selected net oil-importing countries {Shanghai Stock Exchange (SSE) Composite Index, S&P 500, NIKKEI 225, DAX, and CAC 40}, net oil-exporting countries {Tadawul TASI, RTS index, ADX/ADI, S&P TSX, and KSW}, and eleven S&P/TSX composite index sectors {consumer discretionary - GSPTTCD, consumer staples - GSPTTCS, energy - SPTTEN, financials - SPTTFS, health care - GSPTTHC, industrials - GSPTTIN, information technology - SPTTTK, materials - GSPTTMT, real estate - GSPTTRE, telecommunications - GSPTTTS and utilities – GSPTTUT}. The S&P/TSX composite index is the principal market benchmark for the Toronto Stock index, with about 250 companies representing approximately 70% of the TSX.

Brent Crude Oil

One of the most closely watched commodities Worldwide is crude oil. Oil price is usually referred to as the spot price of one barrel of the benchmark crude oil. The price of oil, usually determined by its demand and supply, is measured in USD and depends upon its grade and density, sulphur content[4], and location. Prices of the three significant types of crude oil (Brent, WTI and Dubai) serve as a benchmark for types of crude oil, according to Driesprong, Jacobsen and Maat (2008). Returns on investments influence the theoretical basis for the link between oil and stock prices. It is a well-known fact that movements influence stock returns in expected cash flows and discount rates. According to Huang *et al*. (2011), oil is one key input in the production process. Thus, an increase in the oil price raises the cost of production. This increase, in turn, depresses aggregate stock prices. Against this backdrop, the study predicts a negative relationship between oil price and the stock market index. Brent serves as a benchmark for between 40–50 million barrels per day out of the World's total daily oil consumption of 70–80 million barrels per day. Thus, the study employs Brent crude oil ('Brent oil') in this thesis, representing the primary trading classification.

Exchange Rate

The exchange rate is the price at which one currency is exchanged for another (Jhingan 2006). Fluctuations in the exchange rate influence domestic prices through their effects on aggregate supply and demand. According to the early research of Dornbusch and Fischer (1980), the exchange rate affects the competitiveness of a nation's industry by changing the value of earnings and the cost of funds. This outcome is consistent with the submission of Fouquin *et al*. (2001), who noted that when a country's currency depreciates, it results in

[4] Crude oil with low sulphur content, referred to as *sweet,* accompanied with low density, referred to as *light,* is cheaper to process than crude oil with high sulphur and high density.

higher import prices. There are conflicting reports on the relationship between exchange rates and stock market indices, such as the stock index. For instance, for an export-oriented country, a rise in the exchange rate reduces the competitiveness of exports, negatively impacting domestic stock prices. However, for an import-dependent country, an appreciation of the local currency would reduce input costs which, in turn, generates a positive effect on domestic stock prices. Thus, this present study assumes that the relationship between the exchange rate and the stock market index depends on whether the country is export-dependent or import-dependent. Therefore, the variable can either be positive or negative, depending upon the country's balance of payment (BOP).

Gross Domestic Product (GDP)

GDP is the total market value of all goods and services produced within a country, excluding consumption, investment, and exports, fewer imports in a given period. As a real sector indicator, it is used to measure the economic health of a country. The real GDP is classified as the inflation-adjusted GDP, and the percentage change in real GDP is ranked as the GDP growth. The study includes the GDP growth rate to control the impact of macroeconomic performance on stock performance. Growth in the quantitative measure of a nation's economic activity while examining the oil prices and stock market relationship during economic contractions, troughs, expansions, and peaks phases to confirm if these economic phases affect GDP positively or negatively. Since GDP data are only available at quarterly and annual frequencies, the quarterly time interval was adopted for econometric analysis in this particular test. On a priori grounds, the variable is expected to have a positive impact on stock performance. This expectation is because improved economic growth would mean a nation is more economically sound – hence, more investment.

Inflation Rate

Inflation refers to a general rise in the prices of goods and services in an economy over a given period. According to Okpanachi (2012), inflation depicts an economic situation where there is a general and persistent rise in the prices of goods and services. This situation is due to an increase in the cost of production, deficiency in production, increase in money supply, budget deficit, and exchange rate depreciation. In this study, inflation is seen as a continuous rise in prices as measured by the CPI[5]. According to the Monetarists,

[5] The weighted average of prices for different goods and services

the overall objective of monetary policy is anchored on price stability measured by inflation. Irving Fisher (1930) postulated that inflation increases a firm's operation costs and reduces output; these negatively impact corporate profit through higher input costs. Rising prices of goods and services reduce the purchasing power of money and lower exchange rates. This effect suggests a negative link between the inflation rate and stock market activities. Inflation is expected to influence stock prices directly through changes in the price level, while policies designed to control inflation would indirectly influence stock prices.

Interest Rate

Independent bodies set the benchmark interest rate (for example, the country's regulatory authority or central banks) as a monetary policy tool to achieve the macroeconomic objectives of contraction and expansion – liquidity, growth, exchange rate, and inflation control. The benchmark interest rate is the rate at which banks obtain funds from the central bank, which drives the level of other interest rates within an economy. *Interest rate* is a vital macroeconomic variable that is directly related to economic growth. Bilson, Brailsford and Hooper (2001), among others, have found an indirect link between the interest rate and stock market performance, as a low interest rate allows consumers to borrow and spend instead of saving. The lower the rate, the more the willingness to borrow to invest in other purchases, such as houses, cars and shares. The increased spending resulting from low interest rates creates a ripple effect throughout the economy, including the stock market. Thus, the study expects a negative link between interest rates and the stock market index. In the stock valuation model, the interest rate changes the discount rate to represent the cost of capital. Therefore, interest rate influences current and future cash flow values, and the direction of its movement subsequently impacts stock prices. An increase in interest rate would increase the cost of capital, leading to a rise in corporate cost and a subsequent decrease in profit, affecting the value of a company's stock and stock returns.

Money Supply

The stock of money within an economy could be ascertained using different definitions. The money supply is the total money stock in an economy. Most regulatory authorities use interest rate policy to curb growth in the quantity of money available within the economy, while others apply direct control. In this study, the variable was measured by the broad money supply (M_2). M_2, which measures the total money stock in a country, includes coins and notes in circulation and other money equivalents readily convertible into cash, plus short-term time deposits in banks and 24-hour money market funds. Sellin (2001) and the liquidity hypothesis laid credence to an inverse link between money supply and stock prices. According to this school of thought, an unexpected increase in the money stock is accompanied by a decrease in interest rate. The effect of this is that the return on other fixed-income securities like treasury bills and bonds – which are substitutes for equity – goes down, causing an increase in stock price. Thus, this study predicts that the money supply was expected to have an impact on stock performance. Through its effect on the discount rate, money supply may affect the present value of cash flows and could be related to future inflation uncertainty.

3.6 Summary

Thus, the main objective of this chapter is to discuss the methodology suitable for the thesis. This analysis helps to answer the research questions as well as achieve the study objectives. In sum, this chapter outlines the philosophical perspective supporting the study. These are the interpretivism and positivism paradigms. This section is followed by a discussion of the research strategy, estimation and statistical techniques adopted in the study. The research plan section discusses the three main types of research design, and the final section details the sampling methods, data types, data collection techniques and study variables. The research methodology engaged a combination of quantitative and qualitative methods to triangulate primary and secondary data. Hence, the credibility, validity, and reliability of findings in this research hinged on the use of data and methodological triangulation. The next chapter presents data analysis and further examines the findings of the study. Hypotheses were tested and either rejected or failed to reject. Conclusions were made based on the findings, and recommendations were subsequently made.

Chapter 4 Research Findings and Discussion

4.1 Introduction

This chapter implements statistical and econometric investigations to determine the nature and degree of the relationship between oil prices and stock market performance in net oil-exporting and oil-importing countries. The empirical investigation relies on published monthly data between January 2003 and December 2020 and quarterly data between January 1990 to December 2020 (secondary data) from the World Bank, Statistics Division of the United Nations, EconStats.com, Statistics Canada, Bank of Canada, Bloomberg, and the U.S. Energy Information Administration (U.S. EIA). Ten countries in the sample are divided into two groups. The first group comprises five of the top ten net oil-exporting countries: Saudi Arabia, Russia, United Arab Emirates, Canada, and Kuwait. The second group comprises the USA, China, Japan, Germany, and France, sampled from the top ten net oil-importing countries. The data presentation and analysis are done according to the study objectives and organised into sections to answer each research question. Findings from secondary data analysed using impulse response function, ARCH, EGARCH and Markov switching models were revalidated using opinions of financial market professionals like analysts, investors, regulators, and other critical stakeholders. Their input was obtained through a survey to achieve a high precision that makes findings rich and meaningful with convincing and acceptable generalisation. Each section concludes with the interpretation of key findings relating to each research question.

4.1.1 Sampling Procedure for Primary Data

The study adopted a survey questionnaire to collect primary data, as specified in the previous chapter. Dörnyei (2007) explained that convenience sampling is used where members of the target population that meet certain practical criteria are included in a study. He defines the practical criteria as easy accessibility, geographical proximity, availability at a given time, or willingness to participate. Since it is not possible to include every subject in an almost finite population, the views of researching subjects of the population that are accessible to the researcher (Saumure and Given, 2008, p.124) were observed. Hence, convenience sampling, nonprobability sampling, and snowball sampling techniques were adopted. An initial draft of questions based on the study research questions was submitted to the supervisor, who listed additional requirements for the survey administration. The additional requirements include proper editing and creating a box at the end of the open-ended question for the respondent to express an opinion in writing regarding the question asked. The feedback served as the incentive for making modifications to the questionnaire. Hence, the layout and sequence of the questionnaire instrument were adjusted. The questionnaire focused on the study's objective and did not ask too many questions. A small sample might be sufficient for statistical significance if the differences across respondents were systematic and robust. The questions were structured so that the respondents could give truthful answers. Finally, the golden rule applies, 'Do unto your respondents what you would have them do unto you' (Bhattacherjee, 2012, p. 77) because the study requires their time, attention, trust, and often confidentiality of personal information.

According to Buchanan, Boddy and McCalman (2013), the pre-survey experience involves many ways to get in (ability to negotiate access to subjects for research) and get on (the relationship established with respondents, nature and use of feedback). The questionnaire target analysts, Regulators and investors. Portfolio managers, academics and other investment management professionals are classified as others. It was distributed to eighty participants sampled across the globe on LinkedIn using electronic mail in a standardised manner, with clear instructions on how to answer the question and return the completed form. These eighty participants exclude other potential subjects identified by research participants through the snowball sampling technique. The questions were straightforward to attract a higher response rate. The questionnaire comprised fourteen Likert and ordinal questions and unstructured open-ended question (Appendix C.1). The Likert-type were constructed on a 1-to-5 bipolar scale with a mid-neutral point and the two ends of the scale at opposite positions of the opinion. The mid-neutral point enabled the respondents to position themselves in the middle of the statement if neither represented their view. According to Clatworthy (2005), closed questions have a lower risk of misrepresentation and are generally less time-consuming.

The researcher translates the literature construct for open-ended question into measurable measures and tests some of the survey questions' constructs. The first three questions focus on participants' socio-demography. The remaining questions comprise an assortment of multiple-choice and open-ended questions referencing the research questions for the study. Due to the initial slow response, the researcher was compelled to issue follow-up reminders and calls at one-month intervals. The study received sixty-eight completed structured and unstructured questionnaires. The eighty questionnaires sent out by the researcher exclude other subjects identified by research participants through the snowball sampling technique.

The response rate is favourable when compared with the studies of Wang *et al*. (2011), which reported a response rate of 46% from financial analysts. All sixty-eight responses were usable and included in the sample used for the descriptive statistical analysis. Data collected were coded on an Excel spreadsheet to comply with the questionnaire design. The findings were analysed by the classification of the study's research questions.

Considering the sixty-eight completed structured and unstructured questionnaires received from respondents, 55.9% were analysts, 17.7% were investors, 14.7% were Regulators, and 11.8% were classified as others (portfolio managers and academics). Consequently, they have good knowledge of the subject matter (Appendix C.3). More men completed the questionnaire; males constituted 63.2%, while females represented 36.8% of the total sample. Over 89% of the respondents were between 25 and 64 years. 10.3% are within the age bracket of below 25 and above 65 years. 89.7% of the respondents opined that oil price directly or indirectly influences stock market activities. 5.9% believed that oil prices do not affect stock market activities either directly or indirectly, and 4.4% of the survey respondents were indifferent to the effect of oil prices on stock market activities (Appendix C.4). This result reflects the view of previous studies, as evidenced in the review of existing literature. An engaging theoretical framework such as the reflective data analysis of Kolb (1984) illustrates the rotation of think, plan, experience and reflect with the data. Questionnaire results guided the study and assisted the researcher in analysing the questionnaire content.

Before data analysis, the returned questionnaires were coded in MS excel and entered into SPSS. After that, the researcher checked for missing values, outliers, and errors. A reliability test of the questionnaires was carried out after the coded responses were entered into SPSS using Cronbach's Alpha in Figure 4.1 below. The coefficient was calculated using the reliability analysis processes in SPSS. Cronbach's alpha reliability coefficient allows the researcher to estimate reliability by statistical analysis and identifying the variables' internal consistency or correlation (Dörnyei, 2007). The coefficient of 0.847 indicates that there is internal consistency in the questionnaire. This outcome implies that the questionnaire is reliable within the acceptable range and indicates a relatively high internal consistency in the questionnaire. A reliability coefficient of 0.70 and above is generally acceptable for social science research.

Figure 4.1 Cronbach’s Alpha Reliability Test

Notes

Output Created		
Comments		
Input	Data	C:\Users\billing8-pc\Documents
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	68
	Matrix Input	C:\Users\billing8-pc\Documents
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.17

Case Processing Summary

		N	%
Cases	Valid	68	100.0
	Excluded	0	.0
	Total	68	100.0

a. Listwise deletion based on all variables in the procedure

Reliability Statistics

Cronbach's Alpha	N of Items
0.847	12

Raw values were inserted into SPSS statistical package to carry out logit regression, Spearman Rho Correlation Test and Mann U Whitney test.

4.2 Oil Prices and Stock Market Sectors

The section began by shedding light on how oil price shocks on the Canadian real stock market differ across industries. If the main channel of the oil price-sectoral stock market index link is limited to the energy-related sector, treating the recent increment in Canadian oil production as a positive supply shock/innovation will be safe. Thus, the study estimates data background, EGARCH models, and impulse response functions for consumer discretionary, consumer staples, energy, financials, health care, industrials, information technology, materials, real estate, telecommunications, and utilities indexes.

Descriptive statistics presented in Table 4.1 below provide a historical background for the behaviour of the data used. It was observed that the values of some of the variables were not stable during the study period, as individually analysed below.

Table 4.1 Descriptive Statistics of Canadian Stock Market Sectors and Oil Prices

	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque -Bera	Probability
CONDIS	129.98	109.43	233.15	65.14	47.42	0.499	1.77	22.54	0.000013
CONSTA	321.94	206.53	672.05	142.88	171.70	0.660	1.77	29.34	0.000000
ENERGY	235.84	235.63	443.71	60.12	80.25	0.015	2.36	3.73	0.154692
FINANC	212.62	198.63	324.14	104.45	56.28	0.181	2.10	8.54	0.013954
HEACAR	68.29	63.09	152.31	26.34	26.86	0.857	3.28	27.11	0.000001
INDUST	147.56	116.80	328.83	54.51	70.23	0.739	2.32	23.83	0.000007
INFTEC	47.55	33.44	182.36	15.80	33.54	2.141	7.45	343.26	0.000000
MATERI	257.56	245.90	446.61	108.34	77.62	0.366	2.67	5.78	0.055492
OILPRI	69.72	64.03	132.72	18.38	27.51	0.405	2.12	12.95	0.001541
REAEST	229.15	228.52	361.73	102.22	63.91	- 0.067	2.18	6.20	0.044997
TELCOM	112.88	106.87	183.39	48.85	37.07	0.308	1.89	14.41	0.000742
UTILIT	213.72	219.69	319.50	123.85	38.53	0.003	3.31	0.84	0.656403

Source: Author's computation from Appendix A.1

Table 4.1 reports the summary statistics for the Canadian sector stock index and oil prices. In a meaningful way, the statistics describe the trends and patterns of the data set. The table shows that consumer staples (321.94) have the highest average returns among the selected sectors and the materials sector's average return of 257.56 was next. This sequence was followed by energy, real estate, and a close match between the utilities and financials sectors. The highest volatility, measured by the standard deviation, is recorded for consumer staples (171.70); however, the healthcare sector has the lowest variability, as evidenced by a standard deviation of 26.86. The skewness values are positive for all the series except real estate, indicating that the data are skewed to the right with a large frequency of occurrence of positive returns than negative returns. The kurtosis values are all greater than one, which signifies that the distribution is peaked. Specifically, the kurtosis value for healthcare, information technology and utilities suggest leptokurtic distribution, signifying those investors face extreme returns. Kurtosis values for consumer discretionary, consumer staples, energy, financials, industrials, materials, real estate, telecommunications, and oil price signifies a platykurtic distribution.

In Canada, the economic structure is the collection of sectors contributing to the overall economy at any time. As with any other economy, the performance of a country's economy reflects activities from various sectors. The nation is endowed with enormous natural resources such as oil and solid minerals, among others. These inherent advantages have also contributed to the structure of the Canadian economy, and exposure to a downturn in natural resources and energy-related business could impact trading activities and capital formation. During the period under review, consumer staples remained the largest segment of the Canadian stock performance index, and materials and energy sectors trailed this. Over time, other sector indexes like information technology and industrials have witnessed flux in their activities on the stock market as the information technology sector continued to thrive in 2020. By late 2020, the information technology sector index weighed about 6% of the S&P/TSX composite index compared with the 2.41% average for the dataset. The industrials sector index average increased from 7.46% in the dataset to 10.86% by late 2020.

The trend analysis indicates that since 2008, after the global economic meltdown and the Covid-19 global pandemic, which affected the stock performance of the Canadian economy, like other world economies, the performance of several sectors has changed tremendously. Within the periods, the top five contributors to the Canadian economy are consumer staples, materials, energy, real estate, and utilities, with a mean score of 16%, 13%, 12%, 12%, and 11%, respectively.

4.2.1 Estimation of EGARCH Models

Before estimating the EGARCH models, the study tested for the possible presence of ARCH(q) effects in the residuals using the generalised autoregressive (AR) representation of the squared residuals given below.

$$\tilde{u}_t^2 = b_0 + b_1\tilde{u}_{t-1}^2 + b_2\tilde{u}_{t-2}^2 + b_3\tilde{u}_{t-3}^2 + \cdots + b_q\tilde{u}_{t-q}^2 + \varepsilon_t$$

The significance of the parameters b_1 indicates the presence of conditional volatility effects under the hypothesis of no ARCH effects:

$$b_1 = b_3 + \cdots \ldots \ldots + b_q = 0$$

Therefore, this study tested for ARCH(1) effects:

$$\tilde{u}_t^2 = b_0 + b_1 \tilde{u}_{t-1}^2 + \varepsilon_t$$

If $b_1 = 0$, the model is homoscedastic. However, if there are ARCH effects, b_1 will be significant. The results are detailed in Table 4.2 below.

Table 4.2 ARCH Effects of Canadian Stock Market Sectors

Sector	b_1	**Langrage Multiplier (LM) Statistics**	**P-value**
CONDIS	0.96691	191.232	0.0000
CONSTA	0.97103	199.905	0.0000
ENERGY	0.88976	167.862	0.0000
FINANC	0.93295	189.873	0.0000
HEACAR	0.8757	164.772	0.0000
INDUST	1.02444	201.805	0.0000
INFTEC	1.07145	201.800	0.0000
MATERI	0.859	156.763	0.0000
REAEST	0.928	189.668	0.0000
TELCOM	0.96333	202.685	0.0000
UTILIT	1.00572	195.996	0.0000

Source: Extracted from Appendix B.1

Table 4.2 contains the ARCH effects for sectoral stock returns between 2003 and 2020 in Canada. As shown above, the LM statistics show that the values for all sectors were significant, as evidenced by the probability values of 0.000. The values are substantially lower than the cut-off value of 0.05. This outcome implies that ARCH(1) effects are present in the models. Against this backdrop, this study rejects the hypothesis of no ARCH effects.

The study cast the data series using line graphs to confirm the presence of volatility clustering. Appendix B.1 shows the trends of all the sector stock returns evidenced by volatility clustering (that is, further large volatilities follow large volatilities, and small volatilities are followed by further smaller volatilities). Thus, the study estimates the EGARCH models for better results (Sita, 2019; Tache and Darie, 2019; and Yıldırım and Celik, 2020), and the outcomes are presented in Table 4.3.

Table 4.3 Estimates of EGARCH models for Canadian Stock Market Sectors and Oil Prices

Sector	Mean Stock returns	Lagged value	δ	α	β	α+β	λ	Oil price	R-squared
CONDIS	0.192173	1.007459	-0.277770	0.410243	0.974845	1.38509	-0.036987	0.000916	0.979596
		(0.000)	(0.0111)	(0.000)	(0.000)		(0.548)	0.1667	
CONSTA	-0.485	1.008707	-0.00695	-0.00964	1.006072	0.99643	0.024983	0.0000651	0.994735
		(0.000)	(0.7666)	(0.4131)	(0.000)		(0.2409)	(0.6376)	
ENERGY	4.247	0.984242	0.079679	0.428476	0.91165	1.34013	0.079332	0.000997	0.951448
		(0.000)	(0.6999)	(0.002)	(0.000)		(0.2257)	(0.4277)	
FINANC	0.306	1.004926	0.228782	0.075382	0.924499	0.99988	-0.28815	0.000301	0.973037
		(0.000)	(0.0645)	(0.2875)	(0.000)		(0.000)	(0.5318)	
HEACAR	0.739	0.98933	-0.16236	0.195766	0.992916	1.18868	0.096069	0.000605	0.938132
		(0.000)	(0.0141)	(0.0001)	(0.000)		(0.0089)	(0.2184)	
INDUST	-1.917	1.022422	0.330321	0.009608	0.884234	0.89384	-0.43682	0.000842	0.990104
		(0.000)	(0.0287)	(0.9165)	(0.000)		(0.000)	(0.1033)	
INFTEC	-0.00083	1.014708	-0.08189	0.030662	1.037766	1.06843	0.174259	0.000296	0.986673
		(0.000)	(0.047)	(0.3659)	(0.000)		(0.000)	(0.1954)	
MATERI	3.969	0.989554	0.027498	0.286055	0.938621	1.22468	-0.02266	0.001525	0.934857
		(0.000)	(0.8854)	(0.0012)	(0.000)		(0.684)	(0.1419)	
REAEST	2.884	0.99472	6.291561	0.628877	-0.37108	0.2578	-0.35997	-0.014354	0.969614
		(0.000)	(0.000)	(0.0001)	(0.0002)		(0.000)	(0.0019)	
TELCOM	0.715	1.003189	0.030296	-0.02327	1.005723	0.98245	0.192667	- 0.0000028	0.987896
		(0.0000)	(0.5583)	(0.7057)	(0.000)		(0.0001)	(0.9853)	
UTILIT	6.616	0.972232	8.338394	-0.21542	-0.88195	-1.0974	-0.07119	-0.010077	0.96066
		(0.0000)	(0.000)	(0.0424)	(0.000)		(0.3066)	(0.1456)	

Source: Extracted from Appendix B.1

P-values in parenthesis, δ = coefficient of the constant variance term (C3), α = ARCH term (C4), β = GARCH term (C6), λ = Asymmetric effects (C5).

Table 4.3 reports the average return for Canadian economic sectors, the impact of the previous return on the current return, the coefficient of the constant variance term (δ), ARCH term (α), GARCH term (β), the stationary results (α+β), and the asymmetric effects (λ). The results generally show that Canada's average sector stock returns between 2003 and 2020 were positive except for consumer staples, information technology and industrials.

The table shows that stock returns for all the sampled sectors except consumer discretionary, energy, health care, information technology and materials were stationary [i.e., $\alpha + \beta < 1$]. This outcome implies that the effect of oil price shocks on the stock returns in these sectors will not persist for many future periods, according to Mensi *et al*. (2021). On the other hand, returns in consumer discretionary, energy, and materials are largely non-stationary. This result implies that the effects of oil price shocks on stock market returns in these sectors will continue to grow/ increase indefinitely into the future.

The results in the table further suggest that the modelling of asymmetry and leverage effect were significant for financials, industrials, and real estate sectors. This result signifies that negative oil shocks impact stock returns in these sectors more than positive oil price shocks of the same magnitude. However, for sectors such as consumer staples, energy, health care, information technology, and telecommunications, the table reveals only an asymmetric effect (no leverage effect). This effect implies that positive shocks to oil prices impact stock returns in these sectors more than negative shocks. This affirmation further constitutes an extension of Kilian and Park (2009).

The table reveals that the relationship is positive for most sectors but statistically insignificant across all sectors except real estate and utilities. This result is partly consistent with findings by Chinzara and Aziakpono (2009), Yasmeen *et al*. (2019) and Nwosu *et al*. (2020) that oil price shocks only cause a temporal growth in the real sector. The table also reveals that only one sector (real estate) strongly shows a negative relationship between oil price shocks and stock returns.

In addition to the ARCH LM test, the study further tested the robustness of the models using other diagnostic tests. The residuals from the estimated EGARCH models were examined for normality, autocorrelation and heteroscedasticity. The results, presented in Appendix B.1, show that the residuals for most of the series follow a normal distribution. Also, the LB statistics for the standardised residuals are insignificant, indicating that serial correlation (autocorrelation) is no longer evident. The high R-squared values also suggest that the models highly fit the data series.

4.2.2 Impulse Response of Canadian Stock Market Sectors to Oil Prices

The study further tested for the responsiveness of the sector stock returns to shocks in oil prices.

Figure 4.2 The Impulse Response of Canadian Stock Market Sectors to Oil Prices

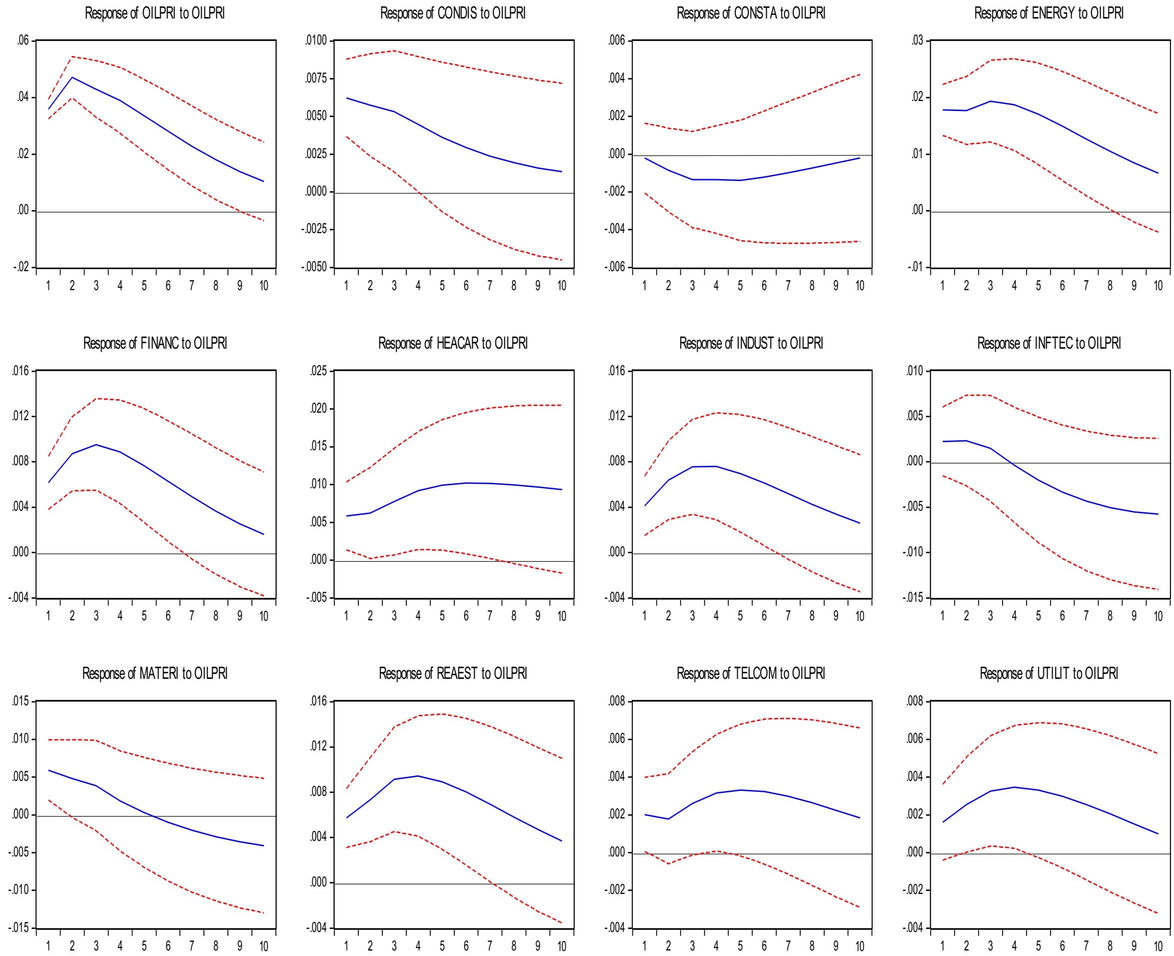


Figure 4.2 contains the impulse response function, which measures the responsiveness of Canadian stock market sectors to shocks in oil prices. The results of the impulse response function suggest that one standard deviation (SD) shock (innovation) to oil price initially increases stock performance for sectors such as energy, financials, health care, industrials, real estate, telecommunications, information technology and utilities sectors. This positive response sharply declined for sectors such as energy and financials (from the third period), industrials, real estate and utilities (from the fourth period). In contrast, the decline in information technology continued into the negative region. In contrast, for the consumer discretionary sector, a one SD shock to oil price has a negative and declining impact. The response of the consumer staple sector to oil prices remains in the negative region, with an upward movement after the third period. The response of consumer discretionary and materials sectors to one SD shock to oil price decreased over time. While the consumer discretionary sector's response remains positive, the material sector's decline continued into the negative region from the fifth period.

4.2.3 The Hypothesis Testing

H_0 : Consumer discretionary, consumer staples, energy, financials, health care, industrials, information technology, materials, real estate, telecommunications, and utilities sectors of the Canadian stock market do not respond to oil price shocks differently.

The study employs impulse response analysis in testing the hypothesis using results in Figure 4.1 above. Kozachenko and Rozora (2016) affirmed the possibility of testing the hypothesis using the shape of an impulse response function where H_0 state that an impulse response function is $L_{(\mathcal{T}),\ \mathcal{T} \in} [0, A]$, and H_1 implies the opposite statement. They further averred that for a given level of confidence $1 - \delta, \delta \in (0, 1)$, H_0 is rejected if

$$\sup_{\mathcal{T} \in [0, A]} \left| L_{(\mathcal{T})} - \hat{L}_{N,n} (\mathcal{T}) \right| > \varepsilon^*_{1,\delta}$$ Otherwise, they fail to reject H_0.

Where $\varepsilon^*_{1,\delta}$ = max $\{\varepsilon_{1,\delta,} Z_{N,n}\}$

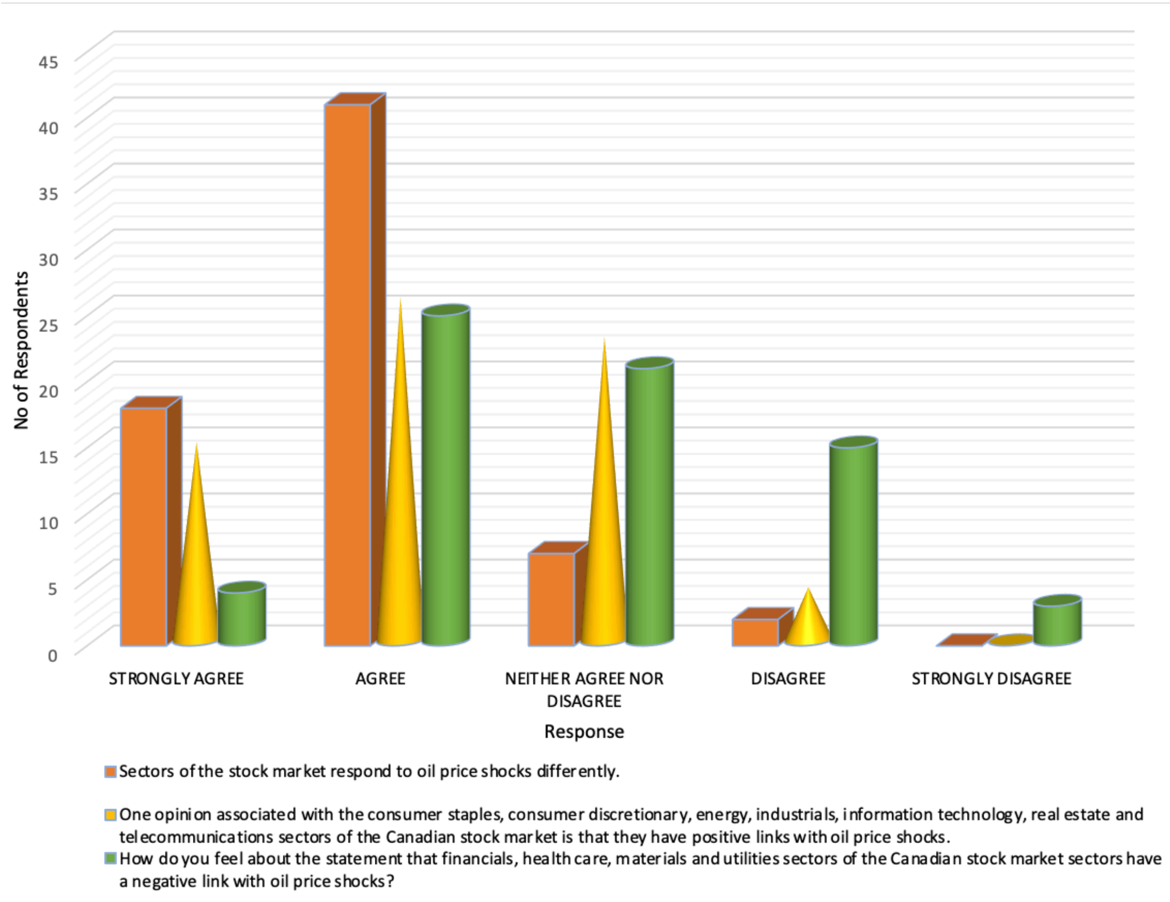
Hence, in testing this hypothesis, the study refers to the red curves in the figure. These red curves represent the lower and upper boundaries of the 95% confidence intervals. The figure shows that the vertical shades (in light blue) mark the periods when sector stock returns in Canada are significant at a 5% level. It is observed that the blue curves fell within the 95% confidence interval. Thus, the study asserts enough evidence to reject the hypothesis of no response between the Canadian stock market sectors and oil price shocks. This outcome implies that the Canadian stock market's consumer discretionary, consumer staples, energy, financials, health care, industrials, information technology, materials, real estate, telecommunications, and utilities sectors diversely respond to oil price shocks, as noted below.

i. A one standard deviation shock (innovation) to oil price initially increases stock performance for consumer discretionary, energy, financials, health care, industrials, information technology, materials, real estate, telecommunications, and utilities. This positive response sharply declined and became negative for consumer discretionary, information technology, and materials.

ii. A one standard deviation shock to oil price has a negative and declining impact on the consumer staples sector from 1 to 6. The responses gradually increased from period seven but remained in the negative region throughout the periods under consideration.

As detailed earlier, perceptions of sixty-eight subjects in the financial market were observed using a survey questionnaire to validate findings from secondary data analysis. Bar charts were used to visualise and compare the distribution of data points. 86.8% of respondents opined that stock market sectors respond to oil prices differently, 10.3% neither agree nor disagree, while 2.9% disagreed that stock market sectors respond differently to oil price shocks.

Figure 4.3 Survey Response for Stock Market Sectors and Oil Prices



Source: Author's visual representation from Appendix C.3

Statistical methods are introduced for comparing the outcome in Table 4.3 while testing the hypothesis. A comparison of this type is of interest to give two explanations for a given phenomenon. According to Tonkin-Crine *et al*. (2016), data triangulation generates new findings and insights into the original findings from the previous data set analyses. Series of comparisons between groups using Mann–Whitney's U rank test was performed. According to Mann and Whitney (1947), cited in Najab and McKnight (2010), the Mann-Whitney U test for differences between two independent groups on a single, ordinal variable with no specific distribution and continuous measure. The study conducted the Mann-Whitney U test by first identifying and comparing the participants' responses across industries and variables. The examination was to test the hypothesis that there is no difference between the opinions of the sampled respondents regarding whether the stock market sectors respond differently to oil price shocks. Data input was uploaded into SPSS and checked for outliers or extreme values in the data, and the study performed the Mann-Whitney U test. The study further defines the hypotheses, which assume no significant difference between groups. The decision rule is to reject the research hypothesis if its probability value is higher than the critical value of 0.05.

Figure 4.4 Hypothesis Test for Stock Market Sectors and Oil Prices

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The medians of One opinion associated with these sectors of the Canadian stock market (Consumer Staples, Energy, Industrials, Information Technology, Real Estate, and Telecommunications) is that they have positive links with oil price shocks are the same across categories of Sectors of the stock market respond to oil price shocks differently.	Independent-Samples Median Test	.258	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

As contained in the result of the Mann–Whitney Rank test above, sectors of the stock market respond differently to oil price shocks since the probability value of 0.258 exceeds the cut-off point of 0.05. The study compares the outcomes in Table 4.3 and Figure 4.4, and it infers that the consumer discretionary, consumer staples, energy, financials, health care, industrials, information technology, materials, real estate, telecommunications, and utilities sectors of the Canadian stock market respond differently to oil price shocks. Thus, the study rejects the hypothesis. Regarding the last two questions in Figure 4.4, this study concludes that the disparity in the results for four sectors (real estate, financials, health care and materials) out of the eleven observed was due to the limited convenience sampling. From the above results, this study infers that the stock market sectors' response to oil prices depends on whether the sector uses oil as direct input, among others.

4.2.4 Key Findings

Sectors of the Canadian economy have adjusted to several shocks in the price of oil over the years. The effects of these shocks on the sectors and the cost of government programmes designed for sectoral growth are difficult to assess a priori. Following the analysis, the study found that the average stock returns for all the sectors were positive except consumer staples, information technology and industrials, which were negative. The impacts of oil price shocks on stock returns were also positive across all sectors except real estate and utilities. An increase in oil prices increases stock indexes of consumer discretionary, consumer staples, energy, financials, health care, industrials, information technology, materials and telecommunications sectors. The result is consistent with the findings of Sadorsky (2001), El-Sharif *et al*. (2005) and Li, Zhu and Yu (2012), as they all affirm the positive impact of oil price shocks on the energy sector of the stock markets. While Li, Zhu and Yu (2012) observed a positive impact of oil prices on the industrial sector, AL-Risheq (2016) and Okoye, Mbakwe and Igbo (2018) had a contrary finding as they concluded that oil price movements have a negative and strong effect on industrial production. Furthermore, the outcome of the study is partially consistent with the findings of Nandha and Faff (2008), Arouri (2011), Hamma, Jarboui and Ghorbel (2014) and Yasmeen, Wang, Zameer and Solangi (2019) as they conclude that the intensity of the impact of oil prices on the stock index varies across sectors.

The outcome of the modelling of asymmetry and leverage effect was significant for the financials, industrials, and real estate sectors. This outcome denotes that negative oil shocks impact stock returns in these sectors more than positive oil price shocks of the same magnitude. However, only an asymmetric effect was observed for consumer staples, energy, health care, information technology, and telecommunications. This effect implies that positive shocks to oil prices impact stock returns in these sectors more than negative shocks. The results are in partial accordance with Arouri, Foulquier and Fouquau (2011) and Wang and Zhang (2014). Both studies observed that the impact of oil prices on stock performance differs significantly according to the sectors or markets and that oil price shocks impact sector stock performance asymmetrically.

Hence, this study adds to the theoretical literature by establishing that oil price movements directly affect the profitability of oil-related industries like the energy sector. At the same time, the effect is indirect in the oil-consuming sectors like the industrials, materials and real estate. This result is partly consistent with findings by Chinzara and Aziakpono (2009), Yasmeen *et al.* (2019) and Nwosu *et al.* (2020) as they conclude that shocks in oil prices only cause a temporal growth in the real sector. Only real estate shows strong evidence of a negative relationship between oil price shocks and stock returns. This finding is consistent with Okoye, Mbakwe and Igbo (2018), who evaluated the interrelationship between oil price shocks, the construction sector and the Nigerian economy proxy by gross domestic product (GDP). Their study found a positive correlation between GDP and the construction sector, between oil prices and the construction sector and between GDP and oil prices.

Several studies have also laid credence to the above. For instance, Elyasiani, Mansur and Odusami (2011) argue that oil price movements may directly affect the profitability of oil-substitute and oil-related industries. However, the impact on oil-consuming sectors is more likely to transpire through indirect channels, including asset substitution and oil return volatility. Other studies that arrived at similar conclusions include El-Sharif *et al*. (2005), Hammoudeh and Li (2005), Sadorsky (2001) and Kling (1985). In their separate studies, the authors aver that an increase in oil price is associated with an increase in oil-related firms such as oil and gas companies, air transport, automobile, and domestic oil industries. In corroborating this finding, El-Sharif *et al*. (2005) noted that oil price movements have a positive link with stock returns of oil-related sectors and that the strength of such a relationship varies extensively across sectors. Other studies with similar results include Li, Zhu and Yu (2012) and Kilian (2009). The latter examined the dynamic relationships between oil prices and selected sectors of the Chinese stock market. They concluded that there was no short-run Granger causality between oil prices and industrial sector stocks.

Contrary to the above viewpoint, Wang and Zhang (2014) examined the impact of oil price shocks on four major industries in China: grains, metals, petrochemicals, and oil fats. They concluded that adverse oil price shocks affect all four markets more than a positive shock, with the petrochemical industry having the most significant effect and the grains market with the most negligible impact. While investigating the linkage between oil prices and Tunisia's sector stock indices like automobile and parts, banks, basic materials, utilities, industrials, consumer services, and financial, Hamma, Jarboui and Ghorbel (2014) affirmed the existence of significant shock and volatility spill-over across the oil and Tunisian sector stock markets. They further confirmed that volatility interactions' intensity varies from sector to sector.

The outcome from the impulse response analysis affirmed that a standard deviation (SD) shock (innovation) to oil price initially increases stock performance for consumer discretionary, energy, financials, health care, industrials, information technology, materials, real estate, telecommunications, and utilities sectors. This positive response sharply declined and became negative for sectors such as consumer discretionary (from the eighth month), information technology (after the second month), and material (from the third month). For the consumer staples sector, a one SD shock to oil price has a negative and declining impact from period one to six. The responses gradually increased from period seven but remained in the negative region throughout the periods under consideration. Financials, industrials, and real estate sectors generally evidenced asymmetry and leverage effects. This outcome signifies that negative oil shocks impact stock returns in these sectors more than positive oil price shocks of the same magnitude. However, for sectors such as consumer staples, energy, health care, information technology, and telecommunication, the study reveals only an asymmetric effect (no leverage effect). This effect implies that positive shocks to oil prices impact stock returns in these sectors more than negative shocks.

Perceptions of the study participants further corroborate this finding. They noted that stock market sectors like consumer discretionary, consumer staples, energy, financials, health care, industrials, information technology, materials, real estate, telecommunications, and utilities respond differently to oil price shocks. From the above results, it can be deduced that stock market sectors respond differently to oil price shocks depending on whether the sector uses oil as direct input, among others. This outcome is because both previous and current oil prices contained information for predicting future prices of stock that were not accommodated in the previous and current prices. The conclusion is in tandem with the observation of Arouri and Nguyen (2010) that a significant relationship exists between most sector returns in Europe and oil prices and that the nature of the reaction changes considerably across sectors. Hamma, Jarboui and Ghorbel (2014 also confirmed that the intensity of volatility interactions varies from sector to sector. Agreeably, Broadstock and Filis (2014) concluded that the U.S. and Chinese stock markets respond differently to varying oil price shocks over time. However, the U.S. stock market seems more responsive to oil price shocks than the Chinese.

In sum, the study conforms with previous studies' affirmation that oil price shocks affect all economic sectors. However, this thesis further demonstrated that the response of the stock market sectors to oil price shocks differs substantially, depending on their degree of oil dependence and multiple transmission mechanisms. That is, the impact of oil prices on sectors of the stock market performance is asymmetric and heterogeneous. Consequently, investors and asset managers should modify their portfolio diversification and risk assessment accordingly.

4.3 Macroeconomic Variables, Oil Prices and Stock Market

Descriptive statistics presented in Table 4.4 below provide patterns, trends, and historical background for the behaviour of data in respect of a net oil-exporting country (Canadian S&P/TSX) and a net oil-importing country (German DAX) stock indexes, selected macroeconomic variables, and oil prices used to address the second objective.

Table 4.4 Descriptive Statistics of Canadian Stock Market, Macroeconomic Variables and Oil Prices

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	0.854530	1.785278	1.902778	1136.764	69.71644	12854.75
Median	0.828723	1.860000	1.250000	1102.717	64.03000	13160.30
Maximum	1.045957	4.680000	4.750000	2121.400	132.7200	17433.40
Minimum	0.641430	-0.950000	0.500000	566.5420	18.38000	6343.29
Std. Dev.	0.103647	0.883601	1.255144	405.2861	27.51306	2616.571
Skewness	0.193348	-0.046377	0.887867	0.424224	0.404962	-0.560349
Kurtosis	1.692385	4.083796	2.621494	2.278555	2.115133	2.599346
Jarque-Bera	16.73451	10.64896	29.66847	11.16310	12.95071	12.74837
Probability	0.000232	0.004871	0.000000	0.003767	0.001541	0.001705
Observations	216	216	216	216	216	216

Source: Author's computation from Appendix A.3

Table 4.5 Descriptive Statistics of German Stock Market, Macroeconomic Variables and Oil Prices

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	1.253251	1.485417	1.215741	2173.485	69.71644	8034.924
Median	1.250798	1.530000	1.000000	2061.800	64.03000	7390.870
Maximum	1.576970	4.680000	4.250000	3433.240	132.7200	13718.78
Minimum	1.054290	-0.500000	0.000000	1333.900	18.38000	2423.870
Std. Dev.	0.122102	0.879689	1.293178	602.8308	27.51306	3062.333
Skewness	0.380202	0.274294	0.870557	0.351949	0.404962	0.169785
Kurtosis	2.433001	3.914132	2.644382	1.937590	2.115133	1.778553
Jarque-Bera	8.097328	10.22928	28.42145	14.61770	12.95071	14.46517
Probability	0.017446	0.006008	0.000001	0.000670	0.001541	0.000723
Observations	216	216	216	216	216	216

Source: Author's computation from Appendix A.4

Tables 4.4 and 4.5 contain summary statistics for macroeconomic variables, oil prices and stock market indices for Canada and Germany. Generally, the results presented in the two

Tables show that data on all the study variables (exchange rate, inflation rate, interest rate, money supply, oil price, and stock market returns) for the two countries are not normally distributed, as evidenced by the skewness statistics which are statistically different from zero. A closer analysis of these statistics shows that while the inflation rate and stock returns have skewed negatively in Canada, they had positive skewness values for Germany. The remaining variables are positively skewed in both countries.

Also, the table contains Kurtosis statistics that reveal whether data distributions are light-tailed or heavy-tailed. Kurtosis statistics from the table reveal that Canada's inflation rate, interest rate, and stock returns, with values of 4.083796, 2.621494, and 2.599346, respectively, tend to have heavy tails. The inflation rate follows a leptokurtic distribution with a peaked curve and higher values. Other stock indexes, oil prices, exchange and interest rates, and money supply are less peaked than the normal distribution. Hence, they follow the platykurtic distribution. In Germany, the inflation rate, interest rate and exchange rate were found to have heavy tails with values of 3.91, 2.64 and 2.43, respectively.

Further analysis of the results presented in Table 4.4 indicates that the average exchange rate of the Canadian dollar to one U.S. dollar between 2003 and 2020 was about 0.854530, with the highest and minimum rates at 1.045957 and 0.641430, respectively, with a standard deviation of 0.103647. Table 4.5 exhibit that the exchange rate was relatively higher in Germany as the average exchange rate of the euro to one U.S. dollar was 1.25%, and the range was between 1.05% and 1.58%. The table further shows that inflation and interest rates averaged 1.79% and 1.90% for Canada; and 1.49% and 1.22% for Germany. While the higher interest rate over inflation in Canada would make savings and investments in long assets such as bonds more attractive, the reverse was the case for Germany, as evidenced by the 1.49% inflation rate, which is substantially higher than the 1.22% interest rate in the country.

Concerning money supply, the two panels reveal that the total money stock averaged 1136.76 in Canada, about 50% lower than the average money supply of 2173.48 in Germany. The panels further show that the fluctuations in oil prices are the same for both Germany and Canada averaging 69.72 with a minimum of 18.38 and a maximum of 132.72. However, the trends of stock returns differ for the countries, averaging 12854.75 with the lowest return put at 6343.29 and the maximum at 17433.40 for Canada, and 8034.92

average with a range between 2423.90 and 13718.78 in Germany over the same period. The study found that oil prices and stock market returns exhibited high volatility measured by their respective standard deviations within the periods for both countries. The hypotheses of the Jarque-Bera test were rejected in all the cases for both countries at a one percent level of significance, and distributions are not normal.

4.3.1 Results from the Application of EGARCH Models

The study tested for the possible presence of ARCH(q) effects in the residuals before estimating the EGARCH models for both countries. The test was done using the generalised autoregressive (AR) representation of the squared residuals, and the results are presented in Tables 4.6 and 4.7 below.

Table 4.6: ARCH Effects – Canadian Stock Market, Macroeconomic Variables and Oil Prices

Heteroskedasticity Test: ARCH

F-statistic	190.2216	Prob. F(1,213)	0.0000
Obs*R-squared	101.4272	Prob. Chi-Square(1)	0.0000

Source: Extracted from Appendix B.3

Table 4.7: ARCH Effects – German Stock Market, Macroeconomic Variables and Oil Prices

Heteroskedasticity Test: ARCH

F-statistic	177.7811	Prob. F(1,213)	0.0000
Obs*R-squared	97.81162	Prob. Chi-Square(1)	0.0000

Source: Extracted from Appendix B.3

The Heteroskedasticity test results are presented in Tables 4.6 and 4.7 above. As shown in the tables, the LM statistics (Obs*R-squared) of 101.4272 and 97.81162 for Canada and Germany, respectively, have a probability value of 0.000. These probability values are substantially lower than the cut-off value of 0.05. Thus, this study rejects the hypothesis of no ARCH effects in favour of the alternative. This outcome implies that the ARCH(1) effect is present in the models for the two countries. Thus, the study estimated the EGARCH model following the graphical evidence of volatility clustering (Figures 4.5 and 4.6).

Figure 4.5 Plot of Estimated Residuals – Volatility Clustering for Canada

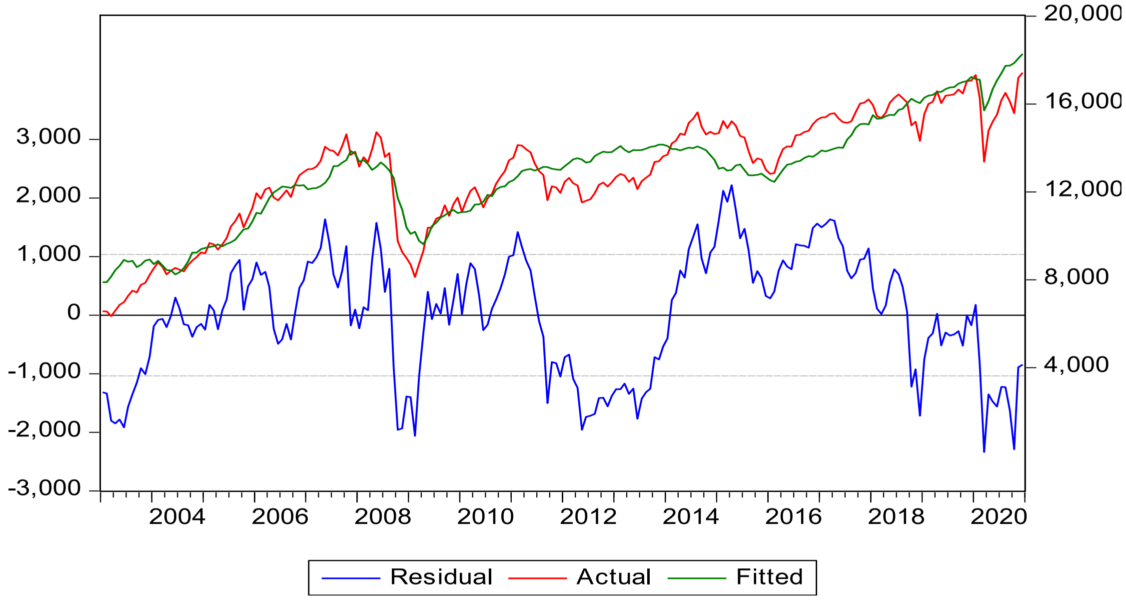
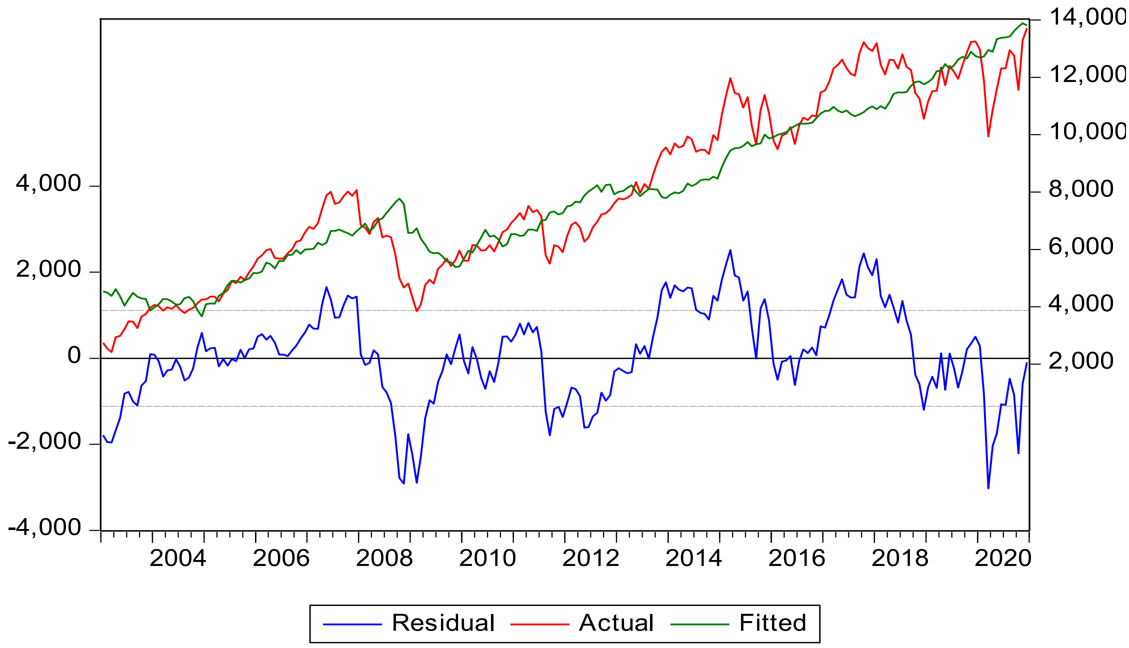


Figure 4.6 Plot of Estimated Residuals – Volatility Clustering for Germany



Figures 4.5 and 4.6 show the volatility pattern obtained using the standardised residuals. The figures show that the model residuals exhibit high volatility, which tends to cluster in both countries.

Table 4.8 Estimates of the EGARCH model for Canada and Germany

Parameter	Canada		Germany	
	Coefficient	P-value	Coefficient	P-value
Mean equation	220.1676	0.1309	101.9152	0.0313
Lagged value	0.988751	0.0000	0.994002	0.0000
δ	-0.070390	0.7830	2.854205	0.1540
α	-0.083640	0.2995	0.181475	0.2853
β	0.990249	0.0000	0.488132	0.0300
α+β	0.906609		0.669607	
λ	0.007212	0.9025	-0.296335	0.0053
Exchange Rate	-0.074001	0.8337	0.246925	0.8594
Inflation Rate	0.049517	0.0824	-0.168685	0.2560
Interest Rate	0.037932	0.0003	0.316738	0.0686
M_2	0.000107	0.0120	0.001114	0.0296
Oil Price	0.000660	0.6035	0.002032	0.7242
R-squared	0.963655		0.979313	

Source: Extracted from Appendix B.3

δ = coefficient of the constant variance term (C3), α = ARCH term (C4), β = GARCH term (C6), λ = Asymmetric effects (C5).

Table 4.8 contains results on the impact of selected macroeconomic variables and oil prices on stock market returns in Canada and Germany. The table reports the average stock return in the stock markets for both countries, the lag value of stock return, the coefficient of the constant variance term (δ), ARCH term (α), GARCH term (β),the stationary results (α+β), and the asymmetric effects (λ). The table shows that the average stock returns between 2003 and 2020 stood at 220.17 and 101.92 for Canada and Germany, respectively. The outcome implies that the past value of stock returns in the two countries significantly drives the current values.

From the variance equation, the table shows that for Canada, the coefficient of the constant variance term (δ) and the ARCH term (α) were also negative and statistically insignificant. For Germany, both the constant variance term (δ) and the ARCH term (α) were positive and statistically insignificant. The GARCH effects were positive and statistically significant for both countries. The table shows that the EGARCH model was stationary [i.e., $\alpha+\beta<1$] for Canada and Germany. Nevertheless, with $\alpha+\beta$ being approximately one for Canada and 0.67 for Germany, it can be noted that the stock returns generating processes exhibited a high degree of persistence (long memory) in conditional variance in both countries, which is relatively higher in Canada. By implication, the effect of shocks from oil prices and macroeconomic variables on current stock returns will persist for many future periods in both countries (Magnus and Fosu, 2006). This outcome is consistent with Mokni's (2020) findings regarding Canada.

The table further exhibits that the modelling of asymmetry was positive but not significant for Canada but negative and significant for Germany. This result implies that for Canada, the impacts of negative shocks do not outweigh positive news but the other way around. Put differently, positive shocks in macroeconomic variables and oil price impact more than negative shocks of the same magnitude. For Germany, positive shocks do not outweigh negative news. Negative shocks in macroeconomic variables and oil prices impact its stock market index more than a positive shock of the same magnitude. This outcome further extends Kilian and Park's (2009) studies.

On the impact of macroeconomic variables and oil prices on stock market returns, the study found that exchange rate, inflation rate, and oil prices have a statistically insignificant effect on the Canadian market index. In contrast, the effect of interest rate and money supply proxied by M_2 was significant. In Germany, however, only the money supply has a statistically significant impact on stock returns as the effect of the exchange rate, inflation rate, interest rate, and oil prices were insignificant.

A variable-by-variable analysis reveals that the exchange rate coefficients, for instance, negatively affect the Canadian market index and positively affect the German stock index. The outcome was insignificant for both countries. It was not significant in the previous research of Mao (2013) and carried a negative sign in Wahyudi *et al*. (2017) in Indonesia, the Philippines, Malaysia and Singapore. Similar outcomes were affirmed by Yousuf and Nilsson (2013), Hsing (2013) and Ehrmann Fratzscher and Rigobon (2011). A coefficient of -0.074 implies that a 1% increase in the exchange rate brings about a 7.4% decrease in the stock market index (a proxy for stock market performance). However, a coefficient of 0.247 in Germany implies that a 1% increase in the exchange rate brings about a 2.47%

increase in the stock market index. IBP (2019) affirmed that Canada is ranked as the best country for business among the G20 due to its stable economy, polity, and high regulatory efficiency. Alzyoud, Wang and Basso (2018) further estimated that more than 40% of all trading on the Canadian Exchanges originates outside of the country. Hence, activities on the Canadian stock exchange are dependent on its exchange rate.

In contrast, the coefficient of inflation rate carries a positive sign with a statistically insignificant impact on the Canadian stock market index. In Germany, the inflation rate has a negative and insignificant impact on stock returns. The positive sign indicates that a 1% increase in the inflation rate would bring about a 4.9% increase in stock returns. This finding is consistent with the outcomes in the studies of Okechukwu *et al*. (2019), Giri and Joshi (2017), and Wahyudi *et al*. (2017) on Thailand's composite index. The finding for the German stock market confirms the argument by Omran & Pointon (2001) and Kwofie & Ansah (2017), who noted that inflation is associated with rising input prices, declining purchasing power of consumers, falling corporate revenues and profits which, ultimately reduces stock performance and economic growth. This argument, however, contradicts that of the Canadian stock market index.

The interest rate coefficient positively affects stock market performance in both countries. The effect of interest rate on the Canadian stock market was statistically significant but statistically insignificant for the German stock market. The positive sign is in tandem with the theoretical expectation and consistent with the findings of Wang (2020), Eldomiaty *et al*. (2019), and Wahyudi *et al*. (2017). It implies that a unit increase in interest rate would lead to a rise in stock market activities in Canada and Germany. A low interest rate allows consumers to borrow and spend instead of waiting to save. The lower the rate, the more prepared consumers can borrow to invest in other purchases, such as houses, cars and shares. The increased spending resulting from a low interest rate creates a ripple effect throughout the economy, including the stock market activities (Hosseini, Ahmad and Lai, 2011and Reddy, 2012).

Compared with the interest rate outcome, the coefficient of money supply carries a positive sign of 0.0107% and 0.1114% in Canada and Germany, respectively. The positive sign aligns with the theoretical postulation of the Quantity Theory of Money. According to the theory, an unexpected change (say, an increase) in money stock in an economy leads to increased stock prices. This effect is because a decrease in the interest rate would create a higher propensity to consume, accompanying a rise in the aggregate money supply. This consequence would make returns on fixed-income securities such as bonds and treasury bills, which are substitutes for stocks to go down, causing an increase in stock prices and stock market returns. Some empirical works have laid credence to this fact. Maskay (2007) examined how money supply changes affect U.S. stock prices and found that anticipated money stock has a higher impact on the stock market than unanticipated change. Other studies with similar findings include Bhuiyan and Chowdhury (2020), Bissoon *et al*. (2016), Hsing (2013), Sirucek (2012), and Hosseini, Ahmad and Lai (2011), who reaffirmed that an increase in money supply subsequently transforms to an increase in stock market returns.

Finally, the coefficient of oil prices has a positive and statistically insignificant impact on stock market performance in Canada and Germany. The positive impact of oil prices on Canadian stock prices confirms the argument of Alzyoud, Wang and Basso (2018), Wahyudi *et al*. (2017), Kang, Ratti and Yoon (2015), Hosseini, Ahmad and Lai (2011), Bjørnland (2009), and Jimenez-Rodriguez and Sanchez (2005). According to some of these authors, oil price shocks positively impact oil-exporting countries' economies. This outcome is because earnings from oil exports largely determine public revenues, expenditures and general aggregate demand. Thus, increasing oil revenues associated with positive oil price shocks would induce public spending and aggregate demand, boosting transactions on stock markets. In addition, the positive expectation effect of a country's rapid economic growth sometimes outweighs the negative effect of the precautionary demand-driven effect. However, Boonyanam (2014) study affirmed that oil prices did not significantly impact stock prices in Pakistan.

The study further tested the EGARCH model's robustness by examining the model's normality, autocorrelation, heteroscedasticity and explanatory power. The results, as presented in Appendix B.3, indicate that the residuals for the series now follow a normal distribution. Also, the LB statistics for the standardised residuals are insignificant, indicating that serial correlation (autocorrelation) is no longer evident. The R-squared of 0.963655 and 0.979313 for Canada and Germany indicate that the model highly fits the data.

4.3.2 Impulse Response of Stock Markets to Macroeconomic Variables & Oil Prices

The study performed an impulse response function to ascertain how stock returns respond to shocks in macroeconomic variables and oil prices in both countries. The results are shown in Figures 4.7 and 4.8 below.

Figure 4.7 The Impulse Response Analysis for Canada

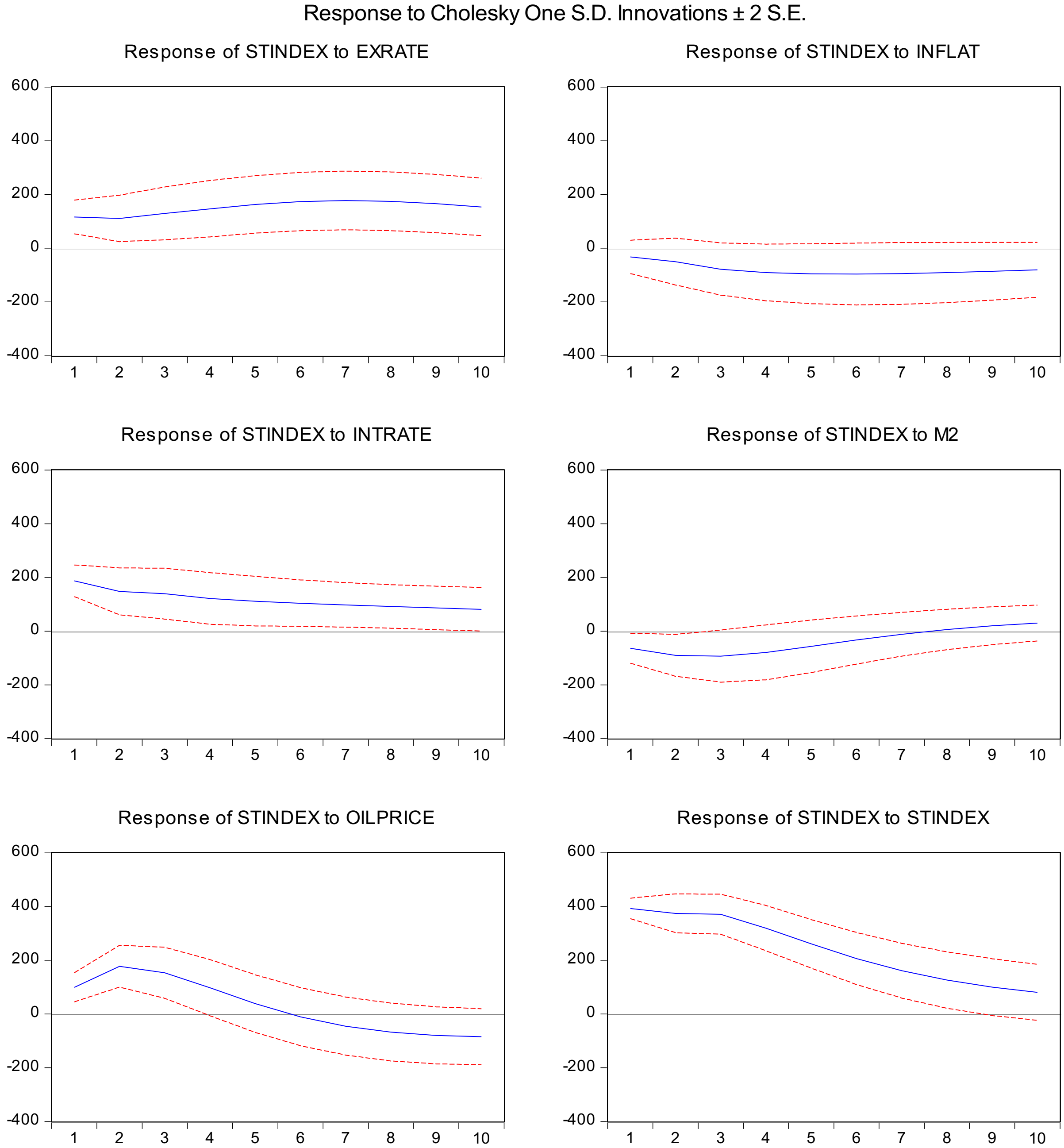
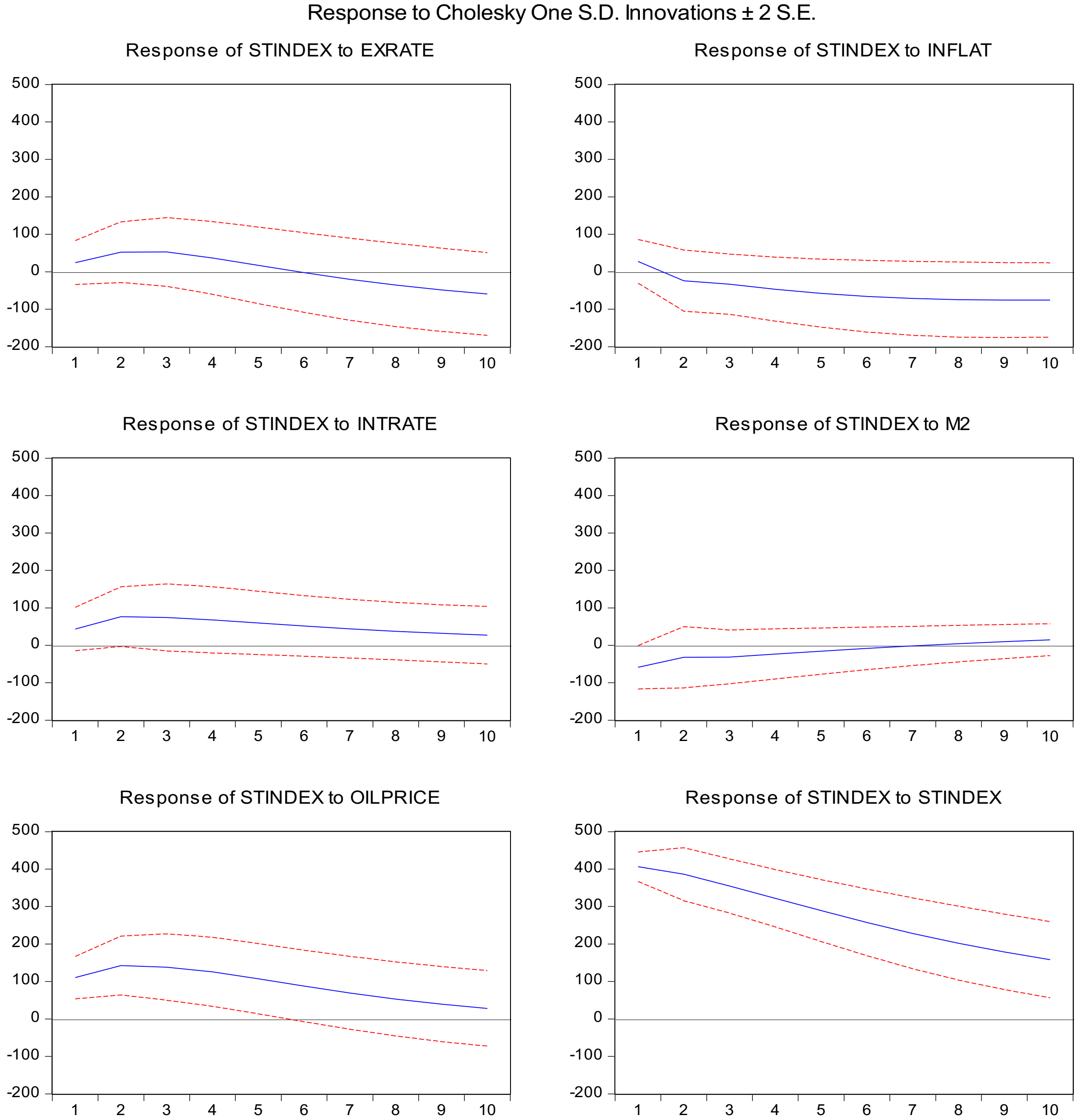


Figure 4.8 The Impulse Response Analysis for Germany



Figures 4.7 and 4.8 contain the response of stock returns to a one SD shock in macroeconomic variables and oil prices in Canada and Germany. As shown in the figures, one SD innovation to the exchange rate in Canada has no noticeable impact on the stock index in periods 1 and 2. From period 2, the response gradually increases until it flattens out in period 6. In Germany, the exchange rate gradually followed a downward trend and became negative from period 5. The graphs further show that one SD shock to inflation decreases stock market returns in both countries. The returns remained in the negative region for all the periods in Canada and most of the periods in Germany. Like the inflation rate, a shock to interest rate decreases stock returns until the seventh period before hitting its steady state within the positive region in both countries.

On the other hand, one SD innovation to money supply increases stock performance in both countries' negative regions. It crosses the baseline into the positive region at period eight for Canada while staying close to the baseline in Germany. Finally, a shock to oil prices increases the stock index initially, and this positive impact continues until period two for both countries before it returns to a downward trend. It becomes negative from period six for Canada but remains in the positive region for all the periods in Germany. In sum, the response of stock market performance to shocks in macroeconomic variables and oil prices in Canada, a net oil-exporting country and Germany, a net oil-importing country, is somewhat similar.

4.3.3 The Hypothesis Testing

H_0 : *Exchange rate, Inflation rate, Interest rate, Money supply and Oil price shocks do not impact the Canadian stock market.*

The test was analysed using the probability values of the estimated coefficients. Since the test statistic is significant at 0.05, the study rejects the hypothesis if the p-value is less than or equal to the cut-off value of 0.05. The outcome is presented in Table 4.9 below. The table contains the results of hypothesis testing regarding the second research objective for Canada and Germany. Based on the result in the table, the study failed to reject the hypothesis that exchange rate, inflation rate, and oil prices have no impact on the stock market returns in Canada and Germany. The result also failed to reject the hypothesis that interest rate has no impact on the stock market returns in Germany. This outcome is due to their respective probability values that are higher than the cut-off values of 0.05. In contrast, the study rejects the hypothesis of no impact for variables such as money supply in both countries and interest rate in Canada. Interest rate and money supply positively and significantly impact the Canadian stock markets, but only the money supply has the same impact in Germany. The inflation rate, interest rate, money supply, oil prices and stock market relationship are positive in Canada, while the exchange rate has a negative relationship with the country's stock market. The relationship between the exchange rate, interest rate, money supply, oil prices, and the stock market is positive in Germany. In contrast, the inflation rate records a negative relationship with the German stock market.

Table 4.9 Test of Hypothesis for Canadian and German Stock Markets

		Canada			Germany		
	Hypothesis	**Coefficient**	**P-value**	**Decision**	**Coefficient**	**P-value**	**Decision**
$H_{02.1}$	Exchange rate has no impact on stock market performance	-0.074001	0.8337	Fail to reject	0.246925	0.8594	Fail to reject
$H_{02.2}$	Inflation rate has no impact on stock market performance	0.049517	0.0824	Fail to reject	-0.168685	0.2560	Fail to reject
$H_{02.3}$	Interest rate has no impact on stock market performance	0.037932	0.0003	Reject	0.316738	0.0686	Fail to reject
$H_{02.4}$	Money supply has no impact on stock market performance	0.000107	0.0120	Reject	0.001114	0.0296	Reject
$H_{02.5}$	Oil price shocks have no impact on stock market performance	0.000660	0.6035	Fail to reject	0.002032	0.7242	Fail to reject

The survey responses of the sampled respondents in this study further corroborate the above findings. The study found that 65% of respondents strongly agree, and 34% agree that macroeconomic variables like exchange rate, inflation rate, interest rate, and money supply affect stock market activities. Their responses were further analysed using a logit regression model using SPSS and presented in Table 4.10. In a logit model, the endogenous variable is a dichotomous or dummy variable (in this case, responses of respondents to whether oil price and macroeconomic variables increase or decrease, or influence stock market activities are indicated by questions 5 and 6 respectively) with (1) representing the respondent who is in the affirmative and zero (0) if otherwise.

The results are presented in Table 4.10 below.

The implicit form of the model is written as

$Stock\ = f(Oil\ prices, macroeconomic\ variables)$………........................ (4.1)

Where

$Stock\ performance = responses\ of\ respondents\ to\ Q5$

$Oil\ prices\ = responses\ to\ Q5$

$Macroeconomic\ variables\ = responses\ to\ Q6.$

Table 4.10 Summary of Logit Regression

Variable	Coefficient	Probability
Q5	.013	.003
Q6	2.033	.649
C	59526.030	.010

McFadden R-squared =.731

The results in Table 4.10 indicate that the coefficient of oil price movement is positive (0.007) and statistically significant at a 5% significance level since the probability value of 0.003 is substantially lower than the cut-off of 0.05. This result implies that the oil price movement directly affects stock market performance compared to the outcome from Table 4.9. Similarly, macroeconomic variables have positive effects on stock market performance. The McFadden R^2, which measures the strength of the model, stood at 0.731. This outcome implies that oil price movement and macroeconomic variables jointly influenced 73.1% of variations in stock market volatility.

4.3.4 Key Findings

In modern history, the first empirical works that focus on the link between macroeconomic variables and stock prices include Jaffe and Mandelker (1976), Nelson (1976), and Fama and Schwert (1977). The 'Fisher effect' hypothesis has played a vital role in macroeconomics and monetary theory. The hypothesis posited that the nominal interest rate fully reflects economists have widely accepted the available information regarding the possible future values of inflation rate according to Jaffe and Mandelker (1976). While economists like Feldstein and Eckstein (1970) and Fama (1975) are in support of the Fisher effect hypothesis, Ball (1964) do not find evidence of a relationship between the expected rate of price inflation and long-term trend in interest rate. In the last two decades, the impact of macroeconomic factors on the performance of the stock market was addressed by authors such as Huang, Wang, and Zhang (2021); Bhuiyan and Chowdhury (2020); Eldomiaty *et al*. (2019); Bilson, Brailsford and Hooper (2001); and Mussa (2000) among others. These studies share similar findings as they maintain that national macroeconomic factors determine stock prices more than global macroeconomic factors.

Thus, the second objective regarding the impact of macroeconomic variables like exchange rate, money supply, interest rate, inflation rate, and oil prices on the Canadian and German stock markets was evaluated using the EGARCH models. The exchange rate coefficients, for instance, carry a negative effect on the Canadian market index and a positive effect on the German stock index. Beyond empirical review, the link between exchange rate and stock market performance has theoretical appeal. The Portfolio Balance Approach captures one explanation of this relationship. According to Khan and Abass (2015), the portfolio balance approach constitutes one of the theories used to determine and forecast a country's exchange rate impacted by such a country's money supply and bonds.

In the study, a coefficient of 0.247 in Germany implies that a 1% increase in the exchange rate brings about a 24.7% increase in the stock market index. This finding is consistent with Okechukwu *et al*. (2019), which reported that the exchange rate has a positive relationship with stock market returns in Nigeria. Giri and Joshi (2017) also examined the impact of some selected macroeconomic variables on stock prices in India and found a positive relationship between exchange rate and stock prices. Mitra (2017) observed a positive and long-run association between the stock market and exchange rates in South Africa. Narayan and Narayan (2010) on Vietnam's stock index also observed that increasing foreign portfolio investment inflows estimated to have doubled from US$0.9 billion in 2005 to US$1.9 billion in 2006 marked the stock market boom.

The result of the negative effect of the exchange rate on the Canadian stock market is consistent with the studies conducted by Wahyudi *et al*. (2017) in Indonesia, the Philippines, Malaysia and Singapore. Similar outcomes were affirmed by Yousuf and Nilsson (2013), Hsing (2013) and Ehrmann Fratzscher and Rigobon (2011). A coefficient of -0.074 implies that a 1% increase in the exchange rate brings about a 7.4% decrease in the stock market index (a proxy for stock market performance). Yousuf and Nilsson (2013) examined the effect of USD and EUR exchange rates on stock market performance in Sweden. Their study revealed that exchange rate movements adversely affect the stock market's future performance. Ehrmann Fratzscher and Rigobon (2011) also focused on the Euro area and found that the exchange rate negatively affects stock prices. According to Özbey, Erhan and Mehmet (2016), exchange rate movements affect stock prices in Turkey.

They used the monthly U.S. Dollar-Turkish Lira (USD-TRY) exchange rate and the Istanbul stock exchange (BIST) 100 indexes from January 2009 to November 2015. Their data were analysed using the generalised autoregressive conditional heteroskedasticity (GARCH) approach. The results show that an increase in exchange rate decreases expected returns and increases the riskiness of BIST 100 in Turkey. IBP (2019) affirmed that Canada is ranked as the best country for business among the G20 due to its stable economy, polity, and high regulatory efficiency. Alzyoud, Wang and Basso (2018) further estimated that more than 40% of all trading on the Canadian Exchanges originates outside of the country. Hence, activities on the Canadian stock exchange depend on its exchange rate. The study concludes that trade in goods with other countries and the flow of capital for investment in the Canadian stock market drive the exchange rate shocks on the country's stock market.

The impact of the inflation rate on stock returns has attracted extensive research sequel to the work of Fisher (1930) where he suggested that an increase in both the current and expected inflation rate would increase the expected flow of future nominal dividend payments, leading to an upward revision of stock prices and subsequently the stock returns. In contradiction with classical economics, both Nelson (1976) and Fama and Schwert (1977) observed that recent empirical results do not support the argument that nominal stock returns could serve as a hedge against inflation which led to the inflation and stock returns puzzle. Davis and Kutan (2003), in their study of thirteen developed and developing countries, affirmed that there is no strong support for the fisher effect in international stock returns and that microeconomic volatility, like changes in inflation and real output, has a weak predictive power for stock market volatility. Most empirical literature reports a negative relationship between inflation rates and stock returns. The results of this study reported that the inflation rate positively impacts the Canadian stock market index. This outcome indicates that a 1% increase in the inflation rate would bring about a 4.9% increase in stock returns in Canada. However, the reverse is the case with the German stock returns, where the coefficient of inflation rate carries a negative impact of 16.9%. Past works have offered several explanations for a negative/positive stock return relationship.

Nichols (1968), in support of the outcome of the impact of the inflation rate on German stock returns, argued that the negative correlation between stock returns and the inflation rate is consistent with commonly held views and theories about asset pricing and that investors should not be advised to avoid stocks when there is a forecast of a high inflation rate. Fama and Schwert (1977) concluded that stock returns were negatively related to the expected inflation rate component. Fama (1981) supported the arguement that the negative relationship is derived from the stagflation phenomenon, that is, the negative relationship between inflation rates and real macroeconomic activity. The finding for the German Stock market and inflation rate relationship was further confirmed by the argument of Geske and Roll (1983) in the US, Omran & Pointon (2001) in Egypt, Quayes and Jamal (2008) in the U.S., Reddy (2012) in India, and Kwofie & Ansah (2017) in Ghana as they noted that inflation is associated with rising input prices, declining purchasing power of consumers, falling corporate revenues and profits which, ultimately reduces stock performance and economic growth. Sathyanarayana and Gargesa (2018), while investigating the relationship between inflation and stock returns in fourteen selected countries, conclude that inflation affects all-economic segments as it erodes currency value, reduces savings and discourages investments. The study of Eldomiaty *et al*. (2019) on the U.S. stock market also concludes that inflation rates are negatively associated with stock prices.

Contrary to the argument above, the outcome of the relationship between the Canadian stock returns and the inflation rate was positive in this study. The positive relationship is consistent with the outcomes of Okechukwu *et al*. (2019) in Nigeria, Sathyanarayana and Gargesa (2018) in Brazil, Giri and Joshi (2017) in India, Wahyudi *et al*. (2017) on Thailand's composite index. Hosseini, Ahmad and Lai (2011) in both China and India also reaffirm the outcome of the relationship between the Canadian stock returns and the inflation rate. As the Fisher (1930) hypothesis postulates, Giri and Joshi (2017) suggested that the stock market returns may provide an effective hedge against inflation in India. Increases in oil prices are often perceived as inflationary by Central Banks. In response to anticipated changes in market forces, regulators and policymakers utilise monetary policy tools to curb the effect of oil prices on aggregate demand and inflation. Hence, adequate macroeconomic policies by Regulators control the adverse effects of inflation in an economy. In addition, companies adjust their product or service prices to reflect the changes in production costs. This also implies that investors making better portfolio decisions should view shares as long-term holdings against inflation's loss of purchasing power.

The impact of interest rate on stock market returns has vital implications for monetary and government policies. The relationship further impacts the valuation of financial securities and risk management practices. A movement in interest rate impacts an economy and its stock market due to its effect on borrowing for individuals, businesses and the government.

The influence of interest rate on the stock market in this research indicates that a 1% increase in the interest rate would bring about a 3.79% increase in stock returns in Canada and a 31.7% increase in stock returns in Germany. Hence, the interest rate coefficient positively affects stock market performance in both Canada and Germany. This outcome is consistent with the findings of Wang (2020), Eldomiaty *et al*. (2019), and Wahyudi *et al*. (2017) in Indonesia, Malaysia, Singapore and the Philippines. It implies that a unit increase in interest rate would lead to a rise in stock market activities in both countries. A low interest rate allows consumers to borrow and spend instead of waiting to save. The lower the rate, the more prepared consumers can borrow to invest in other purchases, such as houses, cars and shares. The increased spending resulting from a low interest rate creates a ripple effect throughout the economy, including the stock market activities (Hosseini, Ahmad and Lai, 2011and Reddy, 2012).

Despite the above relationship between the stock market and interest rate, the studies of Bhuiyan and Chowdhury (2020) in the US, Okechukwu *et al*. (2019) in Nigeria, Wahyudi *et al*. (2017) in Thailand, Schrey, Hafdísarson and Wendt (2017) examination of the Icelandic stock market, Reddy (2012) study on the Indian stock market, Alam and Uddin (2009) on the stock markets of fifteen developed and developing countries (Australia, Canada, Bangladesh, Colombia, Chile, Jamaica, Germany, Japan, Italy, Malaysia, South Africa, Mexico, Philippines, Venezuela, and Spain) all contradict the above findings as they observed that interest rate has a negative impact on the stock markets investigated. Hence, policymakers' effective management of interest rates would greatly benefit the country's stock market performance.

Like the interest rate, the coefficient of money supply carries a positive sign of 0.011% and 0.11% in Canada and Germany, respectively. The positive sign is in tandem with the theoretical postulation of the Quantity Theory of Money concerning the positive relationship between price levels and money supply. According to the theory, an unexpected change (say, an increase) in money stock in an economy leads to increased stock prices. This effect is because a decrease in the interest rate would accompany a rise in the aggregate money supply. This consequence would decrease returns on fixed-income securities such as bonds and treasury bills, which are substitutes for stocks, causing an increase in stock prices. Few empirical works have laid credence to this fact.

Bhuiyan and Chowdhury (2020) compare the impact of macroeconomic variables like industrial production, money supply and interest rate on stock returns in the U.S. and Canada. They observed that the U.S. money supply influences the stock index positively. They found no clear link between the money supply on the Canadian stock index even though the U.S. money supply and interest rate explain the Canadian stock market. Other studies with similar findings include Pícha (2017) in the US, Hsing (2013) in Poland, Sirucek (2012) in the US, and Hosseini, Ahmad and Lai (2011) in China. They reaffirmed a positive relationship between money supply and stock index and that an increase in money supply subsequently transforms into an increase in stock prices. In contrast, however, Hosseni, Ahmadi and Lai (2011) observed a negative relationship between the money supply and the stock market index of India.

Studies by Balcilar, Gupta and Wohar (2017); Lin, Fang and Cheng (2014); Naifar and Dohaiman (2013); Hong, Torous and Valkanov (2007); and Kling (1985) suggest that there is a relationship between oil price and stock market returns. Mussa (2000) further affirmed that an increase in oil prices has implications for asset prices and financial markets through its effect on economic activity, corporate earnings, inflation, and monetary policy. As earlier indicated, oil prices impact stock market performance via its effect on cash flows or macroeconomic values through

i. Fiscal channel – revenue generated from oil to finance government spending as a net oil exporter subsequently impacts household income.
ii. Monetary channel – discount rate through inflation and interest rate.
iii. Output channel – aggregate output through income and production effect.
iv. Stock valuation channel – through firms' expected cash flow, and
v. Uncertainty channel – oil price volatility creates uncertainty in the real economy.

In this study, the coefficient of oil prices positively impacts stock market performance in Canada and Germany. The studies of Alamgir and Amin (2021) in Bangladesh, India, Pakistan, and Sri Lank, Hosseini, and Ahmad and Lai (2011) in China found a positive relationship between oil prices and stock markets in the sampled countries. The probable reason for the positive effect of oil prices on the Canadian and German stock markets is that the positive expectation of the countries' economic growth outweighs the negative effect of the oil price shocks. Further justification includes the countries' economical size coupled with a robust financial system and regulatory efficiency and the distribution of the stock market share across firms. The positive impact of oil prices on Canadian stock return confirms the argument of Alzyoud, Wang and Basso (2018), Wahyudi *et al*. (2017), Kang, Ratti and Yoon (2015), Hosseini, Ahmad and Lai (2011), Bjørnland (2009), and Jimenez-Rodriguez and Sanchez (2005). According to some of these authors, oil price shocks positively impact oil-exporting countries' economies. This is because earnings from oil exports to a large extent, determine public revenues, expenditures and general aggregate demand. Thus, increasing oil revenues associated with positive oil price shocks would induce public spending and aggregate demand, boosting transactions on stock markets. In addition, the positive effect of a country's expected rapid economic growth sometimes outweighs the negative effect of the oil price shocks, according to Lin, Fang and Cheng (2014).

Contrary to the above, Naifar and Al Dohaiman (2013) opined that oil prices negatively correlate with the financial markets, indicating that stock prices decrease as oil prices increase. With increased oil prices, many firms must spend more funds to manage their activities due to increased production costs. A high cost of production could reduce the company's profit and the dividends it pays to shareholders, meaning the company's stock price may drop. The studies of Kose and Ünal (2020) in Kazakhstan, Iran, and Russia, Lin and Su (2020), Coronado, Jiménez-Rodríguez and Rojas (2018) in Bangladesh, India, Pakistan and Sri Lanka, Giri and Joshi (2017) in India, Joo and Park (2017) in U.S., Japan, Korea and Hong Kong, Boonyanam (2014) in Pakistan and Filis (2010) in Greece further reaffirmed the outcome of Naifar and Al Dohaiman (2013) as they argued that an increase in the price of oil creates an inflationary expectation among investors, which affects stock prices adversely. That is, high oil price triggers inflation that affects consumers and ultimately drives down the stock market due to increased production costs, resulting in lower cash flows. Oil prices further impact investment adversely by increasing firms' costs.

In conclusion, the above results affirm that the impact of oil prices and macroeconomic variables on stock market performance is asymmetric and heterogeneous. The stock market and macroeconomic variables are one of many components which can be used to measure the economic condition of an economy. From the above arguments, it is observed that each of these macroeconomic variable influences the others. Weakened currency increases cash flows towards goods and services, which subsequently impact inflation. The effect on inflation triggers the government monetary policy measures to increase the interest rate to stabilize inflation. Rising oil prices are often perceived as inflationary by central banks and policymakers. This phenomenon will affect economic conditions as the central banks of most countries are saddled with the responsibility to curtail any effect that changes in oil prices may have on aggregate demand and inflation. They subsequently respond to inflationary pressures by raising interest rates, consequently affecting the discount rate used in the stock pricing formula. That is, interest rates could affect oil prices through a connection with inflation. If interest rates are high, the cost of borrowing will become high and less attractive. This aftereffect curtails the money supply expansion and subsequently impacts funds available to investors. Golub (1983) and Krugman (1983) argued that movements in oil prices should affect exchange rates as an increase in oil prices would generate a current account surplus for oil-exporting countries and current account deficits for oil-importing countries.

The study further tested the EGARCH model's robustness by examining the model's normality, autocorrelation, heteroscedasticity and explanatory power. The results, as presented in Appendix B.3, indicate that the residuals for the series now follow a normal distribution. Also, the LB statistics for the standardised residuals indicate that serial correlation (autocorrelation) is no longer evident. The R-squared of 0.963655 and 0.979313 for Canada and Germany indicate that the model highly fits the data.

4.4 Business Cycle, Oil Prices and the Stock Market

In analysing the business cycle, Lucas (1975) stresses the co-movement of key macroeconomic variables such as GDP, production, investment, consumption, and employment, among others. Diebold and Rudebusch (1996) suggested that a model for business cycles should, therefore, take into cognisance the co-movement of economic variables and the persistence of economic states. The empirical analysis in this study is anchored on Hsu and Kuan's (2001) study that employed a bivariate Markov switching model to real GDP and employment growth rates in Taiwan. This method was previously adopted by Chen and Lin (2000) while analysing real GDP and consumption expenditure. However, this study considers the stock market index rather than consumption expenditure and attempts to find how trends of Canadian economic performance transit to performance in the country's capital market. Consequently, the study performed multiple breakpoint tests using Bai and Perron (2003) procedure to identify the location of the structural break in the data. The estimated results are presented in Table 4.11 below.

Table 4.11 Bai and Perron Multiple Breakpoint Test

Sequential F-statistic determined breaks:			2
Break Test	**F-statistic**	**Scaled F-statistic**	**Critical Value****
0 vs. 1 *	104.1958	104.1958	21.87
1 vs. 2 *	88.59002	88.59002	24.17
2 vs. 3	24.82708	24.82708	25.13

* Significant at the 0.05 level.
** Bai and Perron critical values

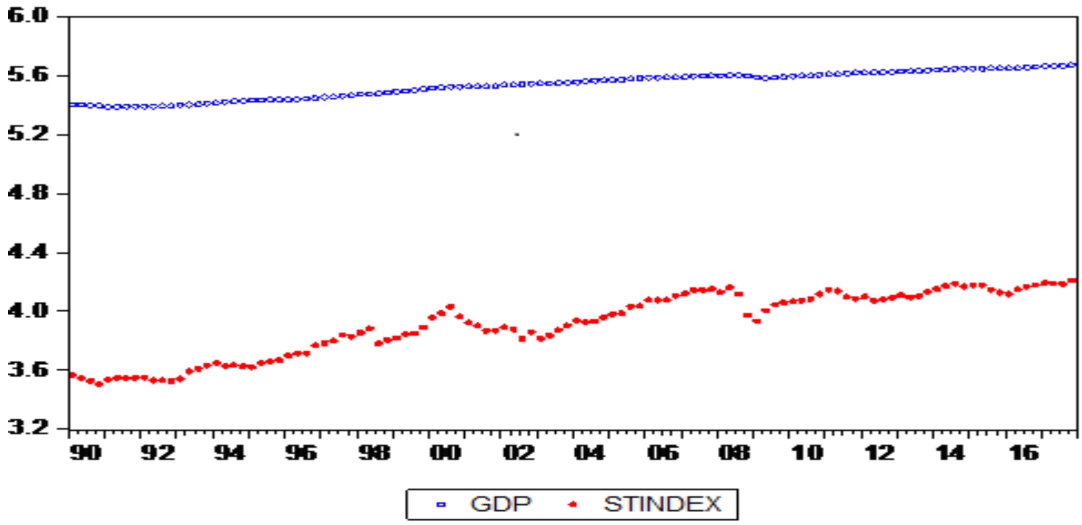
Break dates:

	Sequential	Repartition
1	1998Q1	1998Q1
2	2008Q4	2008Q4

Source: Extracted from Appendix B.2

The sequential test results show that there are two break points in Canadian stock market performance. This upshot was also confirmed by the trend analysis presented in Figure 4.9 below.

Figure 4.9 Structural Break Using MSM



The illustrations in Table 4.11 and Figure 4.9 indicate that the actual structural breaks occurred between 1998 and 2008. The break period indicated that while the Canadian economic recession occurred between the first quarter in 1990 and the second quarter in 1992 (Table 2.1), it took eight years to bring a structural break in the Canadian stock market. However, the effects of the 2008 global economic crisis characterised by liquidity/credit crunch, low investor confidence, de-leveraging, weak aggregate demand and decline in global output were almost immediately exhibited on the stock markets. While the second break period was recorded in 2008, the Canadian economic recession occurred between the third quarter of 2008 and the second quarter of 2009. The immediate transmission of the global crisis to the Canadian stock market may be due to the convergence and integration of the market to the global capital markets. As a result, the market was severely and instantaneously hit by the crisis.

4.4.1 Markov Switching Model

Since two breakpoints were identified, the study further divided the data into two subsamples to reflect the two possible states for an economy and examine the effects of oil price shocks and macroeconomic variables on Canadian stock performance for the two regimes during the economic contraction and expansion periods. The process is required to understand better the true mechanisms that drive data changes by estimating the inferences about the economic relationship during the recession and boom periods. The study employed the Markov Regime Switching model to estimate the impact of oil price shocks and other macroeconomic indicators on stock market performance amid different periods. The Markov switching model of Hamilton (1989), extended by Diebold, Lee and Weinbach (1994), Jones and Kaul (1996) and Kim and Nelson (1998), was adopted as the model is suitable for describing correlated data that exhibit distinct dynamic patterns during different periods. Naifar and Al Dohaiman (2013) affirmed that Markov switching models offer a valuable framework to capture the unstable nature and time-varying links between stock market returns and oil price variables. They affirmed while investigating the impact of oil prices on stock market returns from the GCC economies. Regime-switching models explain oil price sensitivity and financial market returns in crisis and tranquil regimes to oil price shocks.

According to Chen and Shen (2007), the economy has two possible states: bull and bear markets. Since two regimes were identified, the study examines the effects of oil price shocks and macroeconomic variables on Canadian stock returns in these two regimes within the two periods. Tsai (2015) opined that the relationship between stock prices and exchange rates might have been different during and after the recession. Hence, the entire sample was divided into two periods to conduct robustness checks. Particularly, the study was motivated by the endogenous breakpoint determination of the methodology proposed by Bai and Perron above and used the global financial crisis as a cut-off point. High volatility and low return periods are associated with the bear market, while low volatility and high return stable periods are typically associated with the bull markets (Maheu and McCurdy, 2000); Ang and Bekaert, 2002; Chen, 2007). Thus, the study period was divided into two subsamples from the first quarter of 1990 to the fourth quarter of 2008 (recession period) and the first quarter of 2009 to the fourth quarter of 2020 (post-recession period). These subsample periods are consistent with Berger and Uddin (2016), and the results are presented in Tables 4.12 and 4.13 below.

Table 4.12 Markov Switching Regression - BFGS / Marquardt steps (Break period - 1990Q1 - 2008Q4)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Regime 1				
EXRATE	-1.114256	0.419121	-2.658553	0.0078
GDP	0.974549	0.313782	3.105812	0.0019
INFLAT	0.043491	0.023620	1.841254	0.0656
INTRAT	-0.144103	0.074590	-1.931948	0.0534
M_2	-0.643396	0.424245	-1.516565	0.1294
OILPRI	-0.098243	0.103020	-0.953630	0.3403
C	3.171555	0.925513	3.426807	0.0006
Regime 2				
EXRATE	-0.367312	0.339215	-1.082830	0.2789
GDP	0.087821	0.376856	0.233035	0.8157
INFLAT	-0.144291	0.056637	-2.547655	0.0108
INTRAT	0.321955	0.046441	6.932579	0.0000
M_2	0.106365	0.371043	0.286666	0.7744
OILPRI	0.463756	0.099451	4.663155	0.0000
C	2.540855	0.464444	5.470751	0.0000
Common				
LOG(SIGMA)	-3.637956	0.102068	-35.64236	0.0000
Transition Matrix Parameters				
P11-C	3.064031	0.945634	3.240185	0.0012
P21-C	-3.259722	0.940787	-3.464888	0.0005

Source: Extracted from Appendix B.2

Table 4.13 Markov Switching Regression - BFGS / Marquardt steps (Break period - 2009Q1 - 2020Q4)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Regime 1				
EXRATE	0.325403	0.268866	1.210279	0.2262
GDP	0.022885	0.021650	1.057014	0.2905
INFLAT	0.026319	0.015358	1.713629	0.0366
INTRAT	-0.065345	0.034739	-1.881012	0.0500
M_2	0.698607	0.118168	5.912001	0.0000
OILPRI	0.111925	0.061747	1.812634	0.0699
C	1.731402	0.354570	4.883101	0.0000
Regime 2				
EXRATE	0.420685	0.385564	1.091091	0.0452
GDP	0.003196	0.008352	0.382714	0.7019
INFLAT	0.002134	0.011846	0.180174	0.8570
INTRAT	-0.129345	0.036004	-3.592540	0.0003
M_2	0.738731	0.059564	12.40221	0.0000
OILPRI	0.160013	0.109914	1.455801	0.0454
C	1.512597	0.205712	7.352987	0.0000
Common				
LOG(SIGMA)	-4.414296	0.132385	-33.34451	0.0000
Transition Matrix Parameters				
P11-C	2.386909	0.795547	3.000339	0.0027
P21-C	-2.264844	1.024705	-2.210241	0.0271

Source: Extracted from Appendix B.2

Table 4.12 exhibit results from 1990Q1 to 2008Q4. This period coincides with the Canadian economic recession of 1990 and 2008, and Table 4.13 report the outcomes from 2009Q1 to 2020Q4, a recovery and post-depression period recorded as the boom. As shown in Table 4.12 (1990Q1 to 2008Q2), GDP and exchange rate are the significant drivers of stock market performance in Canada during regime one. Oil price and monetary policy variables such as inflation rate, interest rate and money supply do not effectively boost stock market activities during the first regime. However, in regime two, monetary policy variables such as inflation and interest rates significantly boost stock market performance alongside oil prices.

In contrast, the exchange rate, GDP, and money supply do not significantly impact the Canadian stock market. In addition, during the high volatility and low return periods, the exchange rate, interest rate and money supply coefficient hold a negative sign. The GDP and inflation rate positively impact the Canadian stock market in regime one. Regime two records a negative impact on the stock market from the exchange rate and inflation rate, while the impact of GDP, interest rate, money supply and oil prices on the stock market was positive.

During the economic expansion period that followed the global economic crisis of 2008, that is 2009Q1 to 2020Q4, as recorded in Table 4.13, inflation rate, interest rate and money supply were the only variables that significantly drove the Canadian stock market in regime one. Hence, variables like exchange rate, GDP and oil prices are not significant drivers in regime one. However, during the second regime, stock market activities in Canada received a boost from monetary policy tools like exchange rate, interest rate, money supply and oil prices. Variables like GDP and inflation rate do not significantly drive the Canadian stock market performance in regime two during the period under review. During the low volatility and high return stable periods, only the coefficient of interest rate carries a negative sign, while other variables have a positive impact on the Canadian stock market index in regimes one and two.

The transition probability matrix is presented below in Table 4.14 to examine the stability of the two regimes for each period and the transition probability mix from one regime to another.

Table 4.14 Transition Probability Matrix

Transition summary: Constant Markov transition
probabilities and expected durations
Sample (adjusted): 1990Q1 2008Q4
Included observations: 74

Constant transition probabilities:
P(i, k) = P(s(t) = k | s(t-1) = i)
(row = i / column = j)

	1	2
1	0.955384	0.044616
2	0.036979	0.963021

Constant expected durations:

	1	2
	22.41370	27.04230

$$\begin{vmatrix} p_{11} & p_{12} \\ p_{21} & p_{22} \end{vmatrix} = \begin{vmatrix} 0.955384 & 0.044616 \\ 0.036979 & 0.963021 \end{vmatrix}$$

Transition summary: Constant Markov transition probabilities and expected durations
Sample: 2009Q1 2020Q4
Included observations: 47

Constant transition probabilities:
P(i, k) = P(s(t) = k | s(t-1) = i)
(row = i / column = j)

	1	2
1	0.915824	0.084176
2	0.094077	0.905923

Constant expected durations:

	1	2
	11.87982	10.62962

$$\begin{vmatrix} p_{11} & p_{12} \\ p_{21} & p_{22} \end{vmatrix} = \begin{vmatrix} 0.915824 & 0.084176 \\ 0.094077 & 0.905923 \end{vmatrix}$$

Source: Extracted from Appendix B.2

For the first period (1990Q1 - 2008Q4), the probability of being in regime one is 0.955384, and that of regime two is 0.963021, meaning that once the stock market is in the high volatility state for a month, then an average of 95.54% of the time, it will remain in that state for the following month. 0.044616 represents the transition probability from regime one to two, and 0.036979 is the transmission probability from regime two to one. Hence, according to the outcomes of regime one, there is only a 4.46% probability that the market will switch to regime two in the following month. Comparably, there is only a 3.70% probability that it will switch out of the low volatility state. Although the two regimes are persistent, regime two is characterised by relatively low volatility than regime one. The average expected period of being in regime one is about 22 months, and about 27 months in regime two. It is more likely for the relationship between oil prices and stock returns to improve during the first regime than in the second regime.

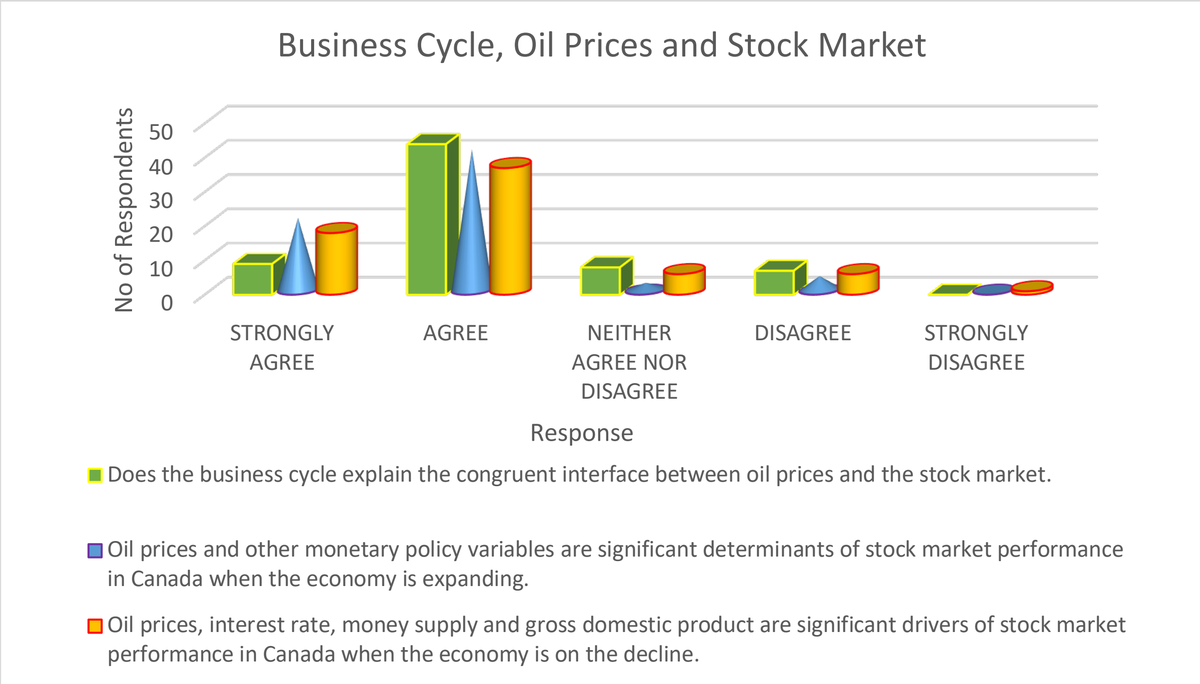
Similarly, for the second period (2009Q1 - 2020Q4), the probability of being in regime one is 0.915824, and that of regime two is 0.905923, meaning that once the stock market is in the low volatility state for a month, then on average of 91.58% of the time, it will remain in that state for the following month. While 0.084176 represents the transition probability from regime one to two, 0.094077 is the transmission probability from regime two to one. Hence, according to the outcomes of regime one, there is only an 8.41% probability that the market will switch to regime two in the following month. Similarly, there is only a 9.41% probability that it will switch out of the high volatility state. Thus, regime one is characterised by relatively low volatility than regime two. The average expected period of being in regime one is 12 months, and 11 months in regime two. The relationship between oil prices and stock returns is more likely to improve during the second regime than in the first regime.

4.4.2 The Hypothesis Testing

H_0 Business cycle does not explain the corresponding interface between oil prices and the stock market.

The study employed Bai and Perron (2003) statistics to test if the business cycle explains the corresponding interface between oil prices and the Canadian stock market. Estimated results from the multiple breakpoints test are represented in Table 4.11 above. The decision rule is to reject the hypothesis of no break if the critical value is higher than the scaled F-statics. Hence, the study rejects the hypothesis of no break as the critical value of 25.13 is higher than the scaled F-statistics of 24.83. As shown in Figure 4.9 above, two breakpoints were identified in the Canadian stock market. The breaks occurred in 1998 and 2008 and were associated with the 1990Q1/1992Q2 and the 2008Q3/2009Q2 economic recessions (see Table 2.1). The two data periods, 1990 – 2008 and 2009 – 2020, are characterised by low and high volatility and uncertainty in the stock market. GDP, exchange rate, money supply, inflation and interest rates significantly boost stock market performance in Canada during the first regimes. However, oil prices do not boost stock market activities during this period (see Tables 4.12 and 4.13 above). During the second regime, oil prices and all the macroeconomic variables except GDP significantly drive stock market performance in Canada. It is more likely for the relationship between oil prices and stock market returns to improve during the second state than in the first state. The finding is further validated using responses obtained from the study participants.

Figure 4.10 Survey Response for Business Cycle, Oil Prices and the Stock Market



Source: Author's visual representation from Appendix C.3

Further to the visual presentation in Figure 4.10 above, the correlation analysis was performed with a nonparametric Spearman's rho correlation test based on ranks to analyse if the business cycle influences the oil price and stock market relationship. The correlation analysis was performed by importing the coded data into SPSS, selecting the variables for analysis and running the correlation analysis. This technique is necessary because it allows for a reasonable estimation of correlation coefficients for distribution deviating significantly from the normal distribution (Field, 2009). The results are presented in Table 4.15 below.

Table 4.15 Spearman's rho correlation test

(N=68); Spearman's rho correlation coefficients.

			Does the business cycle explain the congruent interface between oil prices and the stock market?	Oil prices, interest rate, GDP, and M_2 are significant drivers of stock market performance in Canada when the economy is on the decline.	Oil prices and other monetary policy variables are significant determinants of stock market performance in Canada when the economy is expanding.
Spearman's rho	Does the business cycle explain the congruent interface between oil prices and the stock market?	Correlation Coefficient	1.000	.341**	.106
		Sig. (2-tailed)	.	.004	.390
		N	68	68	68
	Oil prices, interest rate, GDP and M_2 are significant drivers of stock market performance in Canada when the economy is on the decline	Correlation Coefficient	.341**	1.000	.223
		Sig. (2-tailed)	.004	.	.068
		N	68	68	68
	Oil prices and other monetary policy variables are significant determinants of stock market performance in Canada when the economy is expanding	Correlation Coefficient	.106	.223	1.000
		Sig. (2-tailed)	.390	.068	.
		N	68	68	68

**. Correlation is significant at the 0.01 level (2-tailed).

* p <.05, ** p <.01

Results from Table 4.15 indicates that oil prices, interest rate, GDP and money supply are significant drivers of stock market performance in Canada when the economy is on the decline ($rs = .341,\ p < .001$). This finding partially conforms with the estimates in period 1 (economic contraction) presented in Table 4.12 above, except for the level of the impact of the exchange rate, inflation rate and money supply. Further analysis of the result presented in Table 4.15 for period 2 (expansion) above indicates that oil prices and other monetary policy variables have a statistically significant effect even though they positively influence stock market performance in the country (rs=.106). This finding conforms with the estimates in period two (economic expansion) in Table 4.13 above. The study concludes that the disparity in the results for period one, further to the data triangulation analysis, was due to the limited convenience sampling.

In sum, the study safely concludes that there is enough evidence to reject the hypothesis that the business cycle does not explain the corresponding interface between oil prices and the Canadian stock market. The decision is consistent with the findings of Mollick and Assefa (2013) that stock prices react differently depending on the specific period of recession or boom as the variables' relationship varies.

4.4.3 Key Findings

This discussion on the findings of this section describes the role of business cycles in the oil prices and stock market relationship as volatility transmission across capital markets is of increasing interest to the financial community and the increasing trend of financial globalisation worldwide. The study followed the Hsu and Kuan (2001) study that employed a bivariate Markov switching model to real GDP and employment growth rates in Taiwan. This method was previously adopted by Chen and Lin (2000) while analysing real GDP and consumption expenditure. However, this study considers the stock market index rather than consumption expenditure. It aims to examine the role of business cycles in the oil prices and stock market relationship by first performing multiple breakpoints tests using Bai and Perron (2003) and MSM procedure. The sequential test results show two breakpoints in the country’s stock market performance between 1990Q1 and 2020Q4. The breakpoints occurred in 1998 and 2008. These break periods indicate that it took eight years to bring a structural break in the stock market sequel to the country’s economic recession between 1990Q1 and 1992Q2. However, the impact was almost instantly exhibited on the stock market sequel to the 2008 global economic crisis, characterised by liquidity/credit crunch, low investor confidence, de-leveraging, weak aggregate demand, and global output decline.

The study further divided the data into two subsamples to reflect the two possible economic states – the bear and bull periods. Overall, the findings demonstrate strong evidence of switching behaviour between the two periods in the country’s stock market with high volatility and low expected return and low volatility and high expected return. This result is similar to that of Arouri, Lahiani and Nguyen (2011) as they observe the existence of substantial return and volatility spillovers between world oil prices and GCC stock markets and that market situations and geographical proximity play a vital role in explaining the intensity of shock spillover since the latter tend to be more critical during crisis periods than normal (or tranquil) ones.

As shown in the outcome, the study found that the two regimes are persistent. During regime one of the first period (bear market), GDP and exchange rate are the significant drivers of stock market performance. While exchange rate, interest rate and money supply impact the stock market negatively, GDP and inflation rate impact the stock market positively. During regime two of the first period, oil prices and monetary policy variables such as inflation and interest rates significantly boost stock market performance. The exchange rate and inflation rate impact the stock market negatively, but GDP, interest rate, money supply and oil prices positively impact the stock market. The average expected period in regimes one and two is 22 and 27 months, respectively. Hence, It is more likely for the relationship between oil prices and stock returns to improve during the first regime than in the second regime. Zhu *et al*. (2017) affirmed the outcome as they investigated the effect of oil price shocks on stock returns using the two-stage Markov regime-switching model and declared that the effect of oil price shocks varies between low volatility and high volatility regimes.

The outcomes differ during the study's second period (bull market). In regime one of the second period, the inflation rate, interest rate and money supply are the only variables that significantly drive the stock market performance. However, stock market activities in the country received a boost from monetary policy tools like exchange rate, interest rate, money supply and oil prices during regime two of the second period. All the variables considered in the study, including oil prices, were positively correlated with the stock market except the interest rate. The average expected period in regimes one and two is 12 and 11 months, respectively. Therefore, the relationship between oil prices and stock returns is more likely to improve during the second regime than in the first regime. Consistent with Naifar and Al Dohaiman (2013) findings in the Gulf Corporation Council countries, the study further concludes that the relationship between oil prices and stock market returns is regime dependent. This finding is similar to the outcome of Sehgal and Kapur (2012), where they observed that India, South Korea, Indonesia, and the US, provided significantly positive returns in response to oil price shocks on a post-event basis. This finding is also comparable to the outcome of Si, Liu and Kong (2019), which examined the relationship between the business cycle and stock market cycle in China and concluded that the stock market cycles lead the business cycle during expansion while positively correlated. On the other hand, there is a negative correlation when the business cycle leads the stock market cycle.

In sum, the study concludes that the country's business cycle explains the corresponding interface and further highlights the business cycle's complex role in the oil price shock and stock market relationship. As mentioned earlier, the study used convenience and snowball sampling methods for primary data. Financial market professionals were identified as participants across the globe from the LinkedIn professional network platform. The questionnaire was distributed among participants through electronic mail. Due to the initial low response, the researcher was compelled to issue follow-up reminders and calls at intervals, and the study received sixty-eight completed structured and unstructured questionnaires. Hence, the outcome was further validated using the study participants' responses. The finding is comparable to the outcome of Zhu *et al.* (2017), Brayek, Sebai and Naoui (2015) and Mollick and Assefa (2013). Their studies conclude that prices react differently depending on the specific period: bear or bull, as the variables' relationship may vary.

Furthermore, Sharif, Aloui and Yarovaya (2020) evaluated how Covid-19 induced economic recession affects oil price shock and stock market returns in the US. The study found that the oil slump has the highest impact on the stock market returns in the U.S. when compared to the Covid-19 pandemic, geopolitical risk (GPR) and economic policy uncertainty (EPU). Other findings of their study include that the Covid-19 outbreak negatively affects oil prices through its impact on travel restrictions.

4.5 Oil Prices, Macroeconomic Variables and Net Oil-Exporting and Net Oil-Importing Countries

This study further investigates the impact of oil price shocks and selected macroeconomic variables on stock market performance in a net oil-importing country and a net oil-exporting country. The lists of net oil-importing and net oil-exporting countries included in this study were selected from the top ten net oil-importing and net oil-exporting countries. The five net oil-exporting countries are Saudi Arabia – Tadawul All Share Index (TASI), Russia – Russia Trading System (RTS) index, United Arab Emirates – Abu Dhabi Securities Exchange (ADX/ADI), Canada - S&P TSX, and Kuwait - KSW. At the same time, the five net oil-importing countries are the United States of America - Standard and Poor 500, China - Shanghai Stock Exchange Composite index, Japan - NIKKEI 225, Germany – DAX, and France - CAC 40. The variables included in the model are the stock market index, oil price, exchange rate, interest rate, inflation rate and M_2. The data obtained are analysed as follows.

Descriptive Statistics

Table 4.16 Descriptive Statistics for Net Oil-Exporting Countries

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	0.97	3.90	4.00	10725.68	69.72	6569.60
Median	0.27	2.60	2.50	1564.19	64.03	6086.01
Maximum	3.77	16.93	21.00	58651.10	132.72	19502.65
Minimum	0.01	-3.24	0.50	174.74	18.38	351.82
Std. Dev.	1.26	3.86	3.52	14499.87	27.46	4453.09
Skewness	1.34	1.19	1.62	1.23	0.40	0.60
Kurtosis	3.03	3.88	5.29	3.15	2.12	2.45
Jarque-Bera	321.80	287.27	707.50	271.22	64.75	77.78
Probability	0.00	0.00	0.00	0.00	0.00	0.00
Observations	1080	1080	1080	1080	1080	1080

Source: Author's computation from Appendix A.3

Table 4.16 contain statistics describing trends and patterns and summarises the data series from net oil-exporting countries. From the table, maximum (19502.65) and minimum (351.82) values of the stock index variable indicate a departure from normality as the observations are far from the average of 6086.01. Meanwhile, the stock performance index averaged 6569.60. The measure of the degree of asymmetry of the series suggests that the distribution has a long right tail with higher values. The kurtosis values indicate that the exchange rate, inflation rate, interest rate and money supply follow a leptokurtic distribution with a peaked curve and higher values. However, the exchange rate of 3.03 is close to a normal distribution. Oil prices and stock indexes are less peaked than the normal distribution, and hence, they follow a platykurtic distribution. The hypotheses of the Jarque-Bera test are rejected at a 1 percent level of significance. Distributions are not normal.

Table 4.17 Descriptive Statistics for Net Oil-Importing Countries

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	0.53	1.60	1.85	189047.40	69.72	6344.61
Median	0.15	1.54	1.00	9691.05	64.03	4241.81
Maximum	1.58	68.00	7.47	1137027.00	132.72	27444.17
Minimum	0.00	-2.52	-0.10	763.91	18.38	735.09
Std. Dev.	0.60	2.50	2.18	331314.00	27.46	5493.79
Skewness	0.44	17.46	0.91	1.55	0.40	1.40
Kurtosis	1.29	459.62	2.41	3.69	2.12	4.25
Jarque-Bera	165.68	9437245	163.48	453.82	64.75	422.69
Probability	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Observations	1080	1080	1080	1080	1080	1080

Source: Author's computation from Appendix A.4

Table 4.17 contain descriptive statistics and summarises the data series for net oil-importing countries. While the stock performance index average is 6344.61, the maximum (27444.17) and minimum (735.09) values of the variables indicate abnormal distribution as their observations are far from the average of 4241.81. The measure of the degree of asymmetry of the series suggests that the distribution has a long right tail. The kurtosis values indicate that the inflation rate, money supply and stock index follow a leptokurtic distribution with a peaked curve and higher values, especially for the inflation rate. Oil prices, exchange and interest rates are less peaked than the normal distribution, and hence, they follow a platykurtic distribution. The hypotheses of the Jarque-Bera test are rejected at a 1 percent level of significance. Distributions are not normal.

4.5.1 Panel Data Unit Root Test

Much like univariate time series data, panel data tend to exhibit a time trend and are, therefore, non-stationary. To ascertain the time trend of data for oil exporting and importing countries, we employed the Levin-Lin-Chu Test, and the result is presented in Table 4.18.

Table 4.18 Panel Unit Root Test Result

DF–GLS Unit Root Test Results

Variables	Levin, Lin & Chu t* Statistics		Remark
	Level	First Difference	
Oil Importing Countries			
Exchange Rate	-0.81795	-3.72735**	I(1)
Inflation Rate	0.04766	-16.0768**	I(1)
Interest Rate	-0.39284	-4.43490**	I(1)
M_2	11.4643	-5.08958**	I(1)
Oil Price	-1.99265**	-	I(0)
Stock Index	7.78540	-12.1843	I(1)
Oil Exporting Countries			
Exchange Rate	-0.25430	-4.60330**	I(1)
Inflation Rate	-0.38250	-10.5540**	I(1)
Interest Rate	-0.35215	-9.82408**	I(1)
M_2	1.69502	-2.44016**	I(1)
Oil Price	-1.99265**	-	I(0)
Stock Index	-1.62128**		I(0)

Note: ** indicates the rejection of the hypothesis of the existence of unit root at a 5% sig level. A Lag length of 1 was selected based on Schwarz Information Criteria (SIC).

Source: Extracted from Appendix B.3.

Variables for net oil-exporting and oil-importing countries were tested for unit root, and the results are presented in Table 4.18. The study applies the test (Levin–Lin–Chu) to the hypothesis that the series contains a unit root (non-stationary). The decision rule is to reject this hypothesis if the Levin–Lin–Chu test probability value is less than the critical value of 0.05. The table shows that the probability values for oil prices in net-oil importing and net-oil exporting countries and the stock index for net oil-exporting countries were stationary at the level. The exchange rate, inflation rate, interest rate, money supply and stock index for net oil-importing countries and the exchange rate, inflation rate, interest rate and money supply for net oil-exporting countries were not stationary at level. This indicates that these variables' mean, variance and covariance are not constant during the period under consideration. However, after first differencing, they became stationary. The unit root test results imply that oil price and stock index are integrated of order zero, i.e., I(0) for net oil-exporting countries. The oil price is integrated of order zero, i.e., I(0) in net oil-importing countries. In contrast, the remaining variables are integrated into order one, i.e., I(1) in both net oil-importing and net oil-exporting countries.

4.5.2 Results from the Application of EGARCH Models

After confirming the order of integration among the variable, the study empirically evaluates and compares oil price shocks' impact on stock market performance in net oil-exporting and net oil-importing countries using EGARCH models. The study first tested for the possible presence of ARCH(q) effects in the residuals for each country. The results from the generalised autoregressive (AR) representation of the squared residuals are presented in Table 4.19.

Table 4.19 ARCH Effects for Net Oil-Exporting and Net Oil-Importing Countries

Country	b1	LM Statistics	P-value
Oil Exporting countries			
Saudi Arabia	0.876321	165.7296	0.0000
Russia	0.813167	142.3204	0.0000
UAE	0.785954	132.7330	0.0000
Canada	0.686380	101.4272	0.0000
Kuwait	0.705651	107.4103	0.0000
Oil Importing Countries			
USA	0.553898	66.02700	0.0000
China	0.769595	127.3508	0.0000
Japan	0.739275	120.7512	0.0000
Germany	0.675228	97.81162	0.0000
France	0.832202	160.0269	0.0000

Source: Extracted from Appendix B.3

Table 4.19 contains the results of the Heteroskedasticity Tests for net oil-exporting and net oil-importing countries. The table shows that the LM statistics (Obs*R-squared) for the ten sampled countries have their probability values below the cut-off value of 0.05. Thus, the study rejects the hypothesis of no ARCH effects in favour of the alternative. This decision implies that ARCH(1) effects are present in all the models. Thus, the study estimated the EGARCH model following the graphical evidence of volatility clustering (see Appendix B.4). The EGARCH model for each country based on Gaussian distribution was then estimated. A total of 10 models were estimated, and the results are presented in Table 4.20.

Table 4.20 Estimates of EGARCH models for Net Oil-Exporting and Net Oil-Importing Countries

	Mean equation	δ	α	β	α+β	λ	Exchange Rate	Inflation Rate	Interest rate	M_2	Oil price	R-squared
Net Oil-Export												
Saudi Arabia	527.7419	6.799628	-0.070962 (0.1791)	0.977488 (0.0000)	0.906526	0.290531 (0.0000)	-23.94443 (0.0000))	0.006398 (0.3057)	-0.010994 (0.1966)	- 0.000000815 (0.9640)	-0.000504 (0.4489))	0.928694
Russia	30.49495	1.311454	0.169211 (0.2061)	0.865017 (0.0000)	1.034228	0.037323 (0.6359)	5.856983 (0.7177)	0.025790 (0.2347)	-0.056253 (0.2643)	1.9E-100 (1.0000)	-0.000648 (0.7572)	0.942079
UAE	37.78397	0.816237	0.957152 (0.0000)	0.816637 (0.0000)	1.773789	-0.022142 (0.8072)	-0.758987 (0.6855)	0.036774 (0.0903)	0.093594 (0.1863)	0.000176 (0.4393)	0.002986 (0.2025)	0.944123
Canada	193.2369	1.516904	0.563176 (0.0003)	0.702122 (0.0000)	1.265298	-0.250532 (0.0092)	1.15E+00 (0.4765)	0.056466 (0.5163)	0.057412 (0.3189)	0.000341 (0.0690)	0.000607 (0.9156)	0.963568
Kuwait	374.6759	16.18571	0.527006 (0.0013)	0.726532 (0.0000)	1.253538	0.104505 (0.2459)	0.703847 (0.8271)	0.474747 (0.0000)	0.247906 (0.1658)	0.0000371 (0.3930)	-0.027575 (0.0506)	0.963344
Net Oil-Import												
USA	-1.890776	8.71844	0.380130 (0.000)	0.993145 (0.000)	1.373275	0.055717 (0.3886)	n/a	-4.370904 (0.2045)	6.143224 (0.0144)	0.018898 (0.0026)	-0.396137 (0.0139)	0.987727
China	65.49565	-5.867705	0.754924 (0.0000)	0.00804 (0.9460)	0.762964	0.476353 (0.0000)	76.31573 (0.0000)	0.262717 (0.0039)	1.25938 (0.0019)	0.00000144 (0.7898)	-0.04542 (0.0000)	0.928039
Japan	179.9882	1.789584	-0.204243 (0.0174)	0.876046 (0.0000)	0.671803	0.015346 (0.8461)	-73.15839 (0.0436)	-0.060414 (0.0978)	0.191387 (0.2892)	0.000000666 (0.0000)	0.002441 (0.1782)	0.97189
Germany	101.9152	2.854205	0.181475 (0.2853)	0.488132 (0.0300)	0.669607	-0.296335 (0.0053)	0.246925 (0.8594)	-0.168685 (0.2560)	0.316738 (0.0686)	0.001114 (0.0296)	0.002032 (0.7242)	0.979313
France	149.0572	4.740695	0.160018 (0.3963)	0.184905 (0.5776)	0.344923	-0.251821 (0.0335)	1.007112 (0.5504)	-0.022811 (0.6654)	0.354917 (0.0667)	0.0016 (0.0275)	-0.003189 (0.6520)	0.937346

Source: Extracted from Appendix B.4

δ = coefficient of the constant variance term (C3), α = ARCH term (C4), β = GARCH term (C6), λ = Asymmetric effects (C5)

Table 4.20 contains results on the impact of oil price shocks on stock market returns in both net oil-exporting and net oil-importing countries. The table reports the average stock return in the selected countries, the coefficient of the constant variance term (δ), the ARCH term (α), the GARCH term (β), the stationary results ($\alpha+\beta$), and the asymmetric effects (λ). The average stock returns for all the sampled countries were positive except for the US, whose returns averaged -1.890776 between 2003 and 2020.

As evident in the table, stock market returns in all net oil-exporting countries (except Saudi Arabia) were not stationary [i.e., $\alpha+ \beta>1$], implying that a shock in stock returns will continue to grow indefinitely into the future. However, stock returns across all net oil-importing countries (except the US) are largely stationary [i.e., $\alpha+ \beta<1$]. This upshot signifies that while shocks in volatility in net oil-importing countries such as China, Japan, Germany and France may not persist for many future periods, the U.S. will persist indefinitely into the future.

The modelling of asymmetry was also largely positive but not significant for many countries, implying that positive shocks outweigh negative ones. A cursory review of the results in the table shows that no leverage effect was observed for countries such as Saudi Arabia, Russia, Kuwait, the US, China, and Japan; only an asymmetric effect was present. This outcome implies that positive shocks to oil prices and other macroeconomic variables impact more than negative shocks in these countries. However, this effect is only significant for Saudi Arabia and China, and the reverse is the case for countries such as UAE, Canada, Germany and France.

On the impact of macroeconomic variables and oil price on stock market returns, the table shows that for net oil-exporting countries, the exchange rate has a negative and statistically significant effect on stock market returns in Saudi Arabia, negative and insignificant impact on stock returns in UAE, positive and statistically insignificant impact on stock returns in Russia, Canada and Kuwait. For net oil-importing countries similar to Saudi Arabia, the exchange rate has negative and statistically significant impacts on stock returns in Japan, a positive and significant impact on stock returns in China but a positive and a lower significant impact on stock returns in Germany and France. The exchange rate was not computed for the US, given that the U.S. dollar is used as the benchmark rate for other countries.

The results further indicate that though inflation generally positively impacts stock returns across all the five sampled net oil-exporting countries, this impact is only significant on stock returns in Kuwait. Unlike the net oil-exporting countries, the results in the table indicate that the inflation rate has negative but statistically insignificant impacts on the economies of all net oil-importing countries except China. In China, the impact of inflation was positive and statistically significant, implying that a unit increase in the inflation rate would increase stock returns by 26.27%.

Furthermore, the results presented in the table also show that interest rate has positive impacts on stock returns for net oil-exporting countries such as UAE, Canada, and Kuwait and negative impacts on stock returns in Saudi Arabia and Russia. Both positive and negative impacts are generally insignificant at a 5% level of significance. Monetary aggregates such as interest rates positively impact stock returns in all the net oil-importing countries. However, the impact was only significant in the U.S. and China.

Money supply positively impacts all net oil-exporting stock returns except Saudi Arabia, and all these impacts are statistically insignificant. For the net oil-importing countries, the money supply positively impacts all the countries' stock indexes, and the impact was significant in all the countries except China.

The table further reveals that the oil price-stock returns relationships are insignificant for all the net oil-exporting countries. However, the impact of oil shocks was positive in the stock markets of UAE and Canada but negative in the stock markets of Saudi Arabia, Russia and Kuwait. The outcome further affirms that oil price shocks were significant on the stock market index of the U.S. and China but insignificant in Japan, Germany and France. Furthermore, just as with the top two net oil-exporting countries, the coefficient of oil prices negatively and statistically significantly impacts stock returns in the top two net oil-importing countries (U.S. and China). Although the impact of oil prices on the stock returns of France was also negative, the impact was statistically insignificant. However, the impact of oil price shocks on stock returns was positive but statistically insignificant for Japan and Germany.

Juxtaposing the results of the net oil-exporting and net oil-importing countries in the table reveals that the production level and the level of capital market development drive the impact of oil prices on stock returns in these countries. For instance, Saudi Arabia and

Russia are the two largest net oil-exporting countries globally, as they account for over 23% of world oil production. In most cases, an increase in oil prices is associated with OPEC production cuts. The decline in production tends to lower aggregate spending in these countries, thus negatively impacting their stock markets. Unsurprisingly, the top five net oil-importing countries are also some of the countries with the most developed capital markets in the world. Capital markets in these countries are highly integrated, as evidenced by the cross-listing of securities, cross-country hedging, and portfolio diversification. Thus, increasing oil prices due to supply and demand factors would negatively affect investors' behaviour, as reflected in their stock returns.

The study tested the robustness of the EGARCH models by examining the normality, autocorrelation, heteroscedasticity and explanatory power of the models. As presented in Table 4.14 and Appendix B.4, the results indicate that the residuals for the series generally follow a normal distribution. Also, the LB statistics for the standardised residuals are insignificant, indicating that serial correlation (autocorrelation) is no longer evident. The R-squared values for all the models were above 92%, indicating that the models highly fit the data.

4.5.2 Impulse Response of Net Oil-Exporting and Net Oi-Importing Countries

As discussed earlier, the impulse response function is a crucial tool for estimating the reaction of a variable in response to a shock from the other variables. This section detailed the impulse response of stock indexes of all ten countries to oil prices and macroeconomic variables.

Net Oil-Exporting Countries

Figure 4.11 The Impulse Response of TASI Stock Index to Macroeconomic Variables & Oil Prices

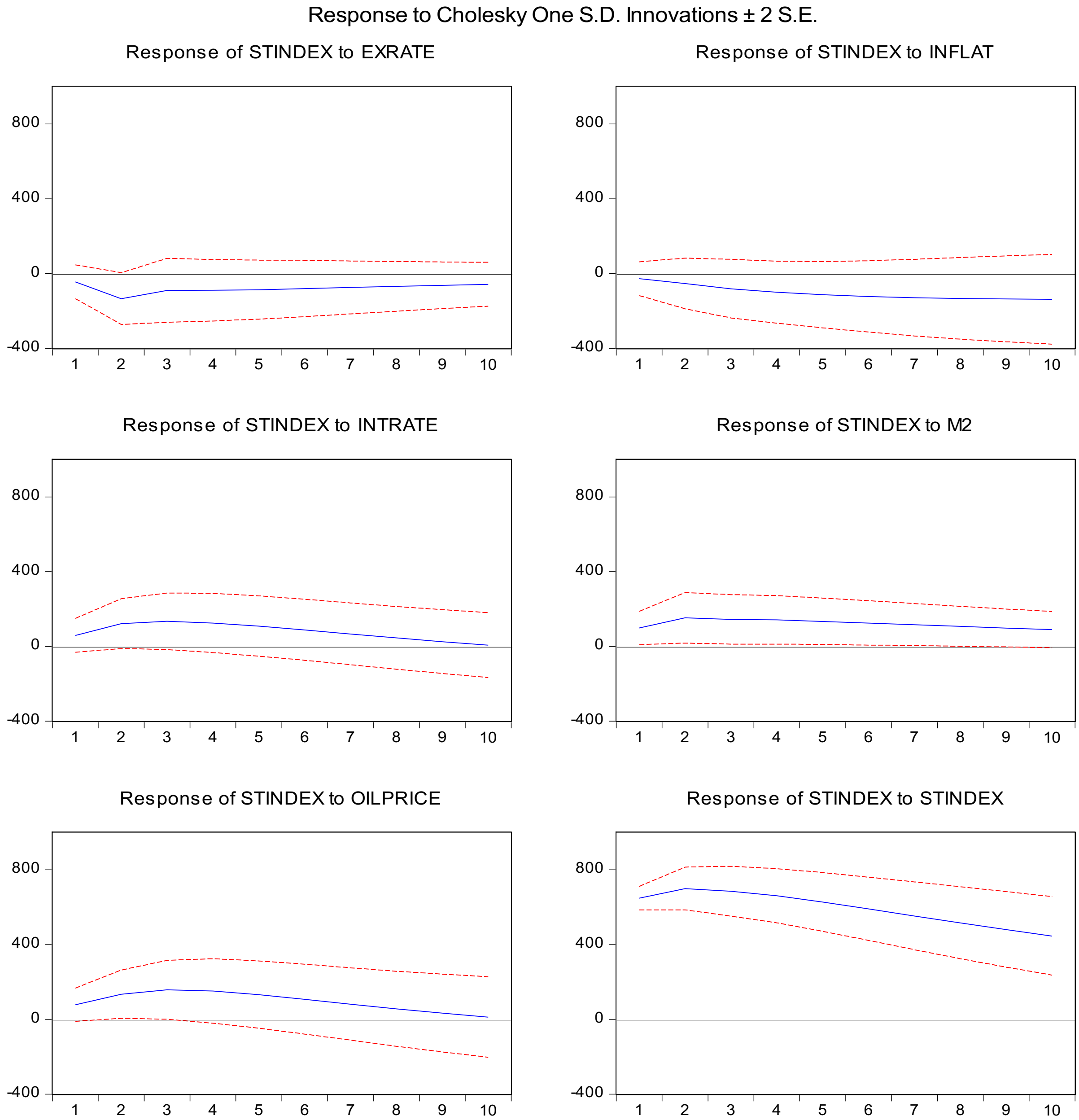


Figure 4.11 contains the response of Saudi Arabia's Tadawul All Share Index to macroeconomic variables and oil prices. The exchange rate remains in the negative region, with an initial decrease in the shock to the stock index until the second period, when it increases till period three and flattens out after that. The stock index responds to a shock in the inflation rate with a gradual decline while remaining in the negative region. A shock to interest rate, money supply, and oil prices increases stock returns until the second period before declining while in the positive region. The stock index responds to its previous lag with an initial increase and a gradual decline from the second period.

Figure 4.12 The Impulse Response of RTS Stock Index to Macroeconomic Variables & Oil Prices

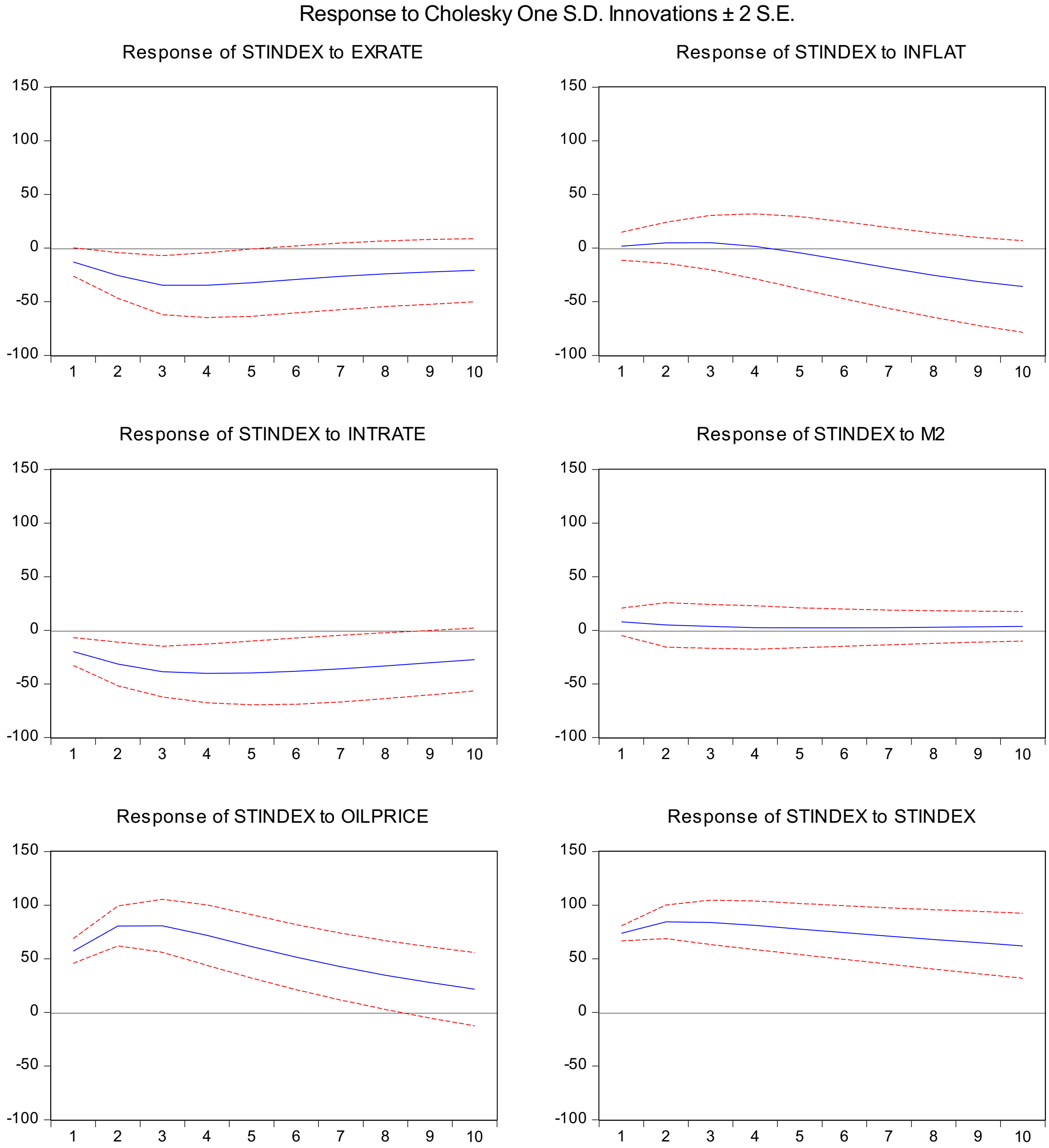


Figure 4.12 contains Russia's RTS stock index response to macroeconomic variables and oil prices. The stock index responds to exchange rate and interest rate shocks with an initial decline that increased from the third period. The inflation rate recorded a minimal impact until the fourth period, when it gradually declined into the negative region. The response of the stock index to the money supply was insignificant. A shock in oil prices increases the stock index until the second period. After that, there was a decline in the response. The stock index responds with an increase to its previous lag immediately after the shock in the first period and a subsequent decrease.

Figure 4.13 The Impulse Response of ADX General Index to Macroeconomic Variables & Oil Prices

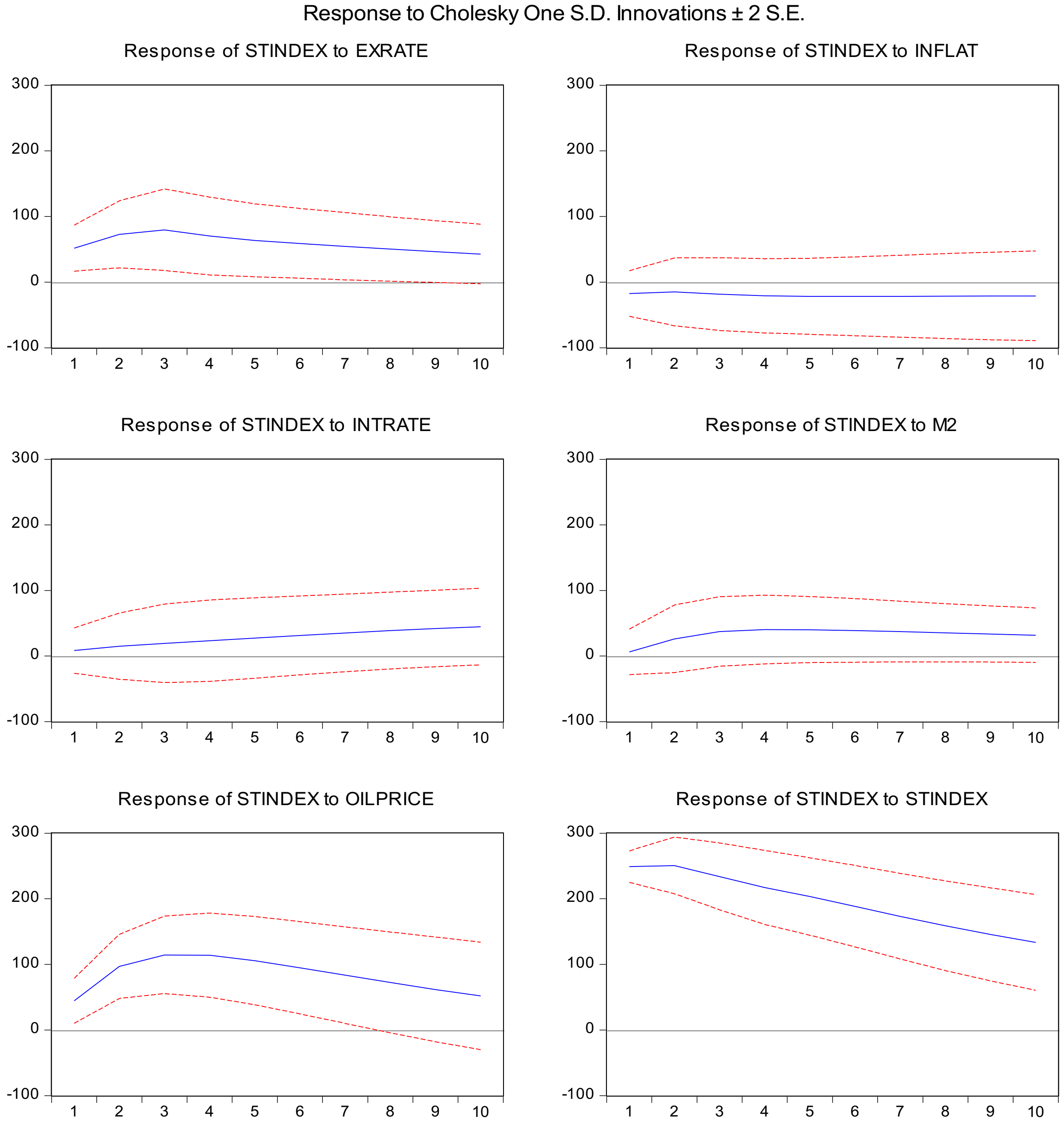


Figure 4.13 contains UAE's ADX/ADI stock index response to macroeconomic variables and oil prices. A shock to the exchange rate increases the stock index until period three when the response gradually decreases. A shock to inflation rate remains in the negative region with an initial increase in the stock index during the first period only. A shock to interest rate gradually increases the stock index throughout the periods. Response of the stock index to money supply increases until the third period when it flattens out. The stock index responds to oil price shocks with an initial increase until the third period and declines after. The stock index responds to its previous lag with an initial increase and decline from the second period.

Figure 4.14 The Impulse Response of S&P TSX Stock Index to Macroeconomic Variables & Oil Prices

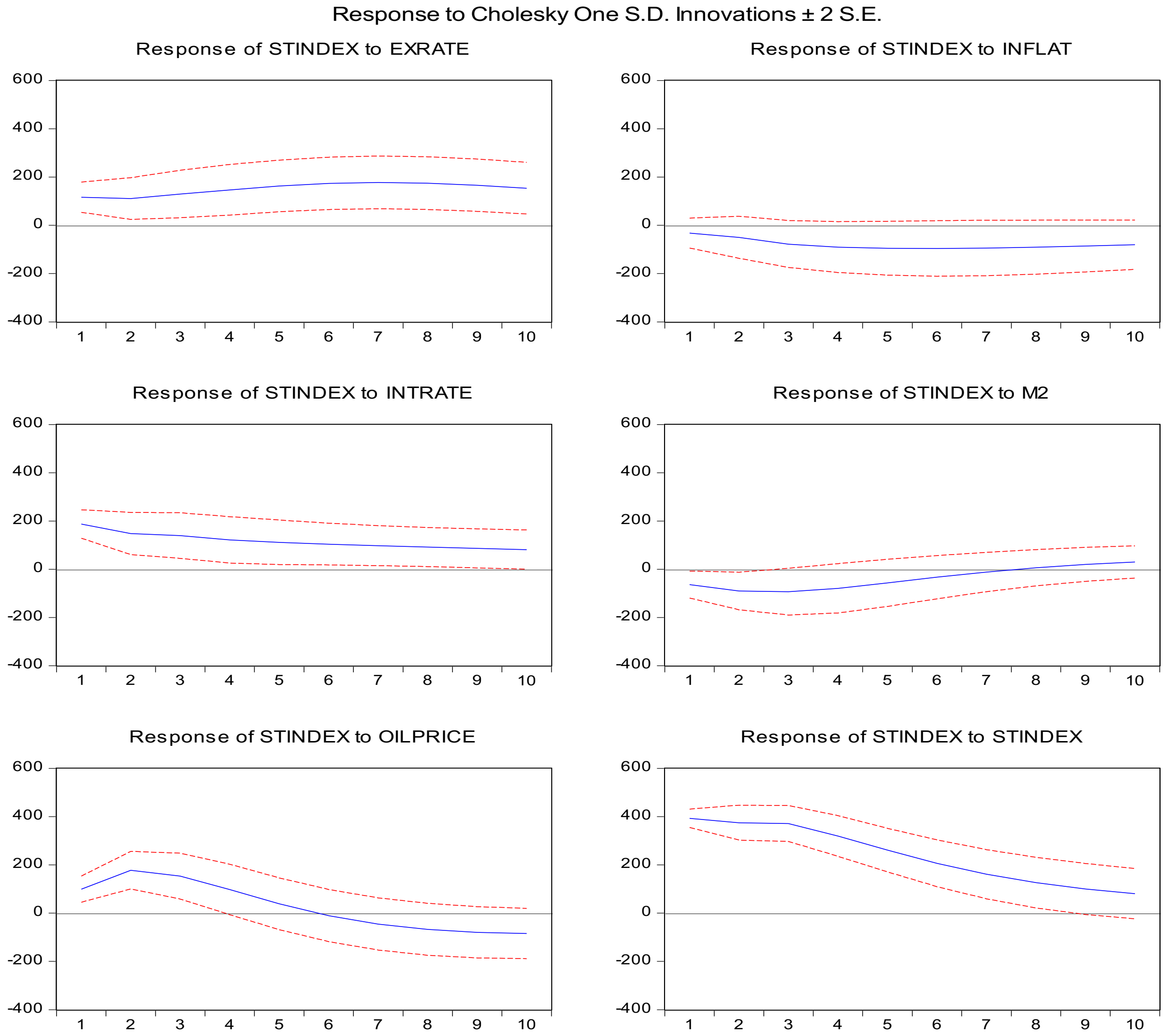


Figure 4.14 contains the response of Canada's S&P TSX stock index to macroeconomic variables and oil prices. The exchange rate has no noticeable positive impact on the stock index until period two when the response gradually increases till period six, and it flattens out. The inflation rate remains in the negative region, with an initial decrease and flattens out from period three. A shock to interest rate decreases stock returns until the seventh period before hitting its steady state within the positive region. Money supply shock increases stock performance in the negative region until the seventh period, when it enters the positive region. A shock to oil price increases the stock index until period two before it returns to a downward trend and becomes negative from period six. Lastly, the stock index responds to its previous lag with an initial insignificant decrease. However, the decrease became significant from the third period.

Figure 4.15 The Impulse Response of the KSW Stock Index to Macroeconomic Variables & Oil Prices

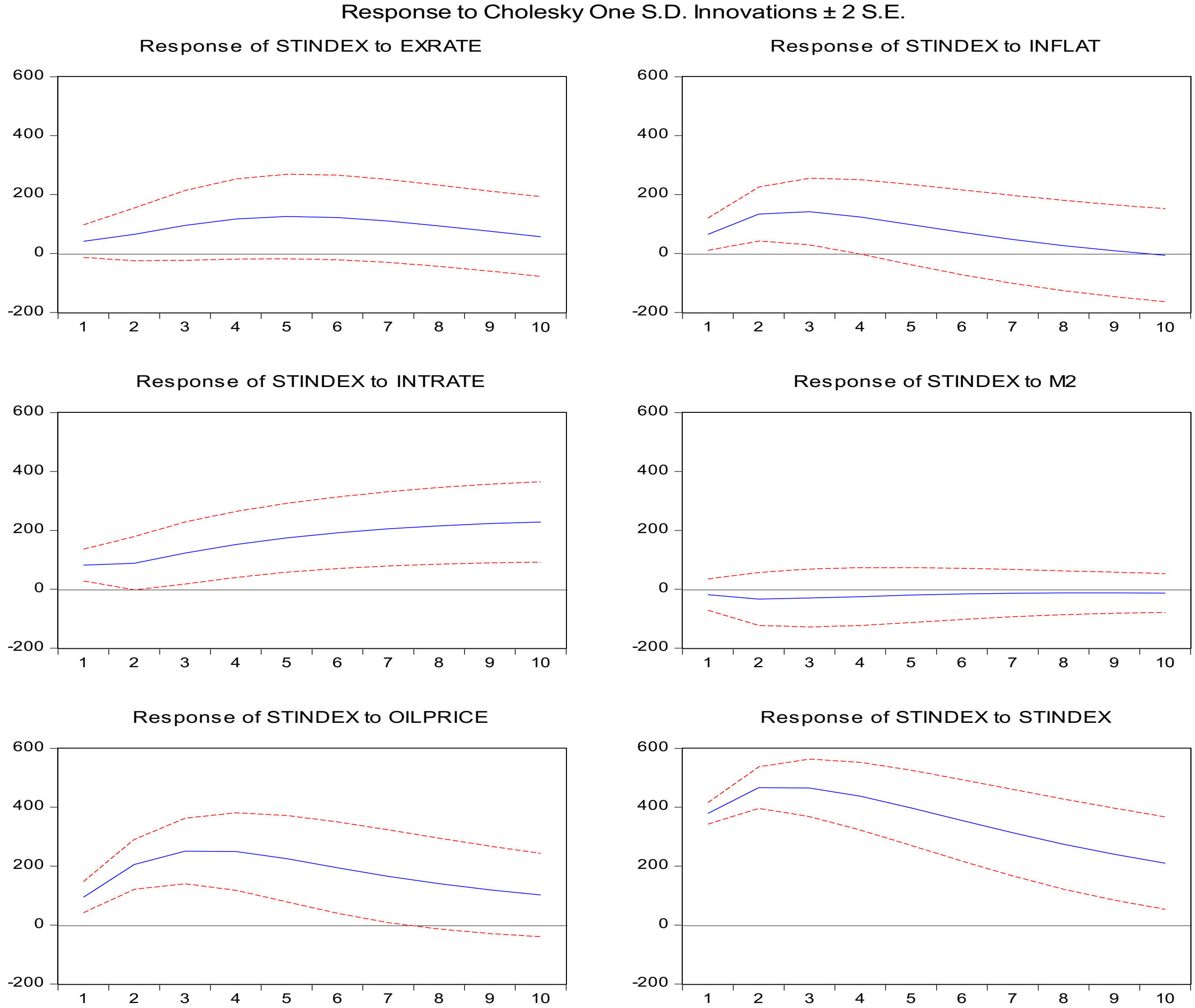


Figure 4.15 contains the response of Kuwait's KSW stock index to macroeconomic variables and oil prices. The stock index responds positively to a shock from the exchange rate until the fifth period, recording a subsequent decline. A shock in the inflation rate increases the stock index until the third period, when it commences a decline and records nil effect by the 10th period. A shock to interest rate consistently increases the stock index from the second period. Stock returns until the seventh period before hitting its steady state within the positive region. The stock index observed a marginal decrease due to a shock in money supply until period two within the negative region. This reaction was followed by a slight increase that stayed close to the baseline until the tenth period. The reaction of the stock index to the oil price shock increased and peaked in the third period, with a steady decline after that. Like the oil price shock, the stock index responds to shocks from its previous lag with an initial increase and records a drop from the second period.

Net Oil-Importing Countries

Figure 4.16 The Impulse Response of the SSE Stock Index to Macroeconomic Variables & Oil Prices

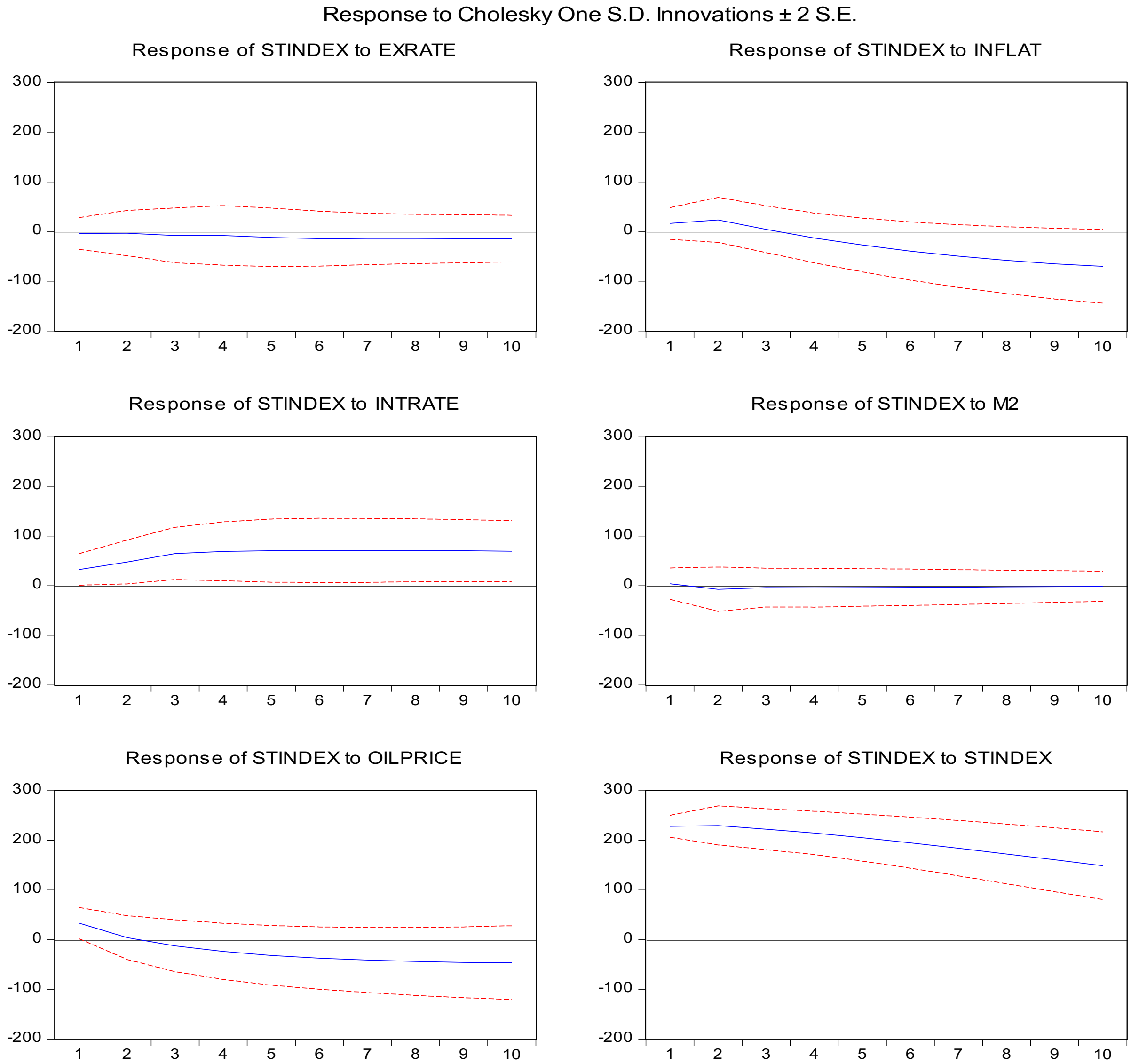


Figure 4.16 contains the response of China's SSE stock index to macroeconomic variables and oil prices. The stock index stayed close to the baseline in response to exchange rate and money supply shocks. The inflation rate records a minimal impact on the stock index in the positive region until the second period when it continuously declines into the negative region by the third period. A shock to the interest rate increase stock returns until the third period before a subsequent nil effect. A shock to oil prices continuously decreased the stock index and crossed the negative region during the second period. Lastly, the stock index responds to shocks from its previous lag with an initial slight decrease that continued until the tenth period.

Figure 4.17 The Impulse Response of the S&P 500 Stock Index to Macroeconomic Variables & Oil Prices

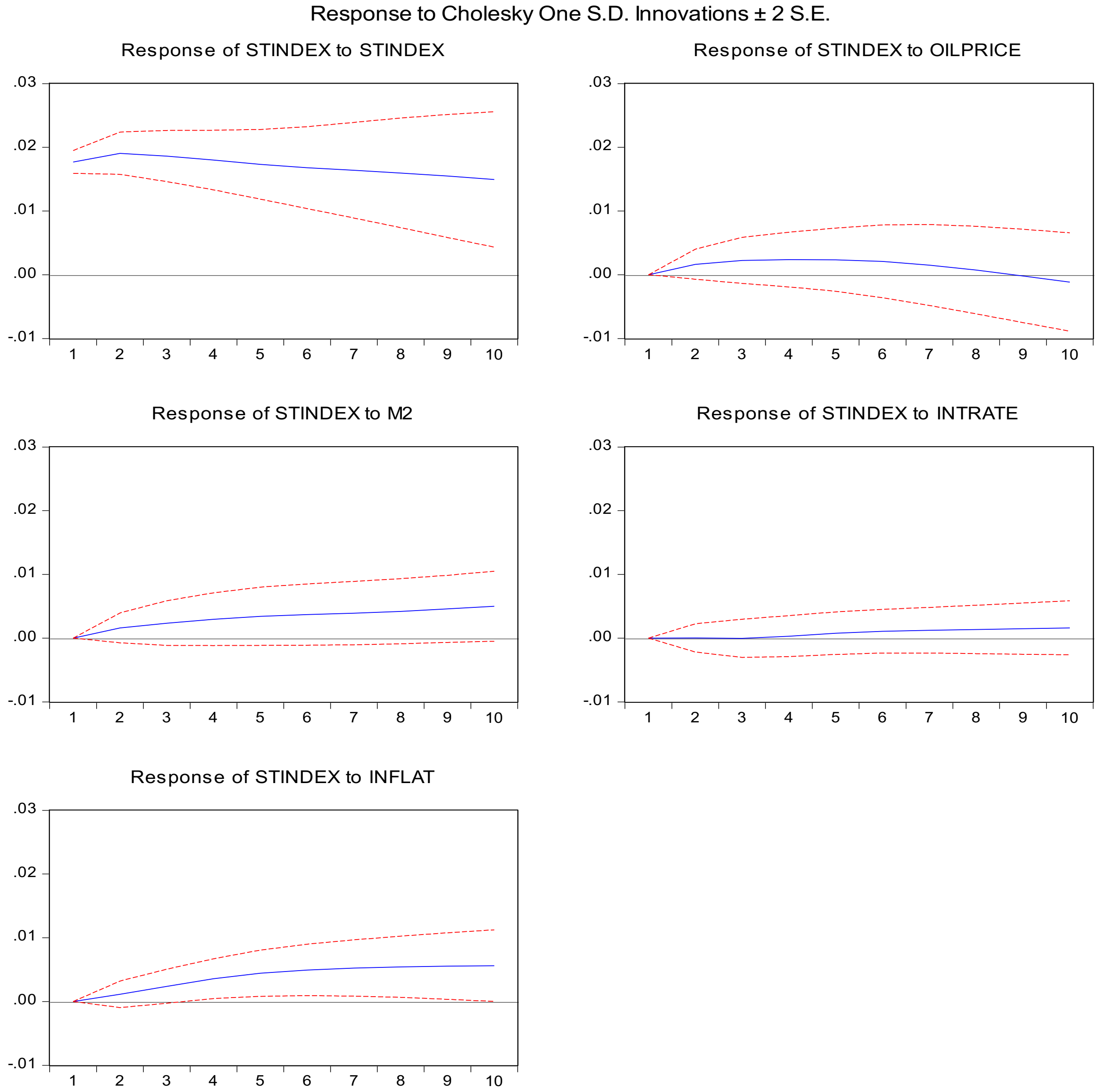


Figure 4.17 contains the USA's S&P 500 stock index response to macroeconomic variables and oil prices. The stock index responds to its previous lag with an initial increase and subsequent marginal decrease from the second period. The stock index responds to shocks from money supply and inflation rate similarly as the response starts from the baseline and gradually increases over the ten periods. Like the money supply and inflation rate, the stock index responds to oil price shock from the baseline with a gradual increase until the seventh period, when it commences a decline and drops to the negative region in the ninth period. A shock to interest rate displayed no impact on the stock index until the fourth period, when a slight response was observed until the tenth period.

Figure 4.18 The Impulse Response of Nikkei Stock Index to Macroeconomic Variables & Oil Prices

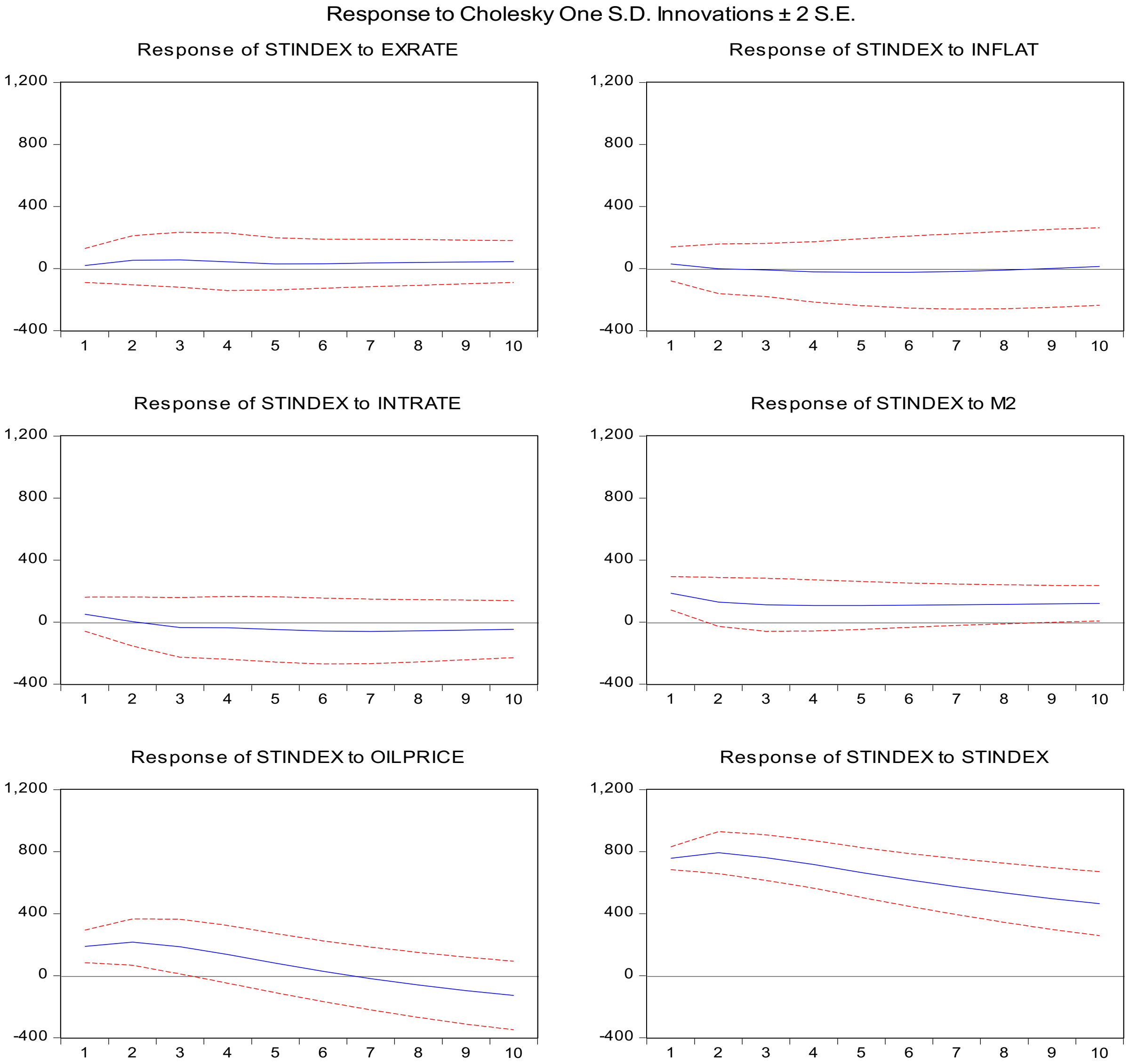


Figure 4.18 contains the response of Japan's Nikkei stock index to macroeconomic variables and oil prices. The stock index responds to a shock in the exchange rate with an initial increase that flattens out from period two while staying close to the baseline. The stock index responds to the inflation rate and interest rate shocks similarly, with an initial drop to the negative region in the second period while staying close to the baseline until the tenth period. A shock to the money supply drops the stock index to period two and subsequently flattens out. A shock to oil price initially increases the stock index until the second period before the drop and subsequently crosses to the negative region in period six. Lastly, the stock index responds to its previous lag with an initial increase until period two, followed by a gradual drop till period ten.

Figure 4.19 The Impulse Response of DAX Stock Index to Macroeconomic Variables & Oil Prices

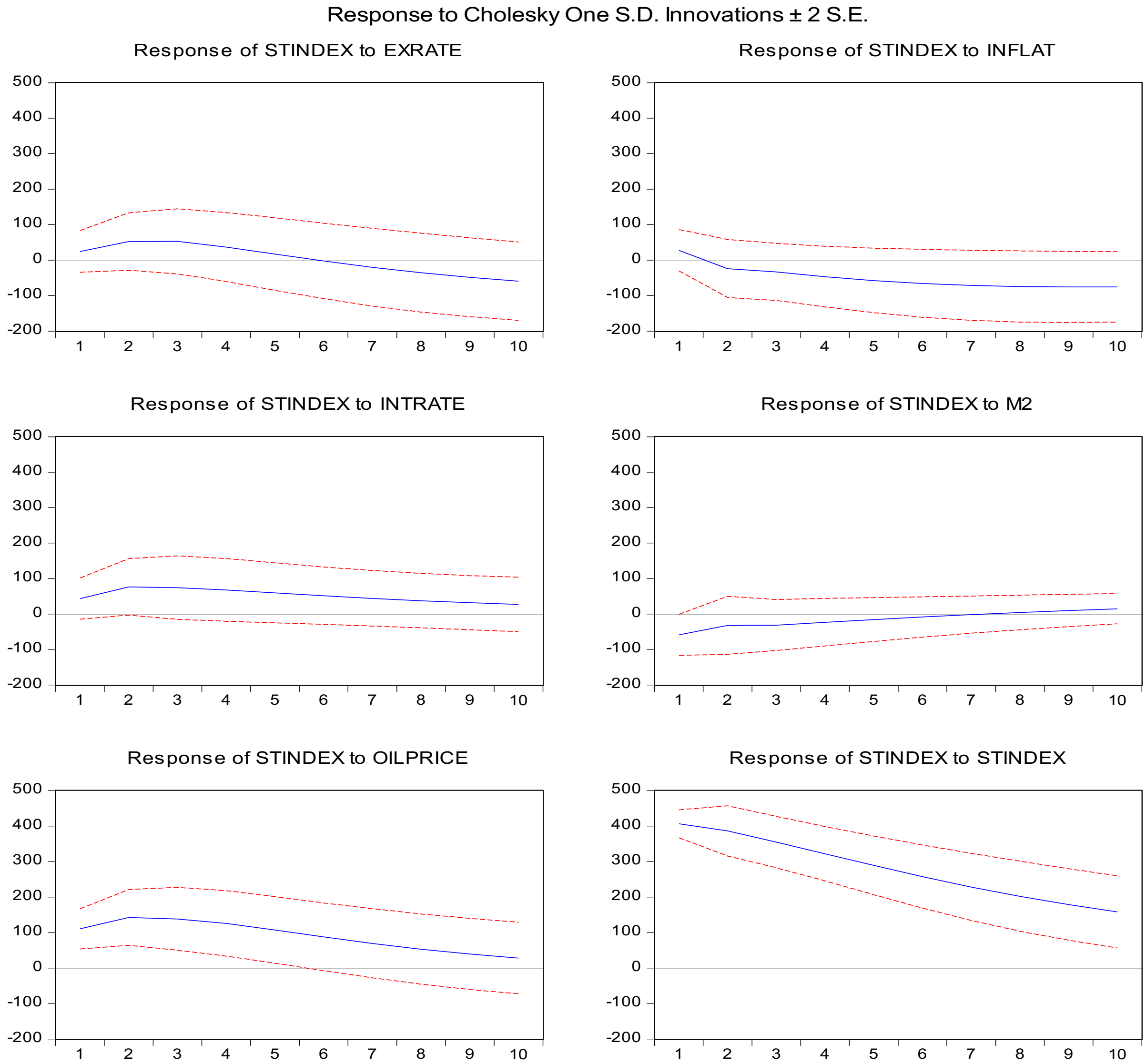


Figure 4.19 contains the response of Germany's DAX stock index to macroeconomic variables and oil prices. A shock to the exchange rate initially increases the stock index until the second period before the drop and subsequently crosses to the negative region in period six. The stock index responded to a shock in the inflation rate with a sharp drop, crossed to the negative region in the second period, and responded with a gradual drop until the tenth period. A shock to interest rate and oil prices increases the stock index until the second period two, followed by a gradual drop till period ten. A shock to money supply increases the stock index in the negative region and crosses the baseline into the positive region at period eight while staying close to the baseline. Lastly, the stock index responds to its previous lag with a consistent decrease in the positive region.

Figure 4.20 The Impulse Response of CAC 40 Stock Index to Macroeconomic Variables & Oil Prices

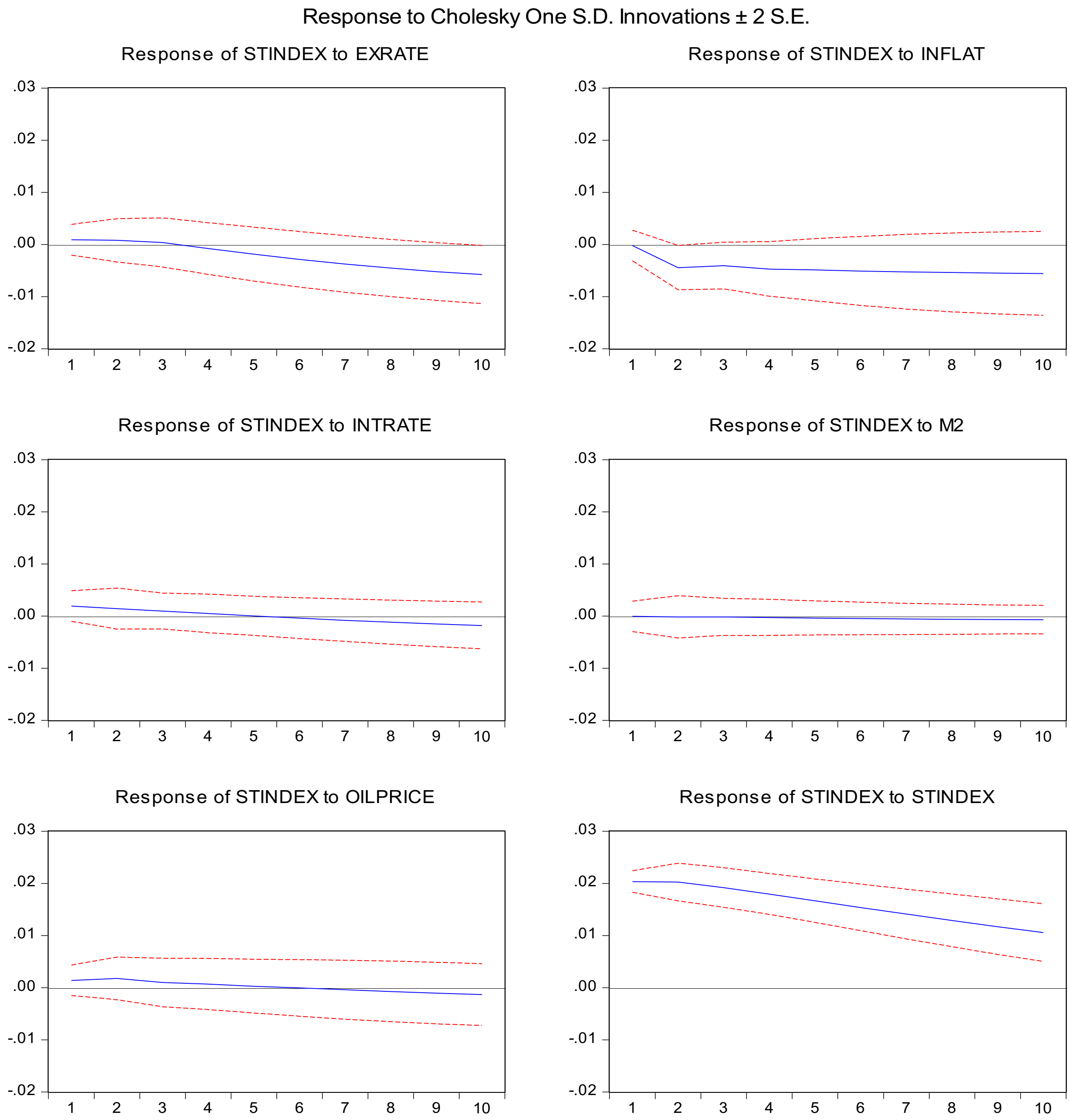


Figure 4.20 contains the response of France's CAC 40 stock index to macroeconomic variables and oil prices. A shock to the exchange rate initially places the stock index close to the baseline until the fourth period before the continuous drop in the negative region. The stock index responds to shocks from the interest rate, money supply and oil price by remaining close to the baseline until the tenth period. With a shock to the inflation rate, the stock index responds in the negative region with a sharp drop until period two, when it flattens out while remaining in the negative region. Lastly, the stock index responds to its previous lag with a consistent decrease in the positive region.

The impulse response functions above have assisted in arriving at a general understanding of the timing and direction of the individual country's stock market reaction to shocks from the macroeconomic variables and oil prices within the model.

4.5.3 The Hypothesis Testing

H_0 Oil price shocks do not affect stock market performance in net oil-importing countries differently from net oil-exporting countries.

The study used the estimated coefficients' probability values to test this hypothesis. The decision rule is to reject H_0 if the p-value is less than the cut-off value of 0.05. The outcome is presented in Table 4.21

Table 4.21 Test of Hypothesis for Net Oil-Exporting and Net Oil-Importing Countries

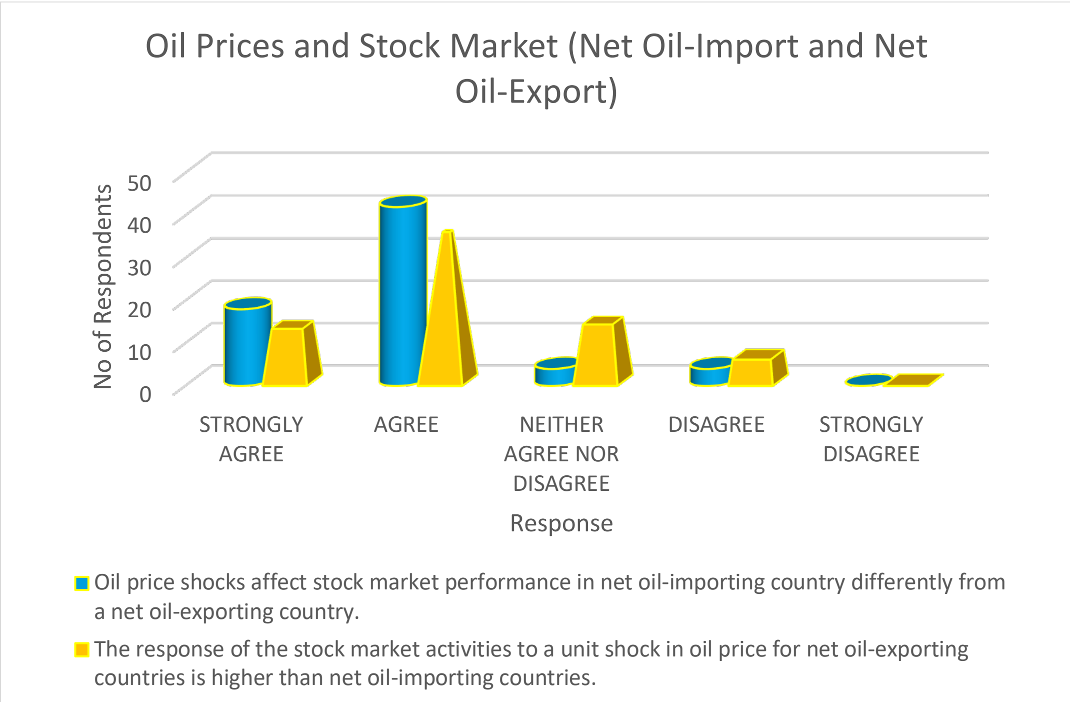
Oil Exporting Countries	
Saudi Arabia	-0.000504 (0.4489)
Russia	-0.000648 (0.7572)
UAE	0.002986 (0.2025)
Canada	0.000607 (0.9156)
Kuwait	-0.027575 (0.0506)
Oil Importing Countries	
USA	-0.396137 (0.0139)
China	-0.04542 (0.0000)
Japan	0.002441 (0.1782)
Germany	0.002032 (0.7242)
France	-0.003189 (0.6520)

Source: Extracted from Appendix B.3

Table 4.21 contains the result of the hypothesis testing for the fourth research objective. The table shows that the study rejects the hypothesis that oil price shocks do not affect stock market performance in net oil-exporting countries differently from net oil-importing countries. A detailed analysis of the results indicates that the oil prices and stock returns relationships in net oil-exporting countries are positive in UAE and Canada and negative for Saudi Arabia, Russia and Kuwait. However, in the net oil-importing countries, this relationship was negative and statistically significant in the USA and China, positive for countries such as Japan and Germany, and negative for France.

To confirm the impact of oil price shocks on stock market performance in net oil-importing and net oil-exporting countries, summarised below in Figure 4.21, is the response to questions posed to respondents.

Figure 4.21 Survey Response for Net Oil-Exporting and Net Oil-Importing Countries



Source: Author's visual representation from Appendix C.3

Kruskal-Wallis H rank test is an extension of the Mann–Whitney U test and is employed with two or more independent samples (Corder and Foreman, 2009). Hence, the study performed the Kruskal-Wallis test to ascertain if the impact of oil price shocks on stock market performance in net oil-importing countries differs from those of net oil-exporting countries using the opinions of the four categories of participants. To achieve this, the code data in Excel were exported to SPSS. The processes in SPSS involve opening the data file, selecting the variables and groups to be compared, and running the analysis. The output provides the test statistic, degrees of freedom, and p-value, to conclude the differences between group medians. The study rejects the research hypothesis if its probability value is higher than the critical value of 0.05. This outcome indicates that there is a significant difference between the medians of the groups.

Figure 4.22 Kruskal-Wallis Test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of The response of the stock market activities to a unit shock in oil price in net oil exporting countries like (Saudi Arabia, Russia, United Arab Emirates, Canada, and Kuwait) is higher than net oil importing country such as (Unites States of America, China is the same across categories of Oil price shocks affect stock market performance in net oil importing country differently from a net oil exporting country.	Independent-Samples Kruskal-Wallis Test	.149	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 4.22 contains the result of the Kruskal-Wallis test. As shown in the figure, the impact of oil price shocks on stock market performance in net oil-importing countries differs from those of net oil-exporting countries since the probability value of 0.149 exceeds the cut-off point of 0.05. This finding has reinforced previous observations that the impact of oil price shocks on the economies of oil-exporting countries may differ from those of oil-importing countries. The conclusion is consistent with earlier findings using secondary data presented in Table 4.21 above. The outcome from these two approaches is in line with the study of Wang, Wu, and Yang (2013) as they affirmed that the duration, magnitude, and direction of response by the stock market to oil price shocks depends highly on whether the country is a net oil-importer or oil-exporter.

4.5.4 Key Findings

There are a considerable number of empirical works on oil price movements and stock market performance. However, there needs to be more knowledge about oil price movement and stock markets relationship in net oil-exporting versus net oil-importing countries, as Filis, Degiannakis and Floros (2011) opined that the time-varying correlation of oil and stock. This assertion is especially where fluctuations in the global business cycle cause aggregate demand-side oil price shocks, and they are expected to influence all stock markets in the same manner. Kilian and Park (2009) noted that stock markets respond to a change in oil prices either negatively or positively, depending on the nature of the economy, that is, whether the economy is a net oil-exporting or net oil-importing country. This argument is consistent with the findings of Wang, Wu and Yang (2013) and Lippi and

Nobili (2012) as they conclude that the duration, magnitude, and direction of response by the stock market to oil price shocks depends highly on whether the country is a net oil importer or oil exporter. The argument forms the basis of this objective by comparing the impact of oil price shocks on stock market performance in net oil-exporting and oil-importing countries.

The descriptive statistics evidenced that the stock performance index of the net oil-exporting countries is higher than those of the net oil-importing countries. This upshot indicates that the stocks of the net oil-exporting countries are more attractive for investment analyses. Following the data analysis using EGARCH models, the study found that the exchange rate has a negative effect on stock market returns in Saudi Arabia, UAE and Japan, and the effect is significant in Saudi Arabia and Japan. The impact of the exchange rate is positive on stock returns in Russia, Canada, Kuwait, China, Germany and France, while the effect is only significant in China. The finding of the positive outcome is consistent with Okechukwu et al. (2019) in Nigeria, Giri and Joshi (2017) in India, Mitra (2017) in South Africa, and Narayan and Narayan (2010) in Vietnam. The negative outcome is in agreement with the findings of Wahyudi et al. (2017) in the Philippines and Indonesia, Yousuf and Nilsson (2013) in Sweden, Hsing (2013) in Croatia and Ehrmann Fratzscher and Rigobon (2011) in the Euro area.

The results further indicate that the inflation rate positively impacts stock returns across all the five sampled net oil-exporting countries. The impact is only significant on stock returns in Kuwait. Unlike the net oil-exporting countries, the results indicate that the inflation rate negatively impacts the stock performance of all net oil-importing countries except China. In China, the impact of inflation was positive and significant, implying that a unit increase in the inflation rate would increase stock returns. The outcome from all the net oil-exporting countries is consistent with Giri and Joshi (2017), Wahyudi *et al*. (2017) and Okechukwu *et al*. (2019). The findings of Reddy (2012), Kwofie & Ansah (2017), Sathyanarayana and Gargesa (2018) and Eldomiaty *et al*. (2019) conform with the result of the net-importing countries.

For monetary aggregates such as interest rate and money supply, the variables positively impact stock returns in all the net oil-importing countries. The impact is significant in the U.S. and China for interest rate, while money supply records a significant impact in the US, Japan, Germany and France. Regarding the net oil exporting countries, the interest rate positively impacts stock returns in UAE, Canada, and Kuwait and negatively impacts stock returns in Saudi Arabia and Russia. The impact of money supply on all the net oil-exporting countries observed was positive. The positive outcome is consistent with the conclusions of Wang (2020), Eldomiaty *et al*. (2019), Pícha (2017) in the US, Wahyudi *et al*. (2017) and Hsing (2013) in Poland, while the negative outcome is in tandem with the findings of Bhuiyan and Chowdhury (2020), Okechukwu *et al*. (2019), and Schrey, Hafdísarson and Wendt (2017) and Hosseni, Ahmadi and Lai (2011).

The theoretical postulation of the Quantity Theory of Money is reaffirmed in the study. Theoretically, economists, particularly Monetarists, view the money supply as having direct and positive links with stock prices. Brunner (1961) and Friedman and Schwartz (1963) ascertained that an increase in money supply creates an excess supply of money balances resulting in excess demand for stocks. The increase in the demand for stocks subsequently results in a rise in stock prices. Hence, advocates of the quantity theory of money conclude that the interaction channel between changes in stock prices and money supply is direct. According to the Monetarists, an unexpected increase in a country's money stock is accompanied by a decrease in interest rate. The effect of this is that the return on other fixed-income securities like treasury bills and bonds, which are substitutes for equity, decreases, causing an increase in stock price. This study confirms this long-standing theoretical postulation as it found that money supply positively impacts the stock market performance of the sampled countries.

Concerning the impact of oil prices, the stock markets of Saudi Arabia, Russia, Kuwait, the US, China and France record a negative relationship. In contrast, the impact is positive on stock returns in UAE, Canada, Japan and Germany. The impact was significant in two countries – U.S. and China. This outcome is in accord with Alamgir and Amin (2021), as they record a positive relationship between oil prices and stock performance in Bangladesh, India, Pakistan, and Sri Lank. Furthermore, the studies of Chikir, Guesmi, Brayek and Naoui (2020) also conclude that oil prices positively impact stock performance in Australia and Canada, France, Japan, Mexico, Norway and the UK Contrarily, the studies of Kose and Ünal (2020) in Kazakhstan, Iran, and Russia, Coronado, Jiménez-Rodríguez and Rojas (2018) in Bangladesh, India, Pakistan and Sri Lanka, Giri and Joshi (2017) in India, Joo and Park (2017) in U.S., Japan, Korea and Hong Kong, Boonyanam (2014) in Pakistan and Filis (2010) in Greece all observed a negative relationship between oil prices and stock performance in the various countries examined.

Asymmetry and Leverage Effects

Results from this study exhibit that the impact of oil prices on stock market performance changes over time. The study reveals that the asymmetry and leverage effect modelling was significant in Canada (net oil exporter), Germany and France (net oil importers). This result signifies that negative oil shocks impact stock returns in these countries more than positive oil price shocks of the same magnitude. However, for Saudi Arabia, Russia, and Kuwait (net oil exporters) and net oil-importing countries like the USA, China, and Japan, this study affirms only the asymmetric effect (no leverage effect). This effect implies that positive shocks to oil prices impact stock returns in these countries more than negative shocks.

Juxtaposing the results of the net oil-exporting and oil-importing countries reveals that the impact of oil prices on stock returns in these countries is heterogeneous, asymmetrical and driven by various inputs like the production level and the level of capital market development. For instance, Saudi Arabia and Russia are the two largest net oil-exporting countries globally, accounting for over 23% of world oil production per day (see Table 3.2). An increase in oil prices is sometimes associated with an OPEC production cut. The decline in production tends to lower aggregate spending in these countries, thus negatively impacting their stock markets. Unsurprisingly, the five net oil-importing countries also have the most developed capital markets in the world. Capital markets in these countries are highly integrated, as evidenced by the cross-listing of securities, cross-country hedging and portfolio diversification. Thus, increasing oil prices due to supply and demand factors would negatively affect investors' behaviour, as reflected in the stock returns in these countries.

The findings of this study are consistent with those of Mokni (2020), as he affirmed that oil prices affect stock market performance in time-varying and heterogeneous dimensions and further confirmed that the relationship is asymmetrical. Khalfaoui, Sarwar and Tiwari (2019) also observed that oil asset is relatively more critical for oil-exporting countries than oil-importing countries and that oil-importing countries are severely affected by lagged oil price shocks compared with the lag effect of oil price shocks on oil-exporting countries.
The findings are partly consistent with those of Hashmi, Chang and Bhutto (2021) and Filis, Degiannakis and Floros (2011). While Hashmi, Chang and Bhutto (2021) conclude that the response of stock market performance to oil prices in both net oil-exporting and net oil-

importing countries are asymmetrical, Filis, Degiannakis and Floros (2011) noted that the time-varying correlation of oil prices and stock prices do not differ for net oil-importing and net oil-exporting economies, mainly where fluctuations in the global business cycle that cause the aggregate demand side oil price shocks are expected to influence all stock markets in the same manner. Further findings confirm that a unit increase in oil price increases the stock market performance in a net oil-exporting country more than in an oil-importing country. Higher oil prices are expected to generate additional income and wealth for the net oil-exporting country, which, if transmitted into economic activities, would lead to higher economic activity, according to Bjørnland (2009) and Jimenez-Rodrıguez and Sanchez (2005). Hence, they both concluded that oil price shocks are expected to have a positive and more significant impact on the economies of the net oil-exporting country than a net oil-importing country. Wang, Wu and Yang (2013) also conclude that stock markets of net oil-importing countries and net oil-exporting countries would respond differently to oil price shocks.

The findings are consistent with the outcome of other studies like Liu *et al.* (2022) and Khalfaoui, Sarwar and Tiwari (2019). In analysing the relationship between oil prices and stock markets of net oil-importing countries (the United States and China) and net oil-exporting countries (Saudi Arabia and Russia), Khalfaoui, Sarwar and Tiwari (2019) observed that oil asset is relatively more critical for net oil-exporting countries than for net oil-importing countries. Those net oil-importing countries are severely affected by lagged oil price shocks compared with the lag effect of oil price shocks on oil-exporting countries. While examining the relationship between oil prices and stock market returns for 25 countries, Liu *et al*. (2022) observed that oil-exporting countries whose economies depend more on oil prices respond more strongly to oil price volatility than oil-importing countries. They further affirmed that stock returns of developing countries are more susceptible to oil price volatility than that of developed countries and that crisis plays a crucial role in the oil price volatility and stock returns relationship. In sum, this study suggests that the dependency on oil prices by the stock markets of net oil-exporting and net oil-importing countries is not constant. The relationship between the variables is heterogeneous and asymmetrical. Hence, investors and asset managers are advised to apply adequate risk assessment during the critical review of asset portfolio structure.

4.6 Summary

This chapter covers the data analysis process in examining the relationship between oil prices, macroeconomic variables and stock market performance while focusing on the research questions. The chapter further discusses the result and findings. Descriptive statistics, unit root test, EGARCH models, impulse response function, Markov switching models and Bai and Perron multiple breakpoint tests have been applied in the process. In addition to using bar charts to visualise the data point distribution, statistical methods like Cronbach's Alpha reliability test, Mann-Witney U test, Spearman's rho correlation test and Kruskal-Wallis test were also applied in the process using SPSS statistical software. The results from the examination indicate that the intensity and extent of the impact of oil prices and macroeconomic variables on stock market performance differ depending on the market conditions. The outcome further indicates that the effect is different for each stock market. The impact of the shocks does not uniformly affect the stock markets, and the effect varies over time.

Chapter 5 Conclusions

5.1 Introduction

The impact of oil prices on the stock market has continued to be one of the most critical areas in financial academics. It has attracted various attention from researchers, policymakers, and investors. The increased attention is linked to the importance of crude oil to various sectors of an economy, recent oil price revolutions and the increased stock market integration. The relationship between the stock market and macroeconomic variables has also been a concern for economic and financial researchers because of the stock market's role in achieving a country's economic growth and development. This role is achieved by mobilising funds from surplus to deficit units (Okechukwu *et al*., 2019). Therefore, the study contributes to the growing literature on oil prices and stock market research.

Specifically, this thesis examines the topic from four different perspectives. In this regard, the central themes are: (a) To critically review the impact of oil price shocks on sectors of the stock market. (b) To establish the impact of macroeconomic indicators like exchange rate, inflation rate, interest rate, money supply, and oil prices on the stock markets. (c) To evaluate the congruent interface of the business cycle in terms of oil price shocks and the stock market relationship. (d) To review and compare the influence of oil prices on stock market performance in a net oil-importing country and a net oil-exporting country. This chapter, therefore, summarises the findings and conclusion of the thesis and outlines the contributions to knowledge, limitations, recommendations, and scope for further research in this field was also addressed.

5.2 Summary

Undoubtedly, oil plays a vital role in world economies by influencing the balance of trade (import and export) structure. Thus, it is natural to expect that oil price shocks would impact the behaviour of an economy and, subsequently, the stock markets of countries. This expectation forms the basis of this study as it investigates the impact of oil price shocks on stock market performance. Enthused by the continuous fluctuations in the global energy market and the impact on stock market performance, theoretical and empirical literature was reviewed. These include the theories of Keynesian, New Keynesian, Financial Theory of Investment, Financial Instability Hypothesis, Efficient Market Hypotheses, Capital

Asset Pricing Model, Hotelling's Theory on Price, Arbitrage Pricing Theory (APT), and Random Walk Theory as no one theory can fully explain the association among the study variables. Despite the large volume of studies in this area, the summary of the literature reviewed affirmed no stable pattern in the relationship. In theory, the outcome of the relationship between oil prices and stock market performance should be either negative or positive. However, some studies conclude with a positive, negative, mixed or no relationship between the two variables, as evidenced in Figure 2.6.

The study aligns with the philosophical assumption of positivism and interpretivism, while the positivist paradigm was supplemented with the interpretivist paradigm. The quantitative research methods were used with some qualitative additions for triangulation and statistical techniques to verify the outcome. Ten countries were sampled from the top ranking of net oil-exporting and net oil-importing countries according to the U.S. EIA classification. The countries selected as the net-oil exporting countries include Saudi Arabia, Russia, United Arab Emirates, Canada, and Kuwait. United States, China, Japan, Germany, and France were selected as the net-oil importing countries. Thus, data were obtained on stock market indices at the aggregate and sector level. Stock index sampled include eleven S&P/TSX composite index sectors (GSPTTCD, GSPTTCS, SPTTEN, SPTTFS, GSPTTHC, GSPTTIN, SPTTTK, GSPTTMT, GSPTTRE, GSPTTTS and GSPTTUT), and aggregate stock index of sampled countries (S&P 500; Shanghai Stock Exchange Composite index; NIKKEI 225; DAX; CAC 40, Tadawul TASI; RTS index; ADX/ADI; S&P TSX; and the KSW). Brent crude oil prices and macroeconomic indicators like exchange rate, GDP, inflation rate, interest rate, and money supply were included in the study. Randomisation was impossible for the second category, primary data, due to the large population, limited resources and time. Hence, the study adopted a survey questionnaire as a means of primary data collection. The questionnaire targets financial market professionals as participants from across the globe on LinkedIn professional networking platform based on their relevance to the issue while using electronic mail. The participants were sampled using the convenience sampling method and snowball sampling technique.

Regarding the data frequency, monthly data from January 2003 to December 2020 were analysed. Since GDP data were available at quarterly and annual frequencies, the study further analysed quarterly data from 1990Q1 to 2020Q4 for the congruent interface of the business cycle on oil prices and stock market relationship. The primary and secondary data were analysed using statistical tools and econometric modellings such as the impulse response function, EGARCH and Markov switching models.

The descriptive statistics reveal that data on all the study variables are not normally distributed. Findings from the empirical results based on the EGARCH models indicate that stock market sectors respond to oil price shocks differently. The impact of oil price shocks on stock returns was positive across all sectors except real estate, telecommunications, and utilities. Only real estate shows strong evidence of a negative relationship between oil price shocks and stock returns. The findings compare with Yasmeen *et al*. (2019) outcome on sector stock performance in Pakistan. They observed a negative relationship between oil prices and sectors of the stock markets like manufacturing, agriculture (livestock) and electricity. However, they observed a positive and significant impact of oil prices on Pakistan's communication and transportation sector. A related study by Catik, Kisla and Akdeniz (2020) observed a negative relationship between oil prices and Turkey's stock performance in banking, chemicals, electricity, food and beverage, metal goods and machinery, industrials and transportation sectors. They affirmed a positive relationship between oil prices and basic materials, services, non-metallic mineral products, textiles and leather, wood, paper and print sectors.

The study ascertained that one standard deviation shock to oil price initially increases stock performance for consumer discretionary, energy, financials, health care, industrials, information technology, materials, real estate, telecommunications, and utilities sectors. The positive response declined and became negative for consumer discretionary from the eight months, information technology from two and a half months, and material from the third month. For the consumer staples sector, one standard deviation shock to oil price has a negative and declining impact from periods one to six. The response gradually increased from period seven but remained in the negative region throughout the periods under consideration.

Regarding the asymmetry and leverage effects, negative oil shocks impact stock returns of financial, industrial, and real estate sectors more than positive oil price shocks of the same magnitude. That is, asymmetry and leverage effects were significant. However, the study reveals only asymmetric effects for consumer staples, energy, health care, information technology, and telecommunications sectors (no leverage effect) — positive shocks to oil price impact more on stock returns of these sectors than negative shocks. These outcomes constitute an extension of Kilian and Park (2009) by viewing the asymmetrical effect of positive and negative oil price shocks on stock market performance. Unlike earlier studies, the findings of this research demonstrate that the response of the Canadian stock market sectors to oil price shocks is asymmetrical, and the effect differs substantially across sectors, depending on their degree of oil dependence and multiple transmission mechanisms. The study participants' perceptions further corroborate this finding as they noted that stock market sectors respond differently to oil price shocks.

The study further concludes that the Canadian and German stock markets respond differently to impacts from macroeconomic variables and oil price shocks. The exchange rate, for instance, has a negative effect on the Canadian stock market index and a positive effect on the German stock market. While interest rate, money supply, and oil prices positively impact both the Canadian and German stock market indexes, the inflation rate records a positive impact on the Canadian stock market and a negative impact on the German stock market. In sum, the study found that the stock returns-generating processes in Canada and Germany exhibited a high degree of persistence (long memory) in conditional variance. This result implies that the effect of shocks from oil prices and macroeconomic variables on current stock returns will persist for many future periods. It was also found that the modelling of asymmetry was positive in Canada and negative in Germany. This implies that the impacts of negative shocks do not outweigh positive news in Canada but the other way around and vice versa in Germany. Put differently, positive shocks from macroeconomic variables and oil price impact more than negative shocks of the same magnitude in Canada, while negative shocks from macroeconomic variables and oil price impact more than positive shocks of the same magnitude in Germany. The above outcome compares with the findings of Taghizadeh-Hesary *et al*. (2019), Naifar and Al Dohaiman (2013) and Ogiri *et al*. (2013). They affirmed that the transmission mechanism through which oil prices impact the stock market is by way of real economic activity. Since oil prices directly impact GDP, investment, interest rate, and exchange rate, the impact will be transmitted to the stock market through the demand and supply channels and macroeconomic indicators.

Multiple breakpoint tests were performed using the Bai and Perron (2003) and MSM procedures. Two break points were observed in the Canadian stock market while examining how business cycles explain the interface between oil prices and the stock market relationship. The breakpoints occurred in 1998 and 2008, while the country's economic recession occurred in 1990 and 2008. The break periods demonstrated that the Canadian stock market took eight years to bring a structural break. The 2008 global economic crisis, characterised by liquidity/credit crunch, low investor confidence, de-leveraging, weak aggregate demand, and decline in global output, was almost immediate on the Canadian stock markets. The study further divided the data into two subsamples to reflect the two possible states for an economy, the bear and bull periods. The periods coincide with the onset of bearish and bullish states and represent stock market contraction and expansion periods.

The findings demonstrate strong evidence of switching behaviour between the two periods with high volatility and low expected return and low volatility and high expected return. Further findings affirmed that GDP and exchange rate are the significant drivers of stock market performance during regime 1 in period 1. On the contrary, oil prices and monetary policy variables such as inflation and interest rates significantly boost stock market performance during regime 2 in period 1. During the second period (a period that followed the global economic crisis), oil prices and all the macroeconomic variables (except interest rate) significantly drive stock market performance in Canada, and it is more likely that the relationship between oil prices and stock returns to improve during the economic expansion period than in contraction period. Hence, the study highlights the business cycle's complex role in the oil price shock and stock market relationship. The stock market reacts differently depending on the specific period: bear or bull.

The outcome is related to Zhu *et al*. (2017) study as they affirmed that the stock market cycles lead the business cycle during expansion while positively correlated; and that there is a negative correlation when the business cycle leads the stock market cycle. In a similar work by Balcilar, Gupta and Wohar (2017), they conclude that in the short-run, oil is driven mainly by cycles (transitory shocks), and permanent shocks mainly drive the stock market. However, permanent shocks dominate in the long-run for both oil and the stock market. In sum, the study concludes that the business cycle explains the corresponding interface between oil prices and the Canadian stock market, as the impact on the relationship is time-varying.

The final empirical section examined the influence of oil prices on the stock market performance of net oil-exporting countries compared to net oil-importing countries. This upshot indicates that the stocks of the net oil-exporting countries are more attractive for investment than the stocks of net oil-importing countries examined. In the net oil-exporting countries, the study established that the exchange rate negatively affects stock market returns in Saudi Arabia and the UAE. At the same time, the impact was positive in Russia, Canada, and Kuwait. However, the impact is only significant in Saudi Arabia. In the net oil-importing countries, the exchange rate negatively and significantly influenced stock market returns in Japan, while the impact was positive in China, Germany, and France. However, the impact is only significant in China.

The results further confirm that although the inflation rate positively impacts stock returns across all the five sampled net oil-exporting countries, the variable negatively impacts the stock performance of all net oil-importing countries except China. The inflation rate significantly impacts stock performance in Kuwait and China. Interest rate and money supply positively impact stock returns in all the net oil-importing countries. While interest rate significantly impacts stock performance in the U.S. and China, money supply significantly impacts stock performance in U.S., Japan, Germany and France. Regarding the net oil-exporting countries, the interest rate positively impacts stock returns in UAE, Canada, and Kuwait. It records a negative impact on stock returns in Saudi Arabia and Russia. The impact of money supply on all the net oil-exporting countries observed was positive.

Concerning the impact of oil prices on stock performance in net oil-exporting countries, the study records a negative relationship in Saudi Arabia, Russia and Kuwait. In contrast, a positive impact was observed in UAE and Canada. Similarly, the study records a negative relationship between oil prices and stock performance of net oil-importing countries like the U.S., China and France, while a positive relationship was observed in Japan and Germany. The impact was significant in two net oil-importing countries – U.S. and China. The study analysis further exhibits that the impact of oil prices on stock market performance changes over time. The modelling of asymmetric and leverage effects was significant in Canada (net oil exporter), Germany and France (net oil importers). This signifies that negative oil shocks impact stock returns in these countries more than positive oil price shocks of the same magnitude. However, for Saudi Arabia, Russia, and Kuwait (net oil exporters) and net oil-importing countries like the USA, China, and Japan, this study affirms only the asymmetric effect (no leverage effect). This effect implies that positive shocks to oil prices impact stock returns in these countries more than negative shocks.

In sum, the thesis reliably concludes that the relationship between oil prices and stock market performance is time-varying, asymmetrical, heterogeneous and complex. Although the impact of oil prices on the stock market is not stable over time, several country-specific factors drive the outcome resulting in mixed results from studies. These country-specific factors are not limited to the level of a country's dependence on oil, as this drives the response of the economy and stock market to such oil shocks. The level of capital market advancement, development, and high integration, as evidenced in the cross-listing of securities and cross-country hedging, also determines how a country responds to oil price shocks. Moreover, the nature of the structural oil shock, time-vary effects, and the role of macroeconomic indicators further influence the outcome.

5.3 Contribution to Literature

The findings provide valuable contributions to the existing literature as oil prices and stock market nexus are popular topics of energy economics research. Literature on the relationship between oil prices and stock market performance has been developed into different strands. These strands include investigating asymmetric and linearity effects, time-varying correlation, volatility, forecasting, country dependency on oil (net-import or net-export), aggregate, sectoral and firm-level analysis, employment of different methods and different data sets, different types of oil shocks among other. There is a high volume of research work with varied results. Hence, the study combines some strands of literature to establish the influence of oil prices and macroeconomic factors among stock markets.

The study's contribution to knowledge is multifold. This thesis evaluates research philosophy and varies its methodology in data gathering technique and approach. Previous studies on the phenomenon like Bhuiyan and Chowdhury (2020), Lin and Su (2020), Wang (2020), Okechukwu *et al*. (2019), Eldomiaty *et a*l. (2019), and Coronado, Jiménez-Rodríguez and Rojas (2018) all based their analysis on secondary data only while employing multiple estimation methods. Triangulation of primary and secondary data and using of a quantitative approach and some qualitative methods provide opportunities for convergence and corroboration of results as the positivist paradigm was supplemented with the interpretivist paradigm. The opportunity to leverage both methods' strengths and weaknesses increased this research study's depth, creativity, validity, and richness. Hence, the triangulation strengthened the study's validity as results from the secondary data analysis were validated using primary data analysis. Adopting the triangulation method in future research studies will strengthen the validity of the results.

This research further contributes to the literature by combining diverse strands of the phenomenon for a holistic view and robust outcome and to broaden the understanding of the nexus. Recent studies by Hashmi, Chang and Bhutto (2021), Chikir, Guesmi, Brayek and Naoui (2020), Mokni (2020) and Giri and Joshi (2017) only focus on one or two strands of the phenomenon. Several strands of the oil price-stock market relationship require further research. This study examined the possible asymmetric effect of positive and negative oil price shocks, but this strand requires further research for better understanding. The thesis also examines the impact of oil prices on the stock market relationship during extreme conditions. Although some studies, including Zhu *et al*. (2017), Jammazi and Reboredo (2016) and Khalfaoui *et al*. (2015), attempt to combine some strands, studies should marry different strands of literature for better understanding.

Other strand covered in this study includes the impact of oil prices on aggregate and sectoral stock market indices; the impact of oil prices on stock market indices of net oil-importing and oil-exporting countries; the examination of macroeconomic parameters that drive the oil price and stock market relationship. Although the findings of these empirical studies were mixed, as highlighted above, the thesis safely concludes that the relationship between oil prices and stock market performance is complex as it depends on several country-specific factors that are time-varying. That is, the impact differs among countries, sectors, and time. These factors include oil dependence, stock market development, general macroeconomic stability, internal and external influence, or events that create uncertainty that subsequently impacts stock market performance. The outcome demonstrated the importance of analysing the impact of oil prices on stock market performance from different strands. Despite the absence of a single study that combined different strands of literature for a holistic viewpoint on the phenomenon, the findings were consistent with most of the literature review outcomes, as demonstrated in the previous chapters.

Kilian and Park (2009) study affirmed that the impact of oil prices on U.S. stock market returns is different and that such impact is dependent on whether the change in oil price is driven by demand or supply shocks in the oil market. They classified oil price structural shocks into three types: oil supply shock, aggregate demand shock, and oil-specific demand shock. Based on the above, this study extends the study of Kilian and Park (2009) by identifying other factors that influence the response of stock market performance to oil price shocks outside the cause of the oil shocks observed in their results. Wherein the nature of oil price shocks determines the impact on stock market returns as affirmed by their studies, this research affirmed that the stock market performance also depends on the modelling of asymmetry and leverage effect of positive and negative oil price shocks. In modelling asymmetry and leverage effects, the studies' results signify that negative oil shocks impact some sectoral and aggregate stock returns more than positive oil price shocks of the same magnitude and vice versa, as detailed in the previous chapter. For instance, the result of this study affirmed that positive shocks in macroeconomic variables and oil prices impact the Canadian stock market more than negative shocks of the same magnitude.

The study has demonstrated that the response of economic sectors of the stock market to oil price shocks differs substantially, depending on their degree of oil dependence and multiple transmission mechanisms. The importance of oil to the national economy also determines its effect on stock market returns (Khalfaoui, Sarwar and Tiwari, 2019). While oil prices and stock markets in an economy remain an important area of inquiry, this empirical work explicitly disentangles how the various sectors of the stock market respond to oil price shocks. Therefore, this study adds to the theoretical literature as it went a step further by establishing that oil price movements directly affect the profitability of oil-related industries. However, the impact on oil-consuming industries is more likely to be indirect. Put differently, higher oil prices raise the cost of production, leading to lower output and income for oil-consuming industries.

Lastly, this study reinforced the previous research of Yasmeen *et al*. (2019) and Nwosu *et al*. (2020). As postulated in the Resource Curse Hypothesis, these studies pointed to the link between natural resource abundance and real sector performance. The traditional argument against natural resource-abundant countries (in this case, net oil-exporting countries) reported in the Dutch Disease model is the coexistence of two sectors (booming natural sector and lagging sub-sectors of traded goods) in an economy. The model argues that rising revenues from the export of natural resources (oil and oil-related products) would lead to exchange rate appreciation, weakening the real sector performance. Therefore, this study validates this theoretical literature with findings that the average sector stock returns in the mean equations for a net oil-exporting between 2003 and 2020 were significant across all real sectors. Thus, understanding the relationship between natural resources and real sector performance will help policymakers redesign their macroeconomic policy to reduce oil dependency in net oil-exporting countries.

5.4 Recommendations

The findings of this study provide some important implications and should be of interest to researchers, regulators, investors, asset managers and market participants. First, the study has shown that shocks in the oil market impact the stock market. This outcome would help capital market investors, traders, portfolio, or fund managers, among others, understand and explain the dynamics of stock performance and appreciate counterintuitive stock market behaviour around the globe. A better understanding would guide their portfolio diversification, risk management and inflation hedging decisions. The study can build profitable investment strategies as countries and sectors respond differently to oil price shocks. Hence, investors, traders and fund managers can better manage their risk and diversify amongst sectors and countries.

The reasons for the persistent bearish market in net oil-importing countries vis-à-vis oil-exporting countries, for example, are complex. This complexity may, in part, be connected to the fact that oil price shocks have lesser effects on stock markets in net oil-importing countries. Thus, this study argues that financial investors and portfolio managers must identify and analyse the driving forces of oil price shocks in line with the net position applicable to the country for an investment decision. This analysis is vital to properly appreciate the effects of oil price shocks on a country's domestic stock market performance. Global investors can improve their investment choice and diversify based on the individual market analysis of the ten countries. Hence, they need to align effective investment decisions on a subjective analysis of the economic and political environment of the country they intend to invest.

The study's findings exhibit some properties of oil-related stocks that have significant implications for global portfolio management. Shocks in oil prices tend to induce market co-movements in countries and sectors with varied customs. This option becomes acceptable, provided their returns are more correlated so that the risk can be adequately diversified. A portfolio of assets (stocks) in diverse countries and sectors with fewer market co-movements can be a better choice for portfolio managers and financial investors than a portfolio of assets in countries and sectors where asset diversification may not be too adequate.

Stock markets play a vital role in the capital formation of an economy. Hence, policymakers are advised to define and implement an appropriate mix of regulatory reforms for the favourable advancement of the stock market while ensuring the continued stability of the macroeconomy. There is a need to provide appropriate policies and manage exogenous shocks to avoid economic instability. Monetary authorities should offer insights into formulating economic and financial policies, execute sound and prudent monetary policies, and maintain the stability of the financial system in general and the stock market specifically. Stability maintenance could be achieved by controlling macroeconomic indicators like inflation, interest rate or money supply through mechanisms in the economy. Given the volatility of oil prices and its impact on sector activities and to ensure a sound and stable financial system, policymakers need to monitor oil price movements and implement policies that would preserve the country from oil shocks. Monetary policy instruments should be implemented in line with a robust economic strategy.

The study's findings suggest that the traditional approach of estimating the link between oil price shocks and stock performance, among other variables, must be rethought. An immediate implication of this study is that researchers may have to go beyond theoretical models and empirical studies that treat crude oil prices as an exogenous variable. This study has provided shreds of evidence that global macro events influence crude oil prices. This view is in tandem with the works of Kilian (2008, 2009), who echoed the early finding of Hamilton (1983) that a global economic downturn is likely to raise crude oil prices. This outcome is an indication that factors that affect macroeconomic aggregates may also influence the prices of oil. This result suggests that cause and effect are not clearly defined in analysing oil prices and stock markets. Thus, this study has direct implications for constructing models that would control for reverse causality in studying the link between oil price shocks and stock market performance. Also, the study recommends using the stock market index as a proxy for stock market performance because it represents the actual tradeable financial asset. Finally, the data triangulation methodology applied in this thesis is highly recommended to enhance validity.

5.5 Limitations and Suggestions for Future Research

This study attempted to cover some crucial strands of literature concerning the impact of oil prices and stock market relationships. However, due to time constraints, the study examined six strands of the phenomenon and five critical macroeconomic indicators - exchange rate, GDP, inflation, interest rate and money supply. Considering the stimulus role of macroeconomic indicators in the oil price and stock market relationship, macroeconomic variables like the balance of payment, budget deficit, foreign direct investment, foreign exchange reserve, foreign institutional investment, foreign trade, industrial production index, Government spending and employment rate could enhance the outcome of future studies.

A further limitation relates to the non-inclusion of the stock market index at the firm level and the non-use of high-frequency data as the study applied to the aggregate and sectoral level of the stock market index using monthly and quarterly data. There could be limitations to results due to this exclusion. The study could also focus on the effect of different types of oil shocks. However, with the different strands of literature combined, the thesis accomplished its primary objective. Finally, the study has a limitation as it did not consider the impact of technological advancement that has facilitated several innovations embarked upon by the capital market, which have been considered to have impacted stock returns across the globe. More research is needed concerning the role of technological advancement, financialisation and other speculative activities like hedge funds and index futures in the oil market and stock market relationship. Hence, future research should consider how technological advancement and financialisation impact the oil price and stock market relationship.

However, given the increasingly important role of oil and the stock market in the growth and development of nations, this study suggests some further research to enhance our understanding of the dynamic relationship between oil prices, economic activities, and stock market behaviour. The proposed extension of this study should consider adding more macroeconomic indicators like the balance of payment, budget deficit, foreign direct investment, foreign exchange reserve, foreign institutional investment, foreign trade, industrial production index, Government spending and employment rate in future studies. This addition would capture a better understanding of the role of macroeconomic indicators and possible transmission channels by which oil prices impact the stock market.

Future studies should continue to marry different strands of literature as previous studies fail to combine various strands of the phenomenon for a holistic view, robust outcome and ability to broaden the understanding of the nexus. In achieving this extension, consideration should be given to comparing the effect of oil price shocks on aggregate stock returns, sector-level, firm-level, and a panel of countries. This consideration is essential to unmask heterogeneity among the aggregate, sector, and firm levels. The impact of oil prices on stock market returns during extreme conditions to adequately analyse the time-varying effects. Using a different proxy for oil prices should be considered. Dubai/Oman crude oil, as applied by Imsirovic (2014), can be adopted to replace West Texas Intermediate (WTI) and Brent Crude, which is commonly used.

Finally, future research should focus on stock markets of emerging markets or developing economies in Africa and Asia (excluding China due to the volume of current research on the country) for a better understanding of the outcomes of the relationship in these countries. Furthermore, a panel of oil refiners, such as Singapore or Venezuela, could be added to the existing panel classification of net oil-importing and oil-exporting countries. The high impact of oil price shocks on the GDP of such oil refining countries is anticipated to be high; hence, a different effect on its stock market may be systematic across countries.

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Appendices

Appendix A: Raw Data

A.1 Canadian Stock Market Sectors and Oil Prices

		Consumer Discretionary	Consumer Staples	Energy	Financials	Health Care	Industrials	Information Technology	Materials	Real Estate	Telecom	Utilities	Oil Price
S/N	DATE	CONDIS	CONSTA	ENERGY	FINANC	HEACAR	INDUST	INFTEC	MATERI	REAEST	TELCOM	UTILIT	OILPRI
1	2003m1	71.42	147.00	126.33	104.58	55.97	61.41	16.90	123.02	106.59	49.71	128.59	31.18
2	2003m2	68.32	144.32	130.49	107.97	59.03	59.85	15.95	116.43	107.83	49.07	127.01	32.77
3	2003m3	65.42	142.88	125.40	106.03	56.83	54.51	15.80	110.27	111.36	48.85	123.85	30.61
4	2003m4	71.93	147.22	121.61	111.73	59.99	59.51	17.75	108.34	113.10	53.19	129.15	25.00
5	2003m5	73.08	158.52	130.67	112.95	67.22	62.86	19.52	110.09	113.46	55.40	138.06	25.86
6	2003m6	75.16	161.84	133.98	115.99	68.86	63.66	19.21	111.24	112.44	58.22	140.17	27.65
7	2003m7	78.78	164.71	132.35	119.52	71.75	69.81	21.10	120.23	121.46	60.29	145.84	28.35
8	2003m8	80.87	163.18	138.65	121.85	72.23	71.60	23.39	131.41	124.34	60.48	145.32	29.89
9	2003m9	80.02	161.38	135.35	120.54	70.23	70.68	24.35	129.02	126.75	57.92	141.36	27.11
10	2003m10	84.88	169.83	135.73	128.83	64.20	74.61	24.88	138.36	134.65	60.99	149.41	29.61
11	2003m11	83.25	166.84	139.67	129.50	60.86	72.23	25.06	148.50	138.26	61.36	151.32	28.75
12	2003m12	86.87	176.98	155.65	132.49	65.84	77.04	25.48	157.69	148.44	63.24	153.02	29.81
13	2004m1	89.15	173.25	154.36	138.79	71.17	77.18	34.16	146.48	151.03	68.52	149.55	31.28
14	2004m2	89.70	176.67	167.31	140.89	71.34	77.90	35.49	155.31	158.11	68.38	152.00	30.86
15	2004m3	86.85	176.23	166.12	141.92	68.52	74.63	32.40	155.00	156.82	63.78	155.87	33.63
16	2004m4	88.40	170.77	164.63	139.12	72.46	74.71	29.23	139.15	147.19	61.49	149.41	33.59
17	2004m5	90.35	174.91	165.62	139.94	69.87	73.29	32.71	149.76	153.78	60.73	143.94	37.57
18	2004m6	90.90	177.00	169.17	140.61	66.86	74.16	36.84	149.10	149.29	59.15	141.04	35.18
19	2004m7	87.24	174.24	178.81	142.91	58.28	71.79	31.20	144.70	146.14	62.16	140.02	38.22
20	2004m8	85.18	170.64	172.55	142.26	54.90	69.29	29.32	151.21	148.36	61.32	145.07	42.74
21	2004m9	86.26	176.76	187.47	144.43	57.37	68.99	29.58	161.87	149.05	60.96	145.47	43.20
22	2004m10	86.93	177.74	191.91	151.35	57.26	69.75	31.29	157.10	149.95	64.93	151.41	49.78
23	2004m11	88.73	187.81	200.98	147.24	55.02	70.54	31.54	168.23	155.23	69.13	158.08	43.11
24	2004m12	94.03	193.47	200.29	154.38	54.37	75.48	31.80	166.68	165.02	71.80	161.49	39.60
25	2005m1	93.19	200.09	209.89	151.12	55.38	77.14	30.12	159.66	167.48	75.05	167.55	44.51
26	2005m2	94.87	204.34	235.78	157.26	53.15	78.85	28.26	174.70	179.53	76.49	163.53	45.48
27	2005m3	93.00	203.28	235.48	158.05	51.17	80.71	29.12	165.03	173.37	77.62	163.18	53.10
28	2005m4	94.06	203.35	222.96	159.58	48.12	79.51	27.03	153.54	181.16	77.99	163.54	51.88
29	2005m5	98.28	205.03	235.35	160.39	49.77	80.97	29.12	154.58	182.40	78.44	169.78	48.65
30	2005m6	98.03	204.01	263.83	163.78	49.02	78.74	27.11	158.12	194.28	79.02	177.67	54.35
31	2005m7	102.03	205.07	286.27	170.84	50.82	85.21	27.23	167.04	198.43	79.15	185.65	57.52
32	2005m8	101.40	207.28	317.35	168.10	49.67	82.89	28.21	166.05	192.32	81.96	196.90	63.98
33	2005m9	101.82	204.41	332.10	173.89	53.62	84.95	27.82	173.54	190.92	84.55	205.87	62.91
34	2005m10	96.89	193.92	286.97	171.07	51.13	82.24	27.00	165.41	194.00	78.31	200.55	58.54
35	2005m11	99.53	187.92	297.93	182.13	51.69	85.63	26.38	177.20	194.06	76.48	210.14	55.24
36	2005m12	102.11	189.14	319.92	186.19	52.17	86.79	27.64	189.93	198.64	79.93	213.05	56.86
37	2006m1	104.61	185.52	363.35	188.70	53.32	92.08	27.65	214.16	203.89	78.39	201.04	62.99
38	2006m2	107.89	189.86	326.89	195.38	56.81	93.74	27.49	202.07	204.22	75.57	203.69	60.21
39	2006m3	107.56	186.07	350.48	197.70	56.47	95.44	30.46	217.84	211.94	78.78	192.04	62.06
40	2006m4	109.98	191.88	358.57	194.06	57.35	96.03	27.51	231.33	200.85	80.42	190.15	70.26
41	2006m5	108.03	185.34	345.45	185.92	52.95	90.41	24.56	223.22	195.75	78.56	196.90	69.78
42	2006m6	104.32	179.36	349.48	181.44	50.98	89.86	24.27	218.82	199.81	77.61	191.82	68.56
43	2006m7	103.72	178.17	354.17	185.21	51.16	86.67	24.44	228.43	207.15	80.97	197.93	73.67
44	2006m8	106.56	188.23	341.71	194.27	49.68	89.68	26.45	233.57	213.98	87.56	201.56	73.23
45	2006m9	106.89	183.44	307.25	196.85	45.99	90.08	29.42	217.79	220.11	94.93	200.80	61.96
46	2006m10	112.91	184.64	323.94	200.54	47.64	99.47	29.90	239.89	226.93	98.43	203.58	57.81
47	2006m11	114.33	189.48	330.71	207.37	50.60	99.41	32.21	261.24	237.76	90.50	206.06	58.76
48	2006m12	115.63	195.95	324.62	214.18	52.72	98.62	34.15	262.06	240.62	91.98	217.13	62.47
49	2007m1	120.28	200.72	322.13	214.11	52.58	104.73	34.40	270.53	255.11	95.11	204.16	53.68
50	2007m2	118.77	196.74	316.17	215.06	51.32	105.05	35.85	273.21	265.83	95.84	198.64	57.56
51	2007m3	120.59	194.17	325.94	218.91	50.81	105.77	33.64	269.87	251.20	98.43	202.16	62.05
52	2007m4	123.60	202.61	334.01	219.34	49.94	110.42	32.85	271.56	257.34	107.40	212.27	67.49
53	2007m5	125.76	200.84	357.87	223.24	50.10	118.23	34.77	293.39	257.65	111.98	223.38	67.21
54	2007m6	124.89	202.91	356.68	217.75	50.06	118.33	35.97	291.92	244.72	112.18	212.46	71.05
55	2007m7	125.06	204.00	353.78	210.88	45.52	117.96	35.31	312.27	228.27	112.04	222.43	76.93
56	2007m8	123.83	200.32	335.17	215.32	44.25	116.34	35.87	300.69	227.11	111.12	218.65	70.76
57	2007m9	123.73	197.17	346.08	219.53	43.73	117.29	35.38	328.01	234.04	109.80	224.22	77.17
58	2007m10	128.04	201.70	359.52	223.82	43.17	116.35	37.15	348.70	228.58	111.82	239.34	82.34
59	2007m11	116.97	180.79	327.03	217.13	41.93	109.06	39.20	321.41	215.89	99.55	227.52	92.41
60	2007m12	117.69	181.37	350.24	206.08	39.41	109.48	37.95	338.33	209.08	103.60	231.27	90.93
61	2008m1	104.95	169.35	325.56	197.10	37.18	104.03	34.27	353.34	198.10	92.24	225.77	92.18
62	2008m2	99.40	162.87	357.71	190.87	37.39	109.51	32.61	385.29	189.50	93.98	221.37	94.99
63	2008m3	100.09	168.74	357.23	187.24	39.06	106.15	32.78	362.72	188.36	92.03	216.31	103.64
64	2008m4	98.79	165.98	394.42	193.99	38.65	112.75	35.95	356.15	200.20	99.46	219.87	109.07
65	2008m5	97.27	172.86	436.59	195.66	39.07	119.97	35.76	382.59	206.92	98.76	227.36	122.80
66	2008m6	88.63	169.03	443.71	177.50	36.08	109.78	33.45	424.98	192.41	93.24	226.24	132.32
67	2008m7	87.34	160.27	380.38	182.80	38.25	111.56	33.06	373.22	194.09	89.16	224.32	132.72
68	2008m8	94.24	168.32	401.25	184.64	37.98	114.58	33.62	346.98	200.72	95.57	222.10	113.24
69	2008m9	84.59	161.20	315.36	182.71	32.63	93.30	23.20	281.83	175.59	86.85	190.22	97.23
70	2008m10	76.96	158.44	252.81	153.79	30.92	83.63	20.54	195.77	134.40	88.58	182.85	71.58
71	2008m11	72.81	155.43	243.39	141.01	28.55	74.45	20.20	214.13	120.72	80.56	172.15	52.45
72	2008m12	73.52	167.90	216.52	127.12	27.84	78.43	19.10	246.53	115.77	79.03	174.98	39.95
73	2009m1	67.87	166.10	205.35	117.50	31.95	71.73	21.33	247.15	112.68	76.97	171.46	43.44
74	2009m2	65.14	160.01	196.59	104.45	29.76	64.12	18.55	247.06	102.22	74.15	166.18	43.32
75	2009m3	67.22	157.30	216.61	117.58	26.34	68.08	20.39	265.47	103.02	72.80	152.23	46.54
76	2009m4	70.08	158.70	234.68	136.04	26.64	75.79	24.97	242.91	111.23	70.44	156.28	50.18
77	2009m5	70.00	163.88	273.91	148.83	26.42	77.35	24.47	295.88	121.53	74.31	159.01	57.30
78	2009m6	73.77	170.50	264.78	157.28	27.97	80.37	25.18	276.28	125.93	71.85	172.76	68.61
79	2009m7	75.20	163.77	263.25	174.39	28.77	83.31	26.15	285.13	135.29	72.76	172.42	64.44
80	2009m8	76.97	168.38	261.17	175.37	31.23	87.40	26.27	284.83	143.64	75.88	174.28	72.51
81	2009m9	77.67	166.75	289.09	179.81	35.96	89.53	27.08	310.28	153.98	76.51	176.71	67.65
82	2009m10	75.37	163.74	283.22	165.95	34.03	85.26	26.69	299.23	147.15	75.91	174.43	72.77

83	2009m11	77.58	174.89	285.79	172.88	34.83	89.97	26.42	341.29	147.86	77.62	183.63	76.66
84	2009m12	81.72	180.21	297.38	176.09	35.67	96.64	29.32	328.92	158.80	79.71	197.44	74.46
85	2010m1	81.41	175.35	278.48	167.11	34.44	91.89	28.69	301.32	157.05	77.67	190.60	76.17
86	2010m2	83.57	179.42	283.25	176.17	35.86	95.66	31.23	328.17	166.26	79.70	192.96	73.75
87	2010m3	86.17	179.90	288.97	188.63	38.04	101.73	31.11	329.61	169.22	82.11	201.28	78.83
88	2010m4	87.98	170.87	299.84	187.67	38.50	100.84	29.75	348.35	172.38	83.44	192.72	84.82
89	2010m5	89.09	170.34	285.92	177.37	37.57	96.44	29.87	339.23	168.56	83.50	189.00	75.95
90	2010m6	87.00	163.63	271.72	167.27	40.39	93.68	27.21	331.55	165.13	83.08	188.10	74.76
91	2010m7	90.22	176.82	282.22	177.17	41.15	99.27	28.29	326.69	174.87	84.54	200.68	75.58
92	2010m8	90.82	184.01	272.28	169.07	45.78	100.01	26.87	382.87	182.44	88.17	201.80	77.04
93	2010m9	93.85	187.89	284.85	176.77	46.48	104.94	28.15	391.55	192.48	90.37	214.61	77.84
94	2010m10	96.48	196.11	287.95	179.41	50.32	107.53	29.41	407.75	197.13	91.22	212.65	82.67
95	2010m11	97.03	191.40	298.39	180.60	48.35	106.25	30.25	427.68	190.69	90.96	217.28	85.28
96	2010m12	99.63	196.29	323.18	183.86	49.88	110.22	30.70	446.61	197.50	89.36	222.31	91.45
97	2011m1	102.02	195.23	340.23	184.90	55.84	114.17	32.18	422.38	201.08	93.52	223.90	96.52
98	2011m2	97.71	200.18	362.56	196.55	56.36	115.53	35.03	441.12	206.34	92.12	219.36	103.72
99	2011m3	97.18	200.62	356.96	199.55	59.85	118.77	34.25	439.57	210.77	92.64	222.41	114.64
100	2011m4	97.53	202.48	347.57	196.14	59.88	119.11	33.25	437.66	211.46	93.38	221.06	123.26
101	2011m5	97.16	209.81	335.83	195.66	60.25	118.84	33.76	422.61	212.55	100.27	227.96	114.99
102	2011m6	97.29	203.86	315.97	191.35	59.40	119.50	31.46	401.77	211.18	99.70	221.21	113.83
103	2011m7	90.91	203.50	310.41	179.84	59.38	111.80	29.80	408.15	207.65	96.42	220.44	116.97
104	2011m8	84.26	198.17	284.84	177.81	52.82	105.47	29.74	428.82	201.76	100.15	225.76	110.22
105	2011m9	82.00	200.91	241.59	170.28	54.84	94.29	26.44	365.80	198.95	97.65	226.36	112.83
106	2011m10	83.78	203.88	273.53	173.29	51.59	105.77	27.44	387.37	201.60	99.27	225.79	109.55
107	2011m11	83.31	202.60	273.69	165.91	59.25	104.32	25.98	395.13	202.68	100.38	225.15	110.77
108	2011m12	81.80	205.77	268.80	170.03	56.56	107.95	24.44	349.19	204.95	104.63	225.77	107.87
109	2012m1	84.47	205.43	282.02	174.08	61.34	113.72	25.55	385.31	212.90	102.98	223.05	110.69
110	2012m2	89.13	202.79	288.28	180.22	64.83	112.18	26.03	378.56	217.92	102.90	230.00	119.33
111	2012m3	92.56	219.73	263.84	187.41	65.87	112.39	26.82	349.13	218.24	104.23	225.65	125.45
112	2012m4	93.89	227.69	264.01	185.89	68.71	113.29	25.81	327.91	224.46	102.24	228.94	119.75
113	2012m5	90.82	219.22	235.48	172.21	67.97	109.88	23.52	305.79	224.05	102.23	221.52	110.34
114	2012m6	91.26	222.05	235.48	173.52	67.59	111.10	22.81	310.01	228.45	103.60	221.89	95.16
115	2012m7	91.00	226.21	246.85	172.46	66.02	113.61	21.69	298.92	233.11	106.33	224.52	102.62
116	2012m8	91.85	231.12	252.69	176.84	67.44	112.71	23.00	318.80	231.43	107.89	220.75	113.36
117	2012m9	92.53	227.75	259.68	180.72	65.95	113.66	23.46	349.58	231.55	108.04	223.81	112.86
118	2012m10	93.71	233.00	258.84	182.78	65.41	117.24	24.05	351.29	228.85	112.03	224.50	111.71
119	2012m11	93.44	234.56	249.26	187.65	61.85	117.24	25.96	325.68	227.26	111.10	217.13	109.06
120	2012m12	97.07	247.65	248.54	190.99	62.77	122.09	26.06	325.08	236.09	111.54	223.89	109.49
121	2013m1	101.06	245.32	254.53	196.99	68.00	131.61	28.34	313.36	237.15	114.39	232.67	112.96
122	2013m2	103.27	257.44	254.10	202.50	71.13	138.74	29.38	295.95	243.04	119.09	227.60	116.05
123	2013m3	108.51	260.42	253.18	197.59	71.53	139.13	30.18	290.17	239.09	121.63	221.55	108.47
124	2013m4	108.88	272.86	246.04	196.25	68.69	135.32	33.15	250.51	252.25	121.00	229.04	102.25
125	2013m5	113.68	273.85	252.42	199.76	74.12	142.02	32.87	258.07	237.67	120.65	219.61	102.56
126	2013m6	117.16	282.25	243.37	197.34	78.87	138.30	30.91	222.63	228.81	110.20	209.31	102.92
127	2013m7	121.48	301.83	254.22	205.61	81.91	139.57	31.59	225.41	224.75	109.39	212.46	107.93
128	2013m8	122.20	288.78	258.32	208.49	84.20	135.88	33.03	244.11	216.58	110.15	196.60	111.28
129	2013m9	126.14	290.18	263.77	212.28	80.88	142.29	32.41	231.60	226.36	113.10	200.39	111.60
130	2013m10	132.59	305.04	270.71	225.30	82.85	155.26	32.29	234.97	234.60	117.18	210.91	109.08
131	2013m11	132.15	299.65	267.71	230.85	84.27	163.15	33.42	221.40	232.17	119.41	204.81	107.79
132	2013m12	135.44	300.57	272.70	233.18	87.87	164.76	35.15	225.61	234.76	118.45	203.96	110.76
133	2014m1	134.91	305.48	270.42	223.27	97.78	163.40	38.00	246.08	236.44	119.37	211.12	108.12
134	2014m2	136.75	315.31	282.16	232.53	97.01	168.44	39.26	261.73	245.13	119.14	211.02	108.90
135	2014m3	140.46	321.34	296.77	236.32	92.87	167.51	37.63	246.37	247.08	121.08	219.33	107.48
136	2014m4	143.04	330.18	316.69	239.26	87.43	171.62	38.27	247.17	251.17	119.45	220.60	107.76
137	2014m5	144.16	320.65	313.37	241.22	93.24	174.22	36.97	236.82	253.72	123.88	217.32	109.54
138	2014m6	146.04	329.31	333.64	247.69	91.44	181.67	39.80	260.56	255.73	120.53	219.76	111.80
139	2014m7	148.16	349.81	317.54	258.35	91.89	187.51	40.69	262.79	257.70	121.73	216.20	106.77
140	2014m8	157.32	357.04	325.37	258.72	97.40	193.85	41.13	263.66	265.52	123.65	220.21	101.61
141	2014m9	150.96	367.96	292.35	252.59	98.12	195.53	41.29	233.24	257.60	119.37	218.34	97.09
142	2014m10	157.39	384.48	260.59	252.39	102.73	195.19	43.03	206.29	271.58	123.66	221.76	87.43
143	2014m11	167.48	408.14	230.22	262.38	104.41	194.00	45.42	213.92	275.42	131.23	231.89	79.44
144	2014m12	171.22	439.15	221.10	253.30	103.82	193.22	47.77	215.48	269.30	128.36	226.97	62.34
145	2015m1	171.16	452.43	216.02	232.20	114.98	188.28	49.97	248.71	295.92	131.06	241.19	47.76
146	2015m2	182.86	456.29	221.79	249.63	123.93	194.64	53.38	246.91	300.37	127.95	236.47	58.10
147	2015m3	180.76	452.26	217.53	245.67	132.90	192.68	51.52	221.58	297.73	123.14	232.69	55.89
148	2015m4	174.64	440.07	236.83	253.22	132.67	189.21	51.74	228.79	293.70	125.67	233.94	59.52
149	2015m5	183.21	446.21	220.13	248.94	137.10	184.74	51.62	226.93	284.87	129.05	226.37	64.08
150	2015m6	182.78	448.78	205.65	245.06	137.79	177.94	48.48	214.84	280.81	129.93	212.40	61.48
151	2015m7	187.99	480.88	187.08	244.38	152.31	182.76	52.22	183.19	284.38	134.07	218.10	56.56
152	2015m8	174.76	470.84	182.85	236.37	142.11	169.29	50.89	178.87	268.46	131.03	214.24	46.52
153	2015m9	175.32	479.58	166.44	234.87	115.75	169.80	49.30	161.30	272.21	131.60	214.76	47.62
154	2015m10	180.75	474.62	178.99	242.36	105.08	171.85	50.29	172.56	282.54	139.18	210.63	48.43
155	2015m11	175.22	484.42	177.30	244.84	127.93	173.96	53.61	170.45	280.26	140.23	205.55	44.27
156	2015m12	165.26	483.04	161.88	236.13	127.22	165.20	54.23	166.34	271.95	131.21	209.22	38.01
157	2016m1	154.53	493.07	158.70	232.34	108.89	159.21	51.89	163.03	267.88	134.24	220.98	30.70
158	2016m2	159.50	514.47	153.67	225.41	102.50	160.30	52.55	192.05	267.24	141.36	209.91	32.18
159	2016m3	169.26	524.38	172.60	241.96	91.58	170.20	53.84	198.42	285.28	143.93	226.67	38.21
160	2016m4	166.11	494.89	187.14	247.46	96.35	175.13	50.33	238.12	284.43	139.87	224.22	41.58
161	2016m5	171.50	517.80	189.96	249.55	95.09	177.82	54.52	222.28	293.11	148.57	231.10	46.74
162	2016m6	163.47	501.80	189.43	241.48	84.74	176.09	50.83	250.82	298.55	150.80	239.99	48.25
163	2016m7	172.36	527.43	188.40	248.44	86.41	189.18	55.10	267.95	308.42	158.13	246.66	44.95
164	2016m8	175.10	548.45	195.70	253.98	84.84	195.02	55.95	241.37	292.77	155.23	238.66	45.84
165	2016m9	177.02	527.90	199.79	254.99	82.05	193.35	56.55	247.24	290.22	154.23	239.24	46.57
166	2016m10	172.86	534.36	203.90	260.48	75.15	193.36	55.59	244.82	281.03	153.17	242.34	49.52
167	2016m11	175.91	520.97	220.18	273.20	71.68	205.20	56.80	233.09	277.86	148.29	229.61	44.73
168	2016m12	178.81	519.78	220.91	281.91	70.69	202.59	56.09	231.21	286.77	149.71	235.56	53.31
169	2017m1	177.65	512.64	202.10	287.23	69.28	203.81	56.47	252.64	285.39	153.66	238.41	54.58
170	2017m2	184.01	509.34	197.05	290.44	72.62	206.79	57.37	243.08	298.09	154.22	238.38	54.87
171	2017m3	190.38	533.95	199.74	289.25	68.44	210.82	60.28	244.66	296.38	158.77	249.92	51.59
172	2017m4	197.71	562.60	196.07	283.91	64.11	216.91	62.45	243.75	300.79	167.89	249.65	52.31
173	2017m5	199.38	559.62	185.00	277.88	66.47	222.22	64.36	238.15	299.86	168.07	253.56	50.33
174	2017m6	198.54	540.14	172.10	284.00	70.94	222.01	61.63	228.17	296.29	162.54	253.59	46.37
175	2017m7	192.92	523.74	177.72	283.61	68.24	214.54	60.95	232.06	289.30	166.14	248.10	48.48
176	2017m8	196.05	525.82	170.36	283.88	63.33	221.08	61.87	244.71	292.83	167.52	251.85	51.70
177	2017m9	206.84	526.89	190.14	294.57	66.56	229.37	63.62	234.90	289.62	165.44	246.05	56.15
178	2017m10	213.44	536.10	193.46	306.45	69.67	238.71	65.58	238.59	298.88	170.99	253.70	57.51

179	2017m11	216.69	552.89	190.20	307.34	78.30	235.92	65.69	237.56	301.91	174.23	252.97	62.71
180	2017m12	215.27	551.99	192.99	308.49	97.34	240.28	65.88	245.72	303.35	170.41	249.85	64.37
181	2018m1	214.27	541.51	185.12	309.50	95.18	237.16	69.29	244.22	299.68	162.60	238.53	69.08
182	2018m2	207.30	526.87	171.02	299.18	85.15	240.42	73.23	234.36	296.35	159.23	228.82	65.32
183	2018m3	207.95	522.27	177.38	295.48	85.87	235.72	72.19	234.49	301.32	157.18	232.49	66.02
184	2018m4	210.11	516.89	199.13	295.37	82.73	241.64	73.88	235.33	299.47	159.90	228.32	72.11
185	2018m5	219.18	527.55	202.08	299.13	92.50	257.07	79.44	248.20	308.03	159.25	223.97	76.98
186	2018m6	220.46	542.08	206.20	298.43	99.26	255.38	79.73	252.16	311.83	161.21	228.71	74.41
187	2018m7	219.66	544.36	208.13	304.92	90.32	266.30	78.15	242.09	316.76	167.57	230.61	74.25
188	2018m8	211.60	531.57	198.03	308.16	117.28	268.09	82.04	222.16	322.85	167.67	228.98	72.53
189	2018m9	201.88	527.30	193.16	307.39	132.53	267.79	82.04	218.80	320.06	165.03	225.29	78.89
190	2018m10	188.89	525.04	166.33	286.26	109.48	250.84	75.43	208.66	309.46	161.65	218.97	81.03
191	2018m11	193.95	561.59	148.71	291.32	102.97	254.11	77.60	208.57	309.84	172.15	227.40	64.75
192	2018m12	177.07	555.99	137.88	269.87	86.02	229.42	73.60	219.74	294.99	166.54	219.47	57.36
193	2019m1	195.85	573.44	148.83	291.38	123.36	246.03	80.89	234.48	317.64	174.00	232.88	59.41
194	2019m2	196.29	592.10	157.55	299.58	126.09	254.77	87.83	232.75	331.58	178.50	241.56	63.96
195	2019m3	193.49	606.40	153.45	295.36	128.72	262.20	92.18	237.77	342.97	181.04	251.84	66.14
196	2019m4	207.05	611.48	161.47	310.77	130.87	273.05	98.01	231.87	333.34	178.55	252.69	71.23
197	2019m5	189.10	624.54	142.47	295.02	113.00	271.91	102.12	221.42	332.26	181.71	259.99	71.32
198	2019m6	201.50	610.67	139.38	302.34	116.57	275.94	105.83	249.64	334.10	177.80	262.54	64.22
199	2019m7	208.45	624.91	133.72	304.19	101.18	280.43	108.79	255.45	340.25	175.24	266.73	63.92
200	2019m8	208.69	653.19	125.58	295.92	88.28	277.27	114.85	270.10	349.00	176.46	277.90	59.04
201	2019m9	206.19	654.38	136.38	314.97	81.65	270.85	109.08	249.82	358.71	176.03	286.08	62.83
202	2019m10	197.73	622.12	123.26	314.79	77.70	273.81	107.71	257.13	349.06	174.06	282.82	59.71
203	2019m11	208.47	652.99	131.42	324.14	75.27	284.35	116.87	256.62	356.33	181.59	289.79	63.21
204	2019m12	201.07	619.15	145.96	315.47	76.42	285.97	117.93	268.40	346.42	179.20	288.78	67.31
205	2020m1	196.01	642.35	129.65	319.88	75.20	298.47	126.43	262.00	361.73	183.39	310.59	63.65
206	2020m2	181.51	606.13	115.09	302.38	62.84	280.13	121.81	241.96	348.13	170.33	300.91	55.66
207	2020m3	134.17	573.23	60.12	246.26	49.10	239.01	108.58	217.03	244.97	159.68	270.80	32.01
208	2020m4	161.04	602.94	77.19	248.54	52.12	261.79	134.46	288.59	263.38	160.14	280.75	18.38
209	2020m5	175.10	622.07	78.10	249.63	55.89	267.35	152.93	294.49	259.85	162.67	280.88	29.38
210	2020m6	177.86	619.07	76.45	258.21	53.89	270.73	162.23	307.22	267.56	155.50	278.09	40.27
211	2020m7	185.32	652.52	74.88	258.43	54.67	284.63	172.87	347.58	275.29	158.83	294.43	43.24
212	2020m8	190.05	628.27	79.57	275.66	50.83	296.38	170.43	344.73	274.13	160.79	288.18	44.74
213	2020m9	192.42	672.05	65.05	265.39	46.23	304.61	166.02	334.13	275.22	158.64	305.57	40.91
214	2020m10	192.66	627.88	64.03	259.13	49.66	295.79	153.53	327.24	272.85	153.69	301.62	40.19
215	2020m11	221.08	640.52	85.54	301.27	67.66	320.72	176.34	311.44	307.18	166.17	317.87	42.69
216	2020m12	233.15	632.76	91.01	306.27	60.15	328.83	182.36	320.62	298.45	163.74	319.50	49.99

A.2 S&P TSX, Macroeconomic Variables and Oil Prices (Quarterly)

SN	DATE	STINDEX	OILPRI	EXRATE	INFLAT	INTRAT	M2	GDP
1	1990q1	3676.89	19.82	0.85	5.42	12.92	347.74	538,156
2	1990q2	3488.94	16.02	0.85	4.61	13.60	355.67	539,144
3	1990q3	3355.58	26.41	0.86	4.15	12.77	360.49	548,776
4	1990q4	3163.01	32.45	0.86	4.95	11.95	369.48	556,680
5	1991q1	3410.31	20.73	0.86	6.44	9.96	374.58	558,092
6	1991q2	3493.58	18.85	0.87	6.21	8.90	381.87	571,397
7	1991q3	3481.80	19.89	0.87	5.81	8.51	383.79	574,588
8	1991q4	3492.21	20.58	0.88	4.09	7.54	388.26	578,016
9	1992q1	3530.07	17.95	0.86	1.59	7.18	389.98	581,980
10	1992q2	3377.06	19.99	0.84	1.37	6.13	394.78	586,072
11	1992q3	3381.41	20.08	0.84	1.20	5.79	398.56	592,928
12	1992q4	3323.13	19.20	0.80	1.81	7.24	401.83	599,716
13	1993q1	3453.20	18.22	0.79	2.12	5.84	399.74	601,084
14	1993q2	3879.49	18.28	0.79	1.79	4.91	407.31	607,472
15	1993q3	4031.80	16.50	0.78	1.74	4.52	409.08	611,340
16	1993q4	4252.39	15.18	0.76	1.81	4.11	412.28	616,528
17	1994q1	4436.10	13.97	0.75	0.55	4.29	410.67	619,924
18	1994q2	4206.38	16.06	0.73	0.00	6.27	412.12	624,908
19	1994q3	4294.22	16.80	0.72	0.16	5.48	417.68	629,776
20	1994q4	4199.56	16.54	0.74	-0.04	6.11	423.33	636,408
21	1995q1	4151.97	16.89	0.71	1.52	7.99	424.75	638,224
22	1995q2	4418.42	18.10	0.72	2.69	7.34	431.07	643,424
23	1995q3	4553.83	16.22	0.73	2.33	6.47	436.52	647,560
24	1995q4	4611.29	16.97	0.74	2.05	5.76	442.29	648,320
25	1996q1	4957.66	18.57	0.73	1.46	5.11	442.81	656,148
26	1996q2	5145.65	19.50	0.73	1.44	4.69	446.99	661,576
27	1996q3	5121.22	20.90	0.73	1.40	4.11	447.65	662,904
28	1996q4	5847.51	23.57	0.74	1.97	2.89	450.57	674,016
29	1997q1	6039.21	21.17	0.74	2.12	2.96	447.38	685,560
30	1997q2	6265.50	18.05	0.72	1.61	3.00	447.54	691,040
31	1997q3	6843.23	18.51	0.72	1.72	3.18	446.04	699,944
32	1997q4	6684.86	18.74	0.72	1.04	3.89	447.29	706,892
33	1998q1	7117.06	14.12	0.70	1.04	4.44	441.93	713,468
34	1998q2	7540.55	13.37	0.70	1.00	4.75	440.32	721,104
35	1998q3	6025.42	12.44	0.67	0.84	5.02	443.74	728,164
36	1998q4	6346.03	11.19	0.65	1.11	5.18	447.31	731,112
37	1999q1	6546.68	11.30	0.66	0.77	5.00	451.99	744,228
38	1999q2	6955.52	15.46	0.67	1.61	4.64	456.38	754,428
39	1999q3	7003.19	20.61	0.67	2.19	4.58	461.21	769,152
40	1999q4	7731.07	24.02	0.68	2.37	4.58	468.64	778,868
41	2000q1	9024.16	26.93	0.69	2.65	4.93	480.17	792,972
42	2000q2	9598.35	26.77	0.68	2.44	5.50	489.93	811,132
43	2000q3	10677.38	30.67	0.68	2.71	5.75	496.45	823,560
44	2000q4	9131.06	29.72	0.66	3.06	5.75	502.24	830,400
45	2001q1	8336.20	25.87	0.66	2.76	5.48	509.52	839,072
46	2001q2	7948.28	27.27	0.64	3.58	4.70	515.30	851,632
47	2001q3	7309.16	25.30	0.65	2.71	4.08	520.29	857,376
48	2001q4	7333.25	19.35	0.63	1.07	2.70	530.85	867,372
49	2002q1	7712.49	21.13	0.63	1.55	2.06	538.86	881,500
50	2002q2	7488.38	25.05	0.64	1.36	2.25	544.67	898,784
51	2002q3	6465.93	26.93	0.65	2.33	2.69	554.06	911,964
52	2002q4	7148.20	26.74	0.64	3.79	2.75	562.68	926,548
53	2003q1	6489.30	31.52	0.65	4.33	3.08	568.66	935,980
54	2003q2	6809.67	26.17	0.70	3.32	3.50	577.01	942,468
55	2003q3	7396.46	28.45	0.73	2.22	3.17	589.76	955,552
56	2003q4	7950.99	29.39	0.75	1.78	3.00	596.07	958,924
57	2004q1	8631.94	31.92	0.76	1.34	2.67	606.48	974,912
58	2004q2	8402.29	35.45	0.74	1.63	2.25	618.01	984,468
59	2004q3	8501.13	41.39	0.75	2.24	2.33	626.05	995,336
60	2004q4	9049.22	44.16	0.80	2.20	2.75	631.77	1,006,284
61	2005q1	9494.92	47.70	0.81	2.07	2.75	643.84	1,023,056
62	2005q2	9626.46	51.63	0.81	2.11	2.75	654.14	1,037,292
63	2005q3	10701.23	61.47	0.82	2.10	2.83	658.59	1,050,040
64	2005q4	10826.57	56.88	0.85	2.60	3.33	669.02	1,062,324
65	2006q1	11914.86	61.75	0.86	2.34	3.83	681.60	1,079,480
66	2006q2	11853.85	69.53	0.88	2.47	4.42	696.79	1,097,148
67	2006q3	11888.66	69.62	0.89	2.30	4.50	713.42	1,111,392
68	2006q4	12668.45	59.68	0.89	1.05	4.50	730.28	1,121,952
69	2007q1	13081.55	57.76	0.86	1.61	4.50	740.69	1,140,860
70	2007q2	13793.34	68.58	0.88	2.23	4.50	753.98	1,161,368
71	2007q3	13876.00	74.95	0.94	2.04	4.75	773.30	1,172,856
72	2007q4	14049.06	88.56	1.01	2.44	4.67	780.02	1,193,444
73	2008q1	13362.64	96.94	1.00	2.13	4.08	798.59	1,212,300

74	2008q2	14372.93	121.40	1.00	1.76	3.25	821.46	1,231,436
75	2008q3	13039.02	114.40	0.97	3.34	3.25	841.88	1,241,872
76	2008q4	9340.36	54.66	0.87	2.66	2.25	880.50	1,231,212
77	2009q1	8512.77	44.43	0.81	1.22	1.08	916.73	1,228,580
78	2009q2	10023.27	58.70	0.83	0.56	0.50	940.65	1,240,256
79	2009q3	11016.77	68.20	0.90	-0.66	0.50	962.10	1,255,332
80	2009q4	11368.02	74.63	0.94	0.06	0.50	976.35	1,275,032
81	2010q1	11587.22	76.25	0.95	1.59	0.50	986.41	1,287,240
82	2010q2	11756.04	78.51	0.98	1.54	0.58	1003.13	1,297,192
83	2010q3	11998.65	76.82	0.96	1.51	1.08	1019.13	1,312,704
84	2010q4	13024.11	86.47	0.98	2.12	1.25	1029.71	1,332,504
85	2011q1	13934.86	104.96	1.00	2.29	1.25	1039.24	1,345,104
86	2011q2	13682.85	117.36	1.03	3.42	1.25	1049.56	1,360,452
87	2011q3	12446.06	113.34	1.03	2.97	1.25	1066.69	1,374,388
88	2011q4	12137.09	109.40	0.98	2.99	1.25	1094.33	1,387,620
89	2012q1	12496.11	118.49	0.99	2.46	1.25	1107.84	1,395,452
90	2012q2	11800.82	108.42	1.00	1.72	1.25	1124.82	1,400,720
91	2012q3	11977.14	109.61	0.99	1.33	1.25	1144.55	1,413,340
92	2012q4	12365.27	110.09	1.01	1.05	1.25	1155.03	1,423,992
93	2013q1	12752.32	112.49	1.00	0.86	1.25	1178.16	1,439,696
94	2013q2	12412.01	102.58	0.98	0.71	1.25	1194.58	1,449,384
95	2013q3	12642.58	110.27	0.96	1.18	1.25	1212.13	1,465,740
96	2013q4	13459.40	109.21	0.96	0.87	1.25	1232.48	1,478,632
97	2014q1	14079.95	108.17	0.92	1.29	1.25	1250.88	1,494,408
98	2014q2	14800.68	109.70	0.91	1.96	1.25	1258.46	1,511,832
99	2014q3	15305.66	101.82	0.92	2.19	1.25	1275.49	1,525,620
100	2014q4	14663.49	76.40	0.89	2.13	1.25	1294.63	1,537,644
101	2015q1	14936.75	53.92	0.83	1.17	1.00	1308.84	1,545,556
102	2015q2	14930.65	61.69	0.81	0.96	1.00	1322.61	1,555,784
103	2015q3	13878.17	50.23	0.78	1.19	0.75	1350.89	1,576,564
104	2015q4	13336.32	43.57	0.76	1.14	0.75	1370.60	1,586,956
105	2016q1	13058.95	33.70	0.72	1.66	0.75	1396.31	1,593,000
106	2016q2	14027.26	45.52	0.77	1.48	0.75	1420.25	1,603,968
107	2016q3	14635.52	45.79	0.77	1.28	0.75	1451.81	1,615,308
108	2016q4	15052.57	49.19	0.75	1.34	0.75	1486.66	1,631,540
109	2017q1	15444.32	53.68	0.76	1.89	0.75	1516.32	1,655,348
110	2017q2	15372.74	49.67	0.74	1.51	0.75	1544.99	1,678,092
111	2017q3	15330.23	52.11	0.78	1.19	1.08	1557.57	1,690,452
112	2017q4	16100.73	61.53	0.80	1.68	1.25	1575.17	1,713,096
113	2018q1	15587.23	66.81	0.79	2.45	1.50	1593.77	1,732,360
114	2018q2	15982.37	74.50	0.77	2.43	1.50	1604.08	1,751,292
115	2018q3	16256.67	75.22	0.77	2.78	1.75	1627.07	1,766,548
116	2018q4	14849.33	67.71	0.75	2.04	2.00	1654.67	1,775,924
117	2019q1	15880.57	63.17	0.76	1.61	2.00	1682.93	1,789,388
118	2019q2	16333.47	68.92	0.75	2.15	2.00	1716.26	1,806,528
119	2019q3	16502.43	61.93	0.75	1.94	2.00	1753.49	1,818,500
120	2019q4	16862.27	63.41	0.76	2.09	2.00	1786.50	1,842,672
121	2020q1	15653.47	50.44	0.74	1.82	1.50	1823.62	1,818,364
122	2020q2	15162.90	29.34	0.73	0.02	0.50	1962.53	1,620,348
123	2020q3	16268.33	42.96	0.75	0.27	0.50	2059.27	1,792,084
124	2020q4	16734.77	44.29	0.77	0.78	0.50	2115.84	1,813,808

A.3 Oil-Exporting Countries' Stock Index, Oil Prices and Macroeconomic Variables

	S/N	ID	DATE	STINDEX	OILPRICE	EXRATE	INFLAT	INTRATE	M2
SAUDI ARABIA	1	1	2003m1	2643.97	31.18	0.27	0.50	2.00	314.30
	2	1	2003m2	2569.80	32.77	0.27	0.30	2.00	314.37
	3	1	2003m3	2779.10	30.61	0.27	0.40	2.00	318.96
	4	1	2003m4	2925.33	25.00	0.27	0.40	2.00	320.18
	5	1	2003m5	3226.71	25.86	0.27	0.50	2.00	322.26
	6	1	2003m6	3612.89	27.65	0.27	0.80	1.75	322.78
	7	1	2003m7	3907.60	28.35	0.27	1.10	1.75	323.58
	8	1	2003m8	4270.75	29.89	0.27	0.70	1.75	320.55
	9	1	2003m9	4276.55	27.11	0.27	0.80	1.75	320.62
	10	1	2003m10	4003.92	29.61	0.27	0.60	1.75	322.10
	11	1	2003m11	4265.79	28.75	0.27	0.50	1.75	327.02
	12	1	2003m12	4437.58	29.81	0.27	0.40	1.75	336.40
	13	1	2004m1	4584.26	31.28	0.27	0.10	1.75	343.17
	14	1	2004m2	4812.79	30.86	0.27	0.40	1.75	345.30
	15	1	2004m3	5182.59	33.63	0.27	0.30	1.75	350.42
	16	1	2004m4	5485.46	33.59	0.27	0.60	1.75	351.71
	17	1	2004m5	5662.63	37.57	0.27	0.40	1.50	350.59
	18	1	2004m6	5712.74	35.18	0.27	0.20	1.50	357.89
	19	1	2004m7	6160.94	38.22	0.27	0.20	1.50	366.05
	20	1	2004m8	6291.77	42.74	0.27	0.40	1.75	372.24
	21	1	2004m9	6593.76	43.20	0.27	0.00	2.00	369.46
	22	1	2004m10	7359.49	49.78	0.27	0.40	2.00	367.07
	23	1	2004m11	8329.70	43.11	0.27	0.60	2.25	406.21
	24	1	2004m12	8206.23	39.60	0.27	0.60	2.50	407.98
	25	1	2005m1	8231.94	44.51	0.27	0.80	2.50	406.09
	26	1	2005m2	9096.23	45.48	0.27	0.50	2.75	404.06
	27	1	2005m3	10499.26	53.10	0.27	0.30	3.25	418.80
	28	1	2005m4	11246.55	51.88	0.27	0.20	3.25	421.39
	29	1	2005m5	12019.68	48.65	0.27	0.30	3.50	431.44
	30	1	2005m6	13454.77	54.35	0.27	0.60	3.50	433.00
	31	1	2005m7	13189.02	57.52	0.27	0.30	3.75	433.20
	32	1	2005m8	14857.22	63.98	0.27	0.40	4.00	432.12
	33	1	2005m9	15029.96	62.91	0.27	0.80	4.25	434.06
	34	1	2005m10	15616.65	58.54	0.27	1.00	4.50	439.91
	35	1	2005m11	16311.11	55.24	0.27	1.10	4.50	443.54
	36	1	2005m12	16712.64	56.86	0.27	1.20	4.75	448.81
	37	1	2006m1	18820.75	62.99	0.27	1.50	4.75	454.01
	38	1	2006m2	19502.65	60.21	0.27	1.60	5.00	464.70
	39	1	2006m3	17060.34	62.06	0.27	2.40	5.00	480.46
	40	1	2006m4	13043.37	70.26	0.27	2.40	5.00	484.80
	41	1	2006m5	11201.48	69.78	0.27	2.20	5.00	488.89
	42	1	2006m6	13145.26	68.56	0.27	2.10	5.00	491.44
	43	1	2006m7	10847.95	73.67	0.27	2.20	5.20	490.45
	44	1	2006m8	11111.90	73.23	0.27	2.20	5.20	498.37
	45	1	2006m9	11410.04	61.96	0.27	2.40	5.20	505.67
	46	1	2006m10	9717.89	57.81	0.27	2.60	5.20	506.20
	47	1	2006m11	8324.43	58.76	0.27	2.80	5.20	515.86
	48	1	2006m12	7933.29	62.47	0.27	2.90	5.20	538.77
	49	1	2007m1	7055.69	53.68	0.27	3.60	5.20	536.16
	50	1	2007m2	8279.03	57.56	0.27	3.00	5.50	547.68
	51	1	2007m3	7731.62	62.05	0.27	2.90	5.50	561.66
	52	1	2007m4	7478.11	67.49	0.27	2.90	5.50	571.89
	53	1	2007m5	7502.02	67.21	0.27	3.00	5.50	578.80
	54	1	2007m6	6973.57	71.05	0.27	3.10	5.50	587.66
	55	1	2007m7	7475.35	76.93	0.27	3.80	5.50	605.66
	56	1	2007m8	8188.53	70.76	0.27	4.40	5.50	602.19
	57	1	2007m9	7813.12	77.17	0.27	4.90	5.50	618.39
	58	1	2007m10	8478.99	82.34	0.27	5.40	5.50	630.13
	59	1	2007m11	9389.71	92.41	0.27	6.00	5.50	647.11
	60	1	2007m12	11038.66	90.93	0.27	6.50	5.50	666.62
	61	1	2008m1	9559.87	92.18	0.27	7.00	5.50	689.02
	62	1	2008m2	10146.16	94.99	0.27	8.70	5.50	692.14
	63	1	2008m3	8992.53	103.64	0.27	9.60	5.50	705.84
	64	1	2008m4	10066.16	109.07	0.27	10.50	5.50	699.20

	65	1	2008m5	9529.34	122.80	0.27	10.40	5.50	702.85
	66	1	2008m6	9352.32	132.32	0.27	10.60	5.50	711.93
	67	1	2008m7	8740.74	132.72	0.27	11.10	5.50	732.06
	68	1	2008m8	8757.04	113.24	0.27	10.90	5.50	737.56
	69	1	2008m9	7458.50	97.23	0.27	10.40	5.50	744.41
	70	1	2008m10	5537.82	71.58	0.27	10.90	5.00	745.56
	71	1	2008m11	4738.14	52.45	0.27	9.50	3.00	772.56
	72	1	2008m12	4802.99	39.95	0.27	9.00	2.50	793.12
	73	1	2009m1	4808.90	43.44	0.27	7.90	2.00	787.98
	74	1	2009m2	4384.59	43.32	0.27	6.90	2.00	799.68
	75	1	2009m3	4703.75	46.54	0.27	6.00	2.00	816.20
	76	1	2009m4	5625.51	50.18	0.27	5.20	2.00	818.37
	77	1	2009m5	5893.34	57.30	0.27	5.50	2.00	816.41
	78	1	2009m6	5596.46	68.61	0.27	5.20	2.00	824.20
	79	1	2009m7	5778.14	64.44	0.27	4.20	2.00	836.04
	80	1	2009m8	5660.89	72.51	0.27	4.10	2.00	825.06
	81	1	2009m9	6322.04	67.65	0.27	4.40	2.00	823.31
	82	1	2009m10	6268.55	72.77	0.27	3.50	2.00	826.14
	83	1	2009m11	6355.82	76.66	0.27	4.00	2.00	848.24
	84	1	2009m12	6121.76	74.46	0.27	4.30	2.00	844.94
	85	1	2010m1	6252.55	76.17	0.27	4.20	2.00	839.52
	86	1	2010m2	6437.50	73.75	0.27	4.60	2.00	849.55
	87	1	2010m3	6801.01	78.83	0.27	4.70	2.00	855.72
	88	1	2010m4	6867.97	84.82	0.27	4.90	2.00	856.98
	89	1	2010m5	6120.52	75.95	0.27	5.40	2.00	863.59
	90	1	2010m6	6093.76	74.76	0.27	5.50	2.00	880.98
	91	1	2010m7	6283.73	75.58	0.27	6.00	2.00	878.82
	92	1	2010m8	6106.42	77.04	0.27	6.10	2.00	876.29
	93	1	2010m9	6392.39	77.84	0.27	5.90	2.00	889.45
	94	1	2010m10	6353.88	82.67	0.27	5.80	2.00	878.76
	95	1	2010m11	6318.50	85.28	0.27	5.80	2.00	899.49
	96	1	2010m12	6620.75	91.45	0.27	5.40	2.00	923.87
	97	1	2011m1	6358.03	96.52	0.27	5.30	2.00	927.95
	98	1	2011m2	5941.63	103.72	0.27	4.90	2.00	933.63
	99	1	2011m3	6562.85	114.64	0.27	4.70	2.00	983.60
	100	1	2011m4	6710.56	123.26	0.27	4.80	2.00	1009.17
	101	1	2011m5	6735.98	114.99	0.27	4.60	2.00	1013.89
	102	1	2011m6	6576.00	113.83	0.27	4.70	2.00	1014.94
	103	1	2011m7	6392.13	116.97	0.27	4.90	2.00	1014.00
	104	1	2011m8	5979.30	110.22	0.27	4.80	2.00	1018.57
	105	1	2011m9	6112.37	112.83	0.27	5.30	2.00	1016.00
	106	1	2011m10	6224.30	109.55	0.27	5.30	2.00	1017.41
	107	1	2011m11	6104.56	110.77	0.27	5.20	2.00	1028.91
	108	1	2011m12	6417.73	107.87	0.27	5.30	2.00	1066.43
	109	1	2012m1	6626.04	110.69	0.27	2.64	2.00	1077.98
	110	1	2012m2	7271.82	119.33	0.27	2.46	2.00	1094.72
	111	1	2012m3	7835.15	125.45	0.27	2.54	2.00	1107.20
	112	1	2012m4	7558.47	119.75	0.27	2.45	2.00	1101.55
	113	1	2012m5	6975.27	110.34	0.27	2.53	2.00	1106.68
	114	1	2012m6	6709.91	95.16	0.27	2.78	2.00	1120.59
	115	1	2012m7	6878.19	102.62	0.27	2.77	2.00	1113.19
	116	1	2012m8	7139.01	113.36	0.27	2.93	2.00	1116.89
	117	1	2012m9	6839.83	112.86	0.27	3.01	2.00	1116.97
	118	1	2012m10	6791.04	111.71	0.27	3.33	2.00	1172.24
	119	1	2012m11	6533.14	109.06	0.27	3.41	2.00	1147.46
	120	1	2012m12	6801.22	109.49	0.27	3.57	2.00	1211.54
	121	1	2013m1	7043.55	112.96	0.27	2.66	2.00	1220.17
	122	1	2013m2	6998.33	116.05	0.27	2.59	2.00	1229.76
	123	1	2013m3	7125.73	108.47	0.27	2.32	2.00	1253.04
	124	1	2013m4	7179.80	102.25	0.27	2.20	2.00	1268.05
	125	1	2013m5	7404.12	102.56	0.27	2.00	2.00	1279.27
	126	1	2013m6	7496.57	102.92	0.27	1.67	2.00	1281.35
	127	1	2013m7	7915.11	107.93	0.27	1.89	2.00	1289.99
	128	1	2013m8	7766.52	111.28	0.27	1.61	2.00	1290.52
	129	1	2013m9	7964.91	111.60	0.27	1.31	2.00	1290.52
	130	1	2013m10	8044.47	109.08	0.27	1.21	2.00	1296.23
	131	1	2013m11	8325.28	107.79	0.27	1.14	2.00	1323.84
	132	1	2013m12	8535.60	110.76	0.27	1.05	2.00	1345.49

	133	1	2014m1	8760.62	108.12	0.27	1.81	2.00	1380.58
	134	1	2014m2	9106.55	108.90	0.27	2.03	2.00	1384.96
	135	1	2014m3	9473.71	107.48	0.27	2.06	2.00	1409.86
	136	1	2014m4	9585.22	107.76	0.27	2.55	2.00	1434.55
	137	1	2014m5	9823.40	109.54	0.27	2.69	2.00	1450.75
	138	1	2014m6	9513.02	111.80	0.27	2.60	2.00	1450.79
	139	1	2014m7	10214.73	106.77	0.27	2.27	2.00	1473.36
	140	1	2014m8	11112.12	101.61	0.27	2.45	2.00	1491.29
	141	1	2014m9	10854.79	97.09	0.27	2.35	2.00	1500.51
	142	1	2014m10	10034.92	87.43	0.27	2.08	2.00	1493.91
	143	1	2014m11	8624.89	79.44	0.27	2.04	2.00	1500.55
	144	1	2014m12	8333.30	62.34	0.27	1.90	2.00	1541.69
	145	1	2015m1	8878.54	47.76	0.27	1.56	2.00	1525.13
	146	1	2015m2	9313.52	58.10	0.27	1.35	2.00	1595.33
	147	1	2015m3	8778.89	55.89	0.27	1.44	2.00	1602.26
	148	1	2015m4	9834.49	59.52	0.27	1.01	2.00	1604.03
	149	1	2015m5	9688.69	64.08	0.27	1.01	2.00	1631.46
	150	1	2015m6	9086.89	61.48	0.27	1.20	2.00	1630.11
	151	1	2015m7	9098.27	56.56	0.27	1.15	2.00	1624.37
	152	1	2015m8	7522.47	46.52	0.27	0.99	2.00	1613.62
	153	1	2015m9	7404.14	47.62	0.27	1.16	2.00	1646.20
	154	1	2015m10	7124.80	48.43	0.27	1.18	2.00	1588.45
	155	1	2015m11	7239.93	44.27	0.27	1.20	2.00	1610.67
	156	1	2015m12	6911.76	38.01	0.27	1.23	2.00	1580.06
	157	1	2016m1	5996.57	30.70	0.27	2.52	2.00	1572.00
	158	1	2016m2	6092.50	32.18	0.27	2.57	2.00	1561.29
	159	1	2016m3	6223.13	38.21	0.27	2.59	2.00	1567.08
	160	1	2016m4	6805.84	41.58	0.27	2.53	2.00	1558.68
	161	1	2016m5	6448.42	46.74	0.27	2.34	2.00	1568.84
	162	1	2016m6	6499.88	48.25	0.27	2.26	2.00	1589.24
	163	1	2016m7	6302.17	44.95	0.27	2.26	2.00	1570.16
	164	1	2016m8	6079.51	45.84	0.27	2.06	2.00	1575.75
	165	1	2016m9	5623.34	46.57	0.27	1.90	2.00	1591.06
	166	1	2016m10	6012.22	49.52	0.27	1.56	2.00	1626.89
	167	1	2016m11	7000.18	44.73	0.27	1.28	2.00	1635.69
	168	1	2016m12	7210.43	53.31	0.27	0.97	2.00	1636.03
	169	1	2017m1	7101.86	54.58	0.27	-0.53	2.00	1626.06
	170	1	2017m2	6972.39	54.87	0.27	-0.57	2.00	1615.57
	171	1	2017m3	7001.63	51.59	0.27	-0.74	2.00	1638.92
	172	1	2017m4	7013.47	52.31	0.27	-0.66	2.00	1632.77
	173	1	2017m5	6871.24	50.33	0.27	-0.74	2.00	1630.93
	174	1	2017m6	7425.72	46.37	0.27	-0.55	2.00	1652.70
	175	1	2017m7	7094.17	48.48	0.27	-0.78	2.00	1659.48
	176	1	2017m8	7258.64	51.70	0.27	-0.74	2.00	1659.96
	177	1	2017m9	7283.01	56.15	0.27	-0.78	2.00	1627.32
	178	1	2017m10	6934.37	57.51	0.27	-1.16	2.00	1612.12
	179	1	2017m11	7003.97	62.71	0.27	-1.70	2.00	1607.01
	180	1	2017m12	7226.32	64.37	0.27	-1.11	2.00	1628.67
	181	1	2018m1	7650.12	69.08	0.27	3.15	2.00	1637.81
	182	1	2018m2	7418.8	65.32	0.27	2.94	2.00	1623.09
	183	1	2018m3	7870.87	66.02	0.27	2.87	2.25	1630.79
	184	1	2018m4	8208.87	72.11	0.27	2.49	2.25	1628.26
	185	1	2018m5	8161.08	76.98	0.27	2.40	2.25	1630.16
	186	1	2018m6	8314.19	74.41	0.27	2.33	2.50	1637.20
	187	1	2018m7	8294.83	74.25	0.27	2.25	2.50	1629.04
	188	1	2018m8	7948.25	72.53	0.27	2.28	2.50	1633.81
	189	1	2018m9	7999.54	78.89	0.27	2.10	2.75	1634.53
	190	1	2018m10	7907.01	81.03	0.27	2.14	2.75	1615.90
	191	1	2018m11	7702.99	64.75	0.27	2.63	2.75	1636.04
	192	1	2018m12	7826.73	57.36	0.27	1.91	3.00	1663.82
	193	1	2019m1	8559.95	59.41	0.27	-3.16	3.00	1652.41
	194	1	2019m2	8492.7	63.96	0.27	-3.24	3.00	1654.11
	195	1	2019m3	8819.44	66.14	0.27	-3.21	3.00	1651.11
	196	1	2019m4	9304.02	71.23	0.27	-2.88	3.00	1668.87
	197	1	2019m5	8516.48	71.32	0.27	-2.63	3.00	1702.47
	198	1	2019m6	8821.76	64.22	0.27	-2.59	3.00	1700.28
	199	1	2019m7	8732.62	63.92	0.27	-2.19	2.75	1693.33
	200	1	2019m8	8019.77	59.04	0.27	-1.86	2.75	1711.06

	201	1	2019m9	8091.76	62.83	0.27	-1.41	2.50	1711.53
	202	1	2019m10	7744.08	59.71	0.27	-0.89	2.25	1732.68
	203	1	2019m11	7859.06	63.21	0.27	-0.81	2.25	1722.60
	204	1	2019m12	8389.23	67.31	0.27	-0.18	2.25	1789.98
	205	1	2020m1	8246.59	63.65	0.27	0.73	2.25	1773.03
	206	1	2020m2	7628.34	55.66	0.27	1.23	2.25	1791.11
	207	1	2020m3	6505.35	32.01	0.27	1.48	2.00	1825.39
	208	1	2020m4	7112.9	18.38	0.27	1.30	2.00	1851.63
	209	1	2020m5	7213.03	29.38	0.27	0.00	2.00	1883.12
	210	1	2020m6	7224.09	40.27	0.27	0.52	2.00	1868.72
	211	1	2020m7	7459.21	43.24	0.27	6.12	2.00	1864.12
	212	1	2020m8	7940.7	44.74	0.27	6.16	2.00	1881.49
	213	1	2020m9	8299.08	40.91	0.27	5.74	2.00	1882.85
	214	1	2020m10	7907.72	40.19	0.27	5.76	2.00	1906.73
	215	1	2020m11	8747.09	42.69	0.27	5.80	2.00	1935.79
	216	1	2020m12	8689.53	49.99	0.27	5.33	2.00	1962.84
RUSSIA	1	2	2003m1	351.82	31.18	0.03	14.29	21.00	2033.30
	2	2	2003m2	366.41	32.77	0.03	14.82	18.00	2114.00
	3	2	2003m3	375.29	30.61	0.03	14.78	18.00	2218.40
	4	2	2003m4	393.96	25.00	0.03	14.62	18.00	2326.10
	5	2	2003m5	445.75	25.86	0.03	13.62	18.00	2447.20
	6	2	2003m6	481.35	27.65	0.03	13.93	16.00	2619.30
	7	2	2003m7	470.73	28.35	0.03	13.91	16.00	2638.30
	8	2	2003m8	499.27	29.89	0.03	13.35	16.00	2695.30
	9	2	2003m9	548.50	27.11	0.03	13.28	16.00	2744.00
	10	2	2003m10	595.53	29.61	0.03	13.20	16.00	2753.50
	11	2	2003m11	523.07	28.75	0.03	12.48	16.00	2835.20
	12	2	2003m12	553.10	29.81	0.03	11.99	16.00	3205.20
	13	2	2004m1	602.67	31.28	0.03	11.28	14.00	3203.30
	14	2	2004m2	639.28	30.86	0.04	10.58	14.00	3323.50
	15	2	2004m3	697.53	33.63	0.04	10.25	14.00	3409.70
	16	2	2004m4	721.69	33.59	0.03	10.22	14.00	3474.20
	17	2	2004m5	612.11	37.57	0.03	10.15	14.00	3514.90
	18	2	2004m6	580.92	35.18	0.03	10.13	13.00	3670.90
	19	2	2004m7	568.42	38.22	0.03	10.36	13.00	3626.80
	20	2	2004m8	553.63	42.74	0.03	11.28	13.00	3649.80
	21	2	2004m9	611.04	43.20	0.03	11.38	13.00	3717.50
	22	2	2004m10	664.01	49.78	0.03	11.53	13.00	3787.80
	23	2	2004m11	657.38	43.11	0.04	11.70	13.00	3928.50
	24	2	2004m12	585.21	39.60	0.04	11.74	13.00	4353.90
	25	2	2005m1	607.77	44.51	0.04	12.70	13.00	4179.90
	26	2	2005m2	665.44	45.48	0.04	12.96	13.00	4300.60
	27	2	2005m3	688.99	53.10	0.04	13.63	13.00	4462.70
	28	2	2005m4	688.88	51.88	0.04	13.77	13.00	4577.50
	29	2	2005m5	657.74	48.65	0.04	13.84	13.00	4677.70
	30	2	2005m6	686.04	54.35	0.04	13.68	13.00	4915.40
	31	2	2005m7	752.18	57.52	0.03	13.16	13.00	4974.30
	32	2	2005m8	832.56	63.98	0.04	12.53	13.00	5118.20
	33	2	2005m9	931.47	62.91	0.04	12.33	13.00	5274.90
	34	2	2005m10	939.71	58.54	0.04	11.68	13.00	5296.50
	35	2	2005m11	998.61	55.24	0.03	11.27	13.00	5417.10
	36	2	2005m12	1100.04	56.86	0.03	10.91	12.00	6032.10
	37	2	2006m1	1283.58	62.99	0.04	10.71	12.00	5822.10
	38	2	2006m2	1393.66	60.21	0.04	11.18	12.00	5899.70
	39	2	2006m3	1412.61	62.06	0.04	10.61	12.00	6148.10
	40	2	2006m4	1571.14	70.26	0.04	9.77	12.00	6333.40
	41	2	2006m5	1568.74	69.78	0.04	9.42	12.00	6663.40
	42	2	2006m6	1391.33	68.56	0.04	9.03	11.50	7057.20
	43	2	2006m7	1516.45	73.67	0.04	9.26	11.50	7199.60
	44	2	2006m8	1628.79	73.23	0.04	9.62	11.50	7417.40
	45	2	2006m9	1560.64	61.96	0.04	9.44	11.50	7727.10
	46	2	2006m10	1596.05	57.81	0.04	9.15	11.00	7743.40
	47	2	2006m11	1699.03	58.76	0.04	9.03	11.00	7974.40
	48	2	2006m12	1849.23	62.47	0.04	9.00	11.00	8970.70
	49	2	2007m1	1829.89	53.68	0.04	8.20	10.50	8674.90
	50	2	2007m2	1898.08	57.56	0.04	7.61	10.50	8873.40
	51	2	2007m3	1841.69	62.05	0.04	7.37	10.50	9381.70
	52	2	2007m4	1959.48	67.49	0.04	7.60	10.50	9964.30

	53	2	2007m5	1843.92	67.21	0.04	7.76	10.50	10673.00
	54	2	2007m6	1859.70	71.05	0.04	8.48	10.00	10827.40
	55	2	2007m7	2010.65	76.93	0.04	8.70	10.00	10888.40
	56	2	2007m8	1900.67	70.76	0.04	8.59	10.00	11128.50
	57	2	2007m9	1964.47	77.17	0.04	9.35	10.00	11461.80
	58	2	2007m10	2144.76	82.34	0.04	10.83	10.00	11382.20
	59	2	2007m11	2207.28	92.41	0.04	11.49	10.00	11756.00
	60	2	2007m12	2282.90	90.93	0.04	11.87	10.00	12869.00
	61	2	2008m1	2112.00	92.18	0.04	12.56	10.00	12509.70
	62	2	2008m2	2007.43	94.99	0.04	12.66	10.25	12662.90
	63	2	2008m3	2023.98	103.64	0.04	13.35	10.25	12973.80
	64	2	2008m4	2119.09	109.07	0.04	14.30	10.50	12944.40
	65	2	2008m5	2363.94	122.80	0.04	15.12	10.50	13312.80
	66	2	2008m6	2360.42	132.32	0.04	15.14	10.75	13841.20
	67	2	2008m7	2123.88	132.72	0.04	14.73	11.00	13842.60
	68	2	2008m8	1745.25	113.24	0.04	15.04	11.00	14196.60
	69	2	2008m9	1341.12	97.23	0.04	15.05	11.00	14045.70
	70	2	2008m10	790.28	71.58	0.04	14.23	11.00	13173.10
	71	2	2008m11	677.39	52.45	0.04	13.78	12.00	12839.20
	72	2	2008m12	647.09	39.95	0.04	13.28	13.00	12975.90
	73	2	2009m1	555.80	43.44	0.03	13.35	13.00	11430.90
	74	2	2009m2	552.88	43.32	0.03	13.86	13.00	11465.20
	75	2	2009m3	653.04	46.54	0.03	13.97	13.00	11581.60
	76	2	2009m4	789.69	50.18	0.03	13.16	12.50	11838.70
	77	2	2009m5	969.90	57.30	0.03	12.29	12.00	12331.60
	78	2	2009m6	1051.74	68.61	0.03	11.88	11.50	12650.50
	79	2	2009m7	943.74	64.44	0.03	12.00	11.00	12618.10
	80	2	2009m8	1057.37	72.51	0.03	11.60	10.75	12797.30
	81	2	2009m9	1186.42	67.65	0.03	10.68	10.00	13101.90
	82	2	2009m10	1378.36	72.77	0.03	9.69	9.50	13376.90
	83	2	2009m11	1412.71	76.66	0.03	9.10	9.00	13713.30
	84	2	2009m12	1411.16	74.46	0.03	8.81	8.75	15267.60
	85	2	2010m1	1519.89	76.17	0.03	8.02	8.75	14904.10
	86	2	2010m2	1415.01	73.75	0.03	7.18	8.50	15236.40
	87	2	2010m3	1516.44	78.83	0.03	6.46	8.25	15639.40
	88	2	2010m4	1617.56	84.82	0.03	6.05	8.00	16098.60
	89	2	2010m5	1391.62	75.95	0.03	5.95	7.75	16470.60
	90	2	2010m6	1382.25	74.76	0.03	5.75	7.75	16900.90
	91	2	2010m7	1402.14	75.58	0.03	5.46	7.75	17063.30
	92	2	2010m8	1458.50	77.04	0.03	6.04	7.75	17437.70
	93	2	2010m9	1477.95	77.84	0.03	6.96	7.75	17690.20
	94	2	2010m10	1581.00	82.67	0.03	7.50	7.75	17848.30
	95	2	2010m11	1605.15	85.28	0.03	8.07	7.75	18264.90
	96	2	2010m12	1733.30	91.45	0.03	8.78	7.75	20011.90
	97	2	2011m1	1877.68	96.52	0.03	9.55	7.75	19307.70
	98	2	2011m2	1899.62	103.72	0.03	9.47	8.00	19536.70
	99	2	2011m3	1988.45	114.64	0.04	9.46	8.00	19819.00
	100	2	2011m4	2051.23	123.26	0.04	9.61	8.00	20048.60
	101	2	2011m5	1868.02	114.99	0.04	9.59	8.25	20196.30
	102	2	2011m6	1885.72	113.83	0.04	9.42	8.25	20745.30
	103	2	2011m7	1951.14	116.97	0.04	9.01	8.25	20850.40
	104	2	2011m8	1675.51	110.22	0.03	8.16	8.25	21083.80
	105	2	2011m9	1523.69	112.83	0.03	7.21	8.25	21497.40
	106	2	2011m10	1417.63	109.55	0.03	7.19	8.25	21380.90
	107	2	2011m11	1496.66	110.77	0.03	6.78	8.25	21961.90
	108	2	2011m12	1420.82	107.87	0.03	6.10	8.00	24483.10
	109	2	2012m1	1486.65	110.69	0.03	4.16	8.00	23617.60
	110	2	2012m2	1654.32	119.33	0.03	3.74	8.00	23791.10
	111	2	2012m3	1700.59	125.45	0.03	3.70	8.00	23975.30
	112	2	2012m4	1608.15	119.75	0.03	3.57	8.00	24162.30
	113	2	2012m5	1384.26	110.34	0.03	3.61	8.00	24365.90
	114	2	2012m6	1296.74	95.16	0.03	4.30	8.25	24679.20
	115	2	2012m7	1368.94	102.62	0.03	5.59	8.00	24564.30
	116	2	2012m8	1421.08	113.36	0.03	5.95	8.00	24573.50
	117	2	2012m9	1486.96	112.86	0.03	6.57	8.25	24657.50
	118	2	2012m10	1479.50	111.71	0.03	6.55	8.25	24739.20
	119	2	2012m11	1411.41	109.06	0.03	6.47	8.25	25080.60
	120	2	2012m12	1497.75	109.49	0.03	6.58	8.25	27405.40

	121	2	2013m1	1596.31	112.96	0.03	7.07	8.25	26745.00
	122	2	2013m2	1580.03	116.05	0.03	7.28	8.25	27173.60
	123	2	2013m3	1498.22	108.47	0.03	7.02	8.25	27465.90
	124	2	2013m4	1391.46	102.25	0.03	7.23	8.25	27841.20
	125	2	2013m5	1405.84	102.56	0.03	7.38	8.25	28083.50
	126	2	2013m6	1281.47	102.92	0.03	6.88	8.25	28506.10
	127	2	2013m7	1328.68	107.93	0.03	6.45	8.25	28734.30
	128	2	2013m8	1320.09	111.28	0.03	6.49	8.25	28779.20
	129	2	2013m9	1401.76	111.60	0.03	6.13	5.50	28629.30
	130	2	2013m10	1479.13	109.08	0.03	6.25	5.50	28545.80
	131	2	2013m11	1437.42	107.79	0.03	6.50	5.50	29167.30
	132	2	2013m12	1414.44	110.76	0.03	6.45	5.50	31404.70
	133	2	2014m1	1372.92	108.12	0.03	6.05	5.50	30136.10
	134	2	2014m2	1316.28	108.90	0.03	6.19	5.50	30459.00
	135	2	2014m3	1149.43	107.48	0.03	6.91	7.00	29800.10
	136	2	2014m4	1181.92	107.76	0.03	7.33	7.50	30160.00
	137	2	2014m5	1263.99	109.54	0.03	7.59	7.50	30245.60
	138	2	2014m6	1361.10	111.80	0.03	7.80	7.50	30426.20
	139	2	2014m7	1314.87	106.77	0.03	7.45	8.00	30524.80
	140	2	2014m8	1222.80	101.61	0.03	7.55	8.00	30688.90
	141	2	2014m9	1194.98	97.09	0.03	8.03	8.00	30644.80
	142	2	2014m10	1073.04	87.43	0.02	8.29	8.00	30268.40
	143	2	2014m11	1030.34	79.44	0.02	9.06	9.50	30625.60
	144	2	2014m12	824.73	62.34	0.02	11.36	17.00	32110.50
	145	2	2015m1	770.02	47.76	0.02	14.97	17.00	31448.60
	146	2	2015m2	859.38	58.10	0.02	16.71	15.00	31716.40
	147	2	2015m3	866.91	55.89	0.02	16.93	14.00	31636.70
	148	2	2015m4	1001.25	59.52	0.02	16.42	14.00	32103.40
	149	2	2015m5	1046.88	64.08	0.02	15.78	12.50	32310.20
	150	2	2015m6	952.09	61.48	0.02	15.29	11.50	32492.80
	151	2	2015m7	893.13	56.56	0.02	15.64	11.50	32665.50
	152	2	2015m8	811.25	46.52	0.02	15.77	11.00	33030.70
	153	2	2015m9	797.31	47.62	0.01	15.68	11.00	32950.80
	154	2	2015m10	850.02	48.43	0.02	15.59	11.00	32859.60
	155	2	2015m11	861.55	44.27	0.02	14.98	11.00	33315.40
	156	2	2015m12	785.27	38.01	0.01	12.91	11.00	35785.50
	157	2	2016m1	693.00	30.70	0.01	9.77	11.00	33975.70
	158	2	2016m2	722.86	32.18	0.01	8.06	11.00	34318.90
	159	2	2016m3	844.26	38.21	0.01	7.26	11.00	34698.70
	160	2	2016m4	907.40	41.58	0.02	7.24	11.00	35113.10
	161	2	2016m5	911.28	46.74	0.02	7.30	11.00	35650.50
	162	2	2016m6	919.84	48.25	0.02	7.48	10.50	35867.90
	163	2	2016m7	940.03	44.95	0.02	7.21	10.50	36039.00
	164	2	2016m8	952.96	45.84	0.02	6.84	10.50	36194.40
	165	2	2016m9	981.32	46.57	0.02	6.42	10.00	36148.80
	166	2	2016m10	994.85	49.52	0.02	6.09	10.00	36051.00
	167	2	2016m11	995.15	44.73	0.02	5.76	10.00	36433.00
	168	2	2016m12	1117.67	53.31	0.02	5.38	10.00	38418.00
	169	2	2017m1	1163.32	54.58	0.02	5.02	10.00	38016.80
	170	2	2017m2	1159.53	54.87	0.02	4.59	10.00	38475.20
	171	2	2017m3	1102.87	51.59	0.02	4.25	9.75	38555.20
	172	2	2017m4	1103.79	52.31	0.02	4.13	9.75	38663.80
	173	2	2017m5	1092.04	50.33	0.02	4.09	9.25	39222.90
	174	2	2017m6	1011.60	46.37	0.02	4.35	9.00	39623.10
	175	2	2017m7	1020.51	48.48	0.02	3.86	9.00	39275.90
	176	2	2017m8	1041.56	51.70	0.02	3.29	9.00	39419.30
	177	2	2017m9	1118.55	56.15	0.02	2.96	8.50	39571.00
	178	2	2017m10	1134.62	57.51	0.02	2.73	8.25	39667.50
	179	2	2017m11	1142.26	62.71	0.02	2.50	8.25	40114.40
	180	2	2017m12	1139.22	64.37	0.02	2.52	7.75	42442.20
	181	2	2018m1	1154.44	69.08	0.02	2.21	7.75	41597.50
	182	2	2018m2	1284.7	65.32	0.02	2.20	7.50	42045.50
	183	2	2018m3	1278.68	66.02	0.02	2.36	7.25	42377.00
	184	2	2018m4	1252.44	72.11	0.02	2.41	7.25	43122.00
	185	2	2018m5	1153.31	76.98	0.02	2.44	7.25	43257.40
	186	2	2018m6	1159.63	74.41	0.02	2.33	7.25	44126.70
	187	2	2018m7	1151.98	74.25	0.02	2.57	7.25	43910.30
	188	2	2018m8	1168.12	72.53	0.02	3.12	7.25	44369.10

	189	2	2018m9	1093.34	78.89	0.01	3.48	7.50	44254.70
	190	2	2018m10	1192.55	81.03	0.02	3.69	7.50	44218.40
	191	2	2018m11	1125.14	64.75	0.02	3.98	7.50	44891.60
	192	2	2018m12	1131.7	57.36	0.01	4.37	7.75	47109.30
	193	2	2019m1	1069.39	59.41	0.01	5.09	7.75	45721.20
	194	2	2019m2	1213.7	63.96	0.02	5.29	7.75	46212.60
	195	2	2019m3	1188.8	66.14	0.02	5.30	7.75	46141.20
	196	2	2019m4	1199.31	71.23	0.02	5.22	7.75	46435.90
	197	2	2019m5	1247.09	71.32	0.02	5.11	7.75	46735.30
	198	2	2019m6	1280.99	64.22	0.02	4.59	7.50	47349.40
	199	2	2019m7	1383.57	63.92	0.02	4.48	7.25	47351.00
	200	2	2019m8	1350.46	59.04	0.02	4.28	7.25	47584.10
	201	2	2019m9	1293.9	62.83	0.01	3.90	7.00	48266.80
	202	2	2019m10	1335.64	59.71	0.02	3.59	6.50	48082.40
	203	2	2019m11	1422.26	63.21	0.02	3.38	6.50	49195.30
	204	2	2019m12	1438.81	67.31	0.02	2.97	6.25	51660.30
	205	2	2020m1	1554.72	63.65	0.02	2.36	6.25	50622.90
	206	2	2020m2	1509.2	55.66	0.02	2.36	6.00	51314.20
	207	2	2020m3	1332.74	32.01	0.01	2.67	6.00	52327.00
	208	2	2020m4	990.15	18.38	0.01	3.18	5.50	52951.70
	209	2	2020m5	1111.28	29.38	0.01	3.18	5.50	53068.00
	210	2	2020m6	1240.08	40.27	0.01	3.39	4.50	54392.60
	211	2	2020m7	1222.73	43.24	0.01	3.59	4.25	54687.40
	212	2	2020m8	1235.2	44.74	0.01	3.80	4.25	55294.20
	213	2	2020m9	1265.7	40.91	0.01	4.28	4.25	56023.90
	214	2	2020m10	1181.29	40.19	0.01	4.62	4.25	55871.60
	215	2	2020m11	1069.09	42.69	0.01	5.05	4.25	56122.60
	216	2	2020m12	1282.56	49.99	0.01	5.50	4.25	58651.10
UAE	1	3	2003m1	1376.73	31.18	0.27	3.10	4.50	174.74
	2	3	2003m2	1366.47	32.77	0.27	3.10	4.50	179.13
	3	3	2003m3	1381.66	30.61	0.27	3.10	4.50	180.95
	4	3	2003m4	1442.51	25.00	0.27	3.10	4.50	184.45
	5	3	2003m5	1434.47	25.86	0.27	3.10	4.50	180.23
	6	3	2003m6	1452.60	27.65	0.27	3.10	4.50	183.36
	7	3	2003m7	1587.85	28.35	0.27	3.10	4.50	191.05
	8	3	2003m8	1623.55	29.89	0.27	3.10	4.50	188.19
	9	3	2003m9	1756.03	27.11	0.27	3.10	4.50	189.94
	10	3	2003m10	1737.31	29.61	0.27	3.10	4.50	192.84
	11	3	2003m11	1770.12	28.75	0.27	3.10	4.50	196.76
	12	3	2003m12	1756.92	29.81	0.27	3.10	4.50	196.55
	13	3	2004m1	1811.76	31.28	0.27	5.00	4.50	203.41
	14	3	2004m2	1887.74	30.86	0.27	5.00	4.50	208.88
	15	3	2004m3	1891.32	33.63	0.27	5.00	4.50	213.27
	16	3	2004m4	1832.43	33.59	0.27	5.00	4.50	215.23
	17	3	2004m5	1945.57	37.57	0.27	5.00	4.50	215.30
	18	3	2004m6	2063.42	35.18	0.27	5.00	4.50	214.36
	19	3	2004m7	2266.40	38.22	0.27	5.00	4.50	217.04
	20	3	2004m8	2298.17	42.74	0.27	5.00	4.50	228.88
	21	3	2004m9	2354.66	43.20	0.27	5.00	4.50	222.47
	22	3	2004m10	2326.94	49.78	0.27	5.00	4.50	228.28
	23	3	2004m11	2699.63	43.11	0.27	5.00	4.50	233.30
	24	3	2004m12	3070.88	39.60	0.27	5.00	4.50	242.24
	25	3	2005m1	3249.33	44.51	0.27	6.20	4.50	253.76
	26	3	2005m2	3551.05	45.48	0.27	6.20	4.50	256.34
	27	3	2005m3	5085.11	53.10	0.27	6.20	4.50	264.94
	28	3	2005m4	6229.04	51.88	0.27	6.20	4.50	286.43
	29	3	2005m5	5671.44	48.65	0.27	6.20	4.50	286.50
	30	3	2005m6	5706.62	54.35	0.27	6.20	4.50	291.01
	31	3	2005m7	4714.21	57.52	0.27	6.20	4.50	300.98
	32	3	2005m8	5248.91	63.98	2.28	6.20	4.50	283.62
	33	3	2005m9	5470.95	62.91	0.27	6.20	4.50	300.92
	34	3	2005m10	5518.63	58.54	0.27	6.20	4.50	304.01
	35	3	2005m11	5432.30	55.24	0.27	6.20	4.50	304.92
	36	3	2005m12	5202.95	56.86	0.27	6.20	4.50	324.06
	37	3	2006m1	4646.93	62.99	0.27	9.30	4.50	326.89
	38	3	2006m2	4503.28	60.21	0.27	9.30	4.50	331.55
	39	3	2006m3	4479.46	62.06	0.27	9.30	4.50	348.07
	40	3	2006m4	3741.40	70.26	0.27	9.30	4.50	350.17

	41	3	2006m5	3600.15	69.78	0.27	9.30	4.50	345.98
	42	3	2006m6	3557.00	68.56	0.27	9.30	4.50	353.85
	43	3	2006m7	3417.62	73.67	0.27	9.30	4.50	358.17
	44	3	2006m8	3596.82	73.23	0.27	9.30	4.50	358.22
	45	3	2006m9	3544.14	61.96	0.27	9.30	4.50	368.05
	46	3	2006m10	3399.12	57.81	0.27	9.30	4.50	371.32
	47	3	2006m11	2974.76	58.76	0.27	9.30	4.50	384.97
	48	3	2006m12	2999.66	62.47	0.27	9.30	4.50	399.29
	49	3	2007m1	2980.42	53.68	0.27	11.10	4.50	404.99
	50	3	2007m2	3090.91	57.56	0.27	11.10	4.50	414.88
	51	3	2007m3	2883.67	62.05	0.27	11.10	4.50	438.22
	52	3	2007m4	3052.74	67.49	0.27	11.10	4.50	456.01
	53	3	2007m5	3577.52	67.21	0.27	11.10	4.50	468.77
	54	3	2007m6	3544.65	71.05	0.27	11.10	4.50	476.37
	55	3	2007m7	3480.37	76.93	0.27	11.10	4.50	484.14
	56	3	2007m8	3436.81	70.76	0.27	11.10	4.50	488.07
	57	3	2007m9	3557.74	77.17	0.27	11.10	4.50	506.94
	58	3	2007m10	4271.51	82.34	0.27	11.10	4.50	528.99
	59	3	2007m11	4163.01	92.41	0.27	11.10	4.75	549.74
	60	3	2007m12	4551.80	90.93	0.27	11.10	4.50	565.70
	61	3	2008m1	4569.58	92.18	0.27	12.30	3.50	597.87
	62	3	2008m2	4815.57	94.99	0.27	12.30	3.00	609.59
	63	3	2008m3	4556.37	103.64	0.27	12.30	2.25	624.36
	64	3	2008m4	4988.86	109.07	0.27	12.30	2.25	648.99
	65	3	2008m5	5037.85	122.80	0.27	12.30	2.00	669.97
	66	3	2008m6	4953.83	132.32	0.27	12.30	2.00	676.37
	67	3	2008m7	4976.15	132.72	0.27	12.30	2.00	686.61
	68	3	2008m8	4413.40	113.24	0.27	12.30	2.00	692.49
	69	3	2008m9	3956.72	97.23	0.27	12.30	2.00	681.37
	70	3	2008m10	3326.10	71.58	0.27	12.30	1.50	680.39
	71	3	2008m11	2775.85	52.45	0.27	12.30	1.50	678.37
	72	3	2008m12	2390.01	39.95	0.27	12.30	1.50	674.31
	73	3	2009m1	2255.85	43.44	0.27	6.45	1.00	684.39
	74	3	2009m2	2376.48	43.32	0.27	5.52	1.00	701.50
	75	3	2009m3	2487.92	46.54	0.27	4.08	1.00	688.50
	76	3	2009m4	2526.53	50.18	0.27	2.56	1.00	703.22
	77	3	2009m5	2679.41	57.30	0.27	1.37	1.00	714.79
	78	3	2009m6	2631.32	68.61	0.27	0.52	1.00	718.09
	79	3	2009m7	2800.81	64.44	0.27	-0.24	1.00	730.32
	80	3	2009m8	2897.18	72.51	0.27	-0.15	1.00	734.22
	81	3	2009m9	3124.22	67.65	0.27	-0.18	1.00	728.85
	82	3	2009m10	3023.10	72.77	0.27	-0.41	1.00	742.40
	83	3	2009m11	2668.23	76.66	0.27	0.16	1.00	744.72
	84	3	2009m12	2743.61	74.46	0.27	-0.29	1.00	740.62
	85	3	2010m1	2633.37	76.17	0.27	-0.43	1.00	745.35
	86	3	2010m2	2703.56	73.75	0.27	-0.26	1.00	747.31
	87	3	2010m3	2908.49	78.83	0.27	0.68	1.00	748.01
	88	3	2010m4	2777.12	84.82	0.27	0.79	1.00	750.68
	89	3	2010m5	2604.17	75.95	0.27	0.88	1.00	744.47
	90	3	2010m6	2514.01	74.76	0.27	0.94	1.00	757.22
	91	3	2010m7	2545.80	75.58	0.27	0.85	1.00	768.29
	92	3	2010m8	2498.52	77.04	0.27	0.90	1.00	760.99
	93	3	2010m9	2673.19	77.84	0.27	1.16	1.00	766.53
	94	3	2010m10	2816.11	82.67	0.27	1.85	1.00	797.48
	95	3	2010m11	2729.87	85.28	0.27	1.46	1.00	784.56
	96	3	2010m12	2719.87	91.45	0.27	1.72	1.00	786.40
	97	3	2011m1	2586.75	96.52	0.27	1.62	1.00	795.22
	98	3	2011m2	2588.90	103.72	0.27	1.52	1.00	818.25
	99	3	2011m3	2607.12	114.64	0.27	1.20	1.00	834.72
	100	3	2011m4	2695.50	123.26	0.27	1.13	1.00	850.52
	101	3	2011m5	2639.14	114.99	0.27	1.40	1.00	841.13
	102	3	2011m6	2704.19	113.83	0.27	1.74	1.00	851.93
	103	3	2011m7	2619.70	116.97	0.27	1.29	1.00	837.95
	104	3	2011m8	2616.02	110.22	0.27	0.60	1.00	819.44
	105	3	2011m9	2533.41	112.83	0.27	0.09	1.00	813.74
	106	3	2011m10	2501.43	109.55	0.27	-0.05	1.00	818.90
	107	3	2011m11	2444.86	110.77	0.27	-0.08	1.00	822.10
	108	3	2011m12	2402.28	107.87	0.27	0.16	1.00	825.76

	109	3	2012m1	2453.98	110.69	0.27	0.73	1.00	835.62
	110	3	2012m2	2611.13	119.33	0.27	0.55	1.00	856.31
	111	3	2012m3	2553.00	125.45	0.27	0.62	1.00	880.42
	112	3	2012m4	2503.82	119.75	0.27	0.80	1.00	859.20
	113	3	2012m5	2441.03	110.34	0.27	0.82	1.00	832.10
	114	3	2012m6	2447.62	95.16	0.27	0.34	1.00	827.14
	115	3	2012m7	2506.23	102.62	0.27	0.46	1.00	832.55
	116	3	2012m8	2561.61	113.36	0.27	0.95	1.00	835.05
	117	3	2012m9	2605.41	112.86	0.27	1.05	1.00	845.48
	118	3	2012m10	2672.43	111.71	0.27	0.54	1.00	844.70
	119	3	2012m11	2674.56	109.06	0.27	0.50	1.00	876.50
	120	3	2012m12	2630.86	109.49	0.27	0.60	1.00	862.37
	121	3	2013m1	2881.78	112.96	0.27	0.43	1.00	875.14
	122	3	2013m2	3044.89	116.05	0.27	0.74	1.00	905.90
	123	3	2013m3	3025.33	108.47	0.27	1.01	1.00	915.30
	124	3	2013m4	3273.63	102.25	0.27	0.90	1.00	909.00
	125	3	2013m5	3562.88	102.56	0.27	0.96	1.00	917.90
	126	3	2013m6	3551.24	102.92	0.27	1.25	1.00	929.80
	127	3	2013m7	3847.43	107.93	0.27	1.27	1.00	931.30
	128	3	2013m8	3734.55	111.28	0.27	1.26	1.00	939.50
	129	3	2013m9	3842.98	111.60	0.27	1.27	1.00	955.00
	130	3	2013m10	3845.72	109.08	0.27	1.26	1.00	1003.50
	131	3	2013m11	3849.84	107.79	0.27	1.41	1.00	1036.80
	132	3	2013m12	4290.30	110.76	0.27	1.44	1.00	1056.80
	133	3	2014m1	4673.07	108.12	0.27	1.45	1.00	1058.90
	134	3	2014m2	4958.66	108.90	0.27	1.74	1.00	1072.40
	135	3	2014m3	4894.42	107.48	0.27	1.85	1.00	1124.30
	136	3	2014m4	5044.62	107.76	0.27	2.12	1.00	1123.70
	137	3	2014m5	5253.41	109.54	0.27	2.05	1.00	1125.90
	138	3	2014m6	4551.02	111.80	0.27	2.21	1.00	1142.62
	139	3	2014m7	4976.16	106.77	0.27	2.33	1.00	1129.40
	140	3	2014m8	5082.72	101.61	0.27	2.42	1.00	1130.70
	141	3	2014m9	5106.29	97.09	0.27	2.91	1.00	1136.10
	142	3	2014m10	4861.45	87.43	0.27	3.11	1.00	1125.60
	143	3	2014m11	4671.29	79.44	0.27	2.82	1.00	1140.10
	144	3	2014m12	4528.93	62.34	0.27	3.11	1.00	1141.20
	145	3	2015m1	4456.82	47.76	0.27	3.66	1.00	1153.10
	146	3	2015m2	4686.19	58.10	0.27	3.62	1.00	1176.10
	147	3	2015m3	4467.93	55.89	0.27	4.32	1.00	1191.90
	148	3	2015m4	4647.12	59.52	0.27	4.25	1.00	1182.00
	149	3	2015m5	4527.63	64.08	0.27	4.32	1.00	1198.90
	150	3	2015m6	4723.23	61.48	0.27	4.22	1.00	1190.00
	151	3	2015m7	4834.22	56.56	0.27	4.44	1.00	1184.70
	152	3	2015m8	4493.93	46.52	0.27	4.95	1.00	1174.99
	153	3	2015m9	4502.79	47.62	0.27	4.29	1.00	1176.40
	154	3	2015m10	4322.04	48.43	0.27	3.68	1.00	1185.10
	155	3	2015m11	4236.39	44.27	0.27	3.52	1.00	1182.90
	156	3	2015m12	4307.26	38.01	0.27	3.60	1.00	1204.40
	157	3	2016m1	4054.37	30.70	0.27	2.55	1.00	1212.50
	158	3	2016m2	4351.41	32.18	0.27	2.20	1.00	1212.50
	159	3	2016m3	4390.42	38.21	0.27	1.42	1.00	1218.40
	160	3	2016m4	4543.53	41.58	0.27	1.62	1.00	1203.12
	161	3	2016m5	4250.20	46.74	0.27	1.62	1.00	1186.44
	162	3	2016m6	4497.64	48.25	0.27	1.76	1.00	1180.42
	163	3	2016m7	4575.34	44.95	0.27	1.76	1.00	1191.26
	164	3	2016m8	4471.01	45.84	0.27	1.28	1.00	1183.91
	165	3	2016m9	4476.32	46.57	0.27	0.76	1.00	1200.27
	166	3	2016m10	4300.18	49.52	0.27	1.28	1.00	1203.32
	167	3	2016m11	4308.77	44.73	0.27	1.96	1.00	1212.89
	168	3	2016m12	4546.37	53.31	0.27	1.24	1.00	1225.45
	169	3	2017m1	4548.82	54.58	0.27	-0.11	1.00	1230.24
	170	3	2017m2	4552.09	54.87	0.27	2.68	1.00	1244.20
	171	3	2017m3	4443.53	51.59	0.27	2.96	1.25	1272.20
	172	3	2017m4	4522.56	52.31	0.27	2.17	1.25	1273.70
	173	3	2017m5	4427.30	50.33	0.27	1.89	1.50	1274.50
	174	3	2017m6	4425.40	46.37	0.27	1.99	1.50	1267.10
	175	3	2017m7	4566.15	48.48	0.27	1.17	1.50	1264.40
	176	3	2017m8	4468.41	51.70	0.27	0.80	1.50	1245.50

	177	3	2017m9	4397.40	56.15	0.27	1.15	1.50	1257.13
	178	3	2017m10	4479.60	57.51	0.27	2.09	1.50	1244.10
	179	3	2017m11	4283.07	62.71	0.27	1.73	1.75	1248.85
	180	3	2017m12	4398.44	64.37	0.27	2.73	1.75	1276.20
	181	3	2018m1	4396.03	69.08	0.27	7.27	1.75	1277.20
	182	3	2018m2	4602.23	65.32	0.27	4.45	1.75	1284.90
	183	3	2018m3	4597.66	66.02	0.27	3.36	2.00	1293.80
	184	3	2018m4	4584.25	72.11	0.27	3.53	2.00	1313.10
	185	3	2018m5	4669.45	76.98	0.27	3.48	2.25	1304.40
	186	3	2018m6	4607.44	74.41	0.27	3.30	2.25	1300.10
	187	3	2018m7	4506.74	74.25	0.27	3.79	2.25	1302.30
	188	3	2018m8	4860.59	72.53	0.27	3.86	2.25	1278.90
	189	3	2018m9	4987.15	78.89	0.27	3.09	2.50	1291.10
	190	3	2018m10	4935.85	81.03	0.27	1.62	2.50	1265.70
	191	3	2018m11	4901.87	64.75	0.27	1.34	2.75	1288.40
	192	3	2018m12	4775.53	57.36	0.27	0.34	2.75	1308.50
	193	3	2019m1	4913.88	59.41	0.27	-2.39	2.75	1305.50
	194	3	2019m2	5044.49	63.96	0.27	-2.53	2.75	1321.30
	195	3	2019m3	5137.81	66.14	0.27	-2.48	2.75	1328.60
	196	3	2019m4	5074.65	71.23	0.27	-2.09	2.75	1335.10
	197	3	2019m5	5257.54	71.32	0.27	-1.09	2.75	1321.30
	198	3	2019m6	5004.61	64.22	0.27	-1.49	2.75	1351.00
	199	3	2019m7	4980.63	63.92	0.27	-2.22	2.50	1363.80
	200	3	2019m8	5316.83	59.04	0.27	-2.04	2.50	1362.40
	201	3	2019m9	5165.57	62.83	0.27	-2.17	2.25	1361.30
	202	3	2019m10	5056.64	59.71	0.27	-1.86	2.00	1372.70
	203	3	2019m11	5108.96	63.21	0.27	-1.67	2.00	1380.50
	204	3	2019m12	5033.34	67.31	0.27	-1.13	2.00	1413.10
	205	3	2020m1	5075.89	63.65	0.27	-1.34	2.00	1426.80
	206	3	2020m2	5153.95	55.66	0.27	-1.30	2.00	1426.30
	207	3	2020m3	4894.81	32.01	0.27	-1.60	1.50	1454.90
	208	3	2020m4	3722.99	18.38	0.27	-1.77	1.50	1464.80
	209	3	2020m5	4230.37	29.38	0.27	-2.79	1.50	1451.90
	210	3	2020m6	4142.12	40.27	0.27	-2.36	1.50	1458.01
	211	3	2020m7	4285.38	43.24	0.27	-2.14	1.50	1492.24
	212	3	2020m8	4304.74	44.74	0.27	-2.59	1.50	1513.51
	213	3	2020m9	4519.32	40.91	0.27	-2.38	1.50	1468.66
	214	3	2020m10	4518.3	40.19	0.27	-2.18	1.50	1486.50
	215	3	2020m11	4660.55	42.69	0.27	-2.19	1.50	1450.50
	216	3	2020m12	4965.45	49.99	0.27	-2.32	1.50	1478.93
CANADA	1	4	2003m1	6569.49	31.18	0.64	3.80	3.00	566.54
	2	4	2003m2	6555.12	32.77	0.65	4.51	3.00	568.51
	3	4	2003m3	6343.29	30.61	0.66	4.68	3.25	570.92
	4	4	2003m4	6586.07	25.00	0.68	4.25	3.50	573.03
	5	4	2003m5	6859.80	25.86	0.68	2.91	3.50	576.62
	6	4	2003m6	6983.14	27.65	0.72	2.81	3.50	581.36
	7	4	2003m7	7257.92	28.35	0.74	2.60	3.25	586.56
	8	4	2003m8	7510.32	29.89	0.72	2.09	3.25	590.61
	9	4	2003m9	7421.13	27.11	0.72	1.98	3.00	592.12
	10	4	2003m10	7772.70	29.61	0.73	2.18	3.00	593.00
	11	4	2003m11	7859.39	28.75	0.75	1.58	3.00	596.80
	12	4	2003m12	8220.89	29.81	0.76	1.58	3.00	598.41
	13	4	2004m1	8521.39	31.28	0.76	2.08	2.75	603.24
	14	4	2004m2	8788.49	30.86	0.77	1.27	2.75	607.51
	15	4	2004m3	8585.93	33.63	0.75	0.68	2.50	608.70
	16	4	2004m4	8243.97	33.59	0.75	0.78	2.25	612.81
	17	4	2004m5	8417.32	37.57	0.75	1.66	2.25	618.54
	18	4	2004m6	8545.58	35.18	0.73	2.44	2.25	622.68
	19	4	2004m7	8458.07	38.22	0.74	2.54	2.25	624.91
	20	4	2004m8	8377.03	42.74	0.76	2.34	2.25	626.25
	21	4	2004m9	8668.29	43.20	0.76	1.85	2.50	627.01
	22	4	2004m10	8870.97	49.78	0.77	1.84	2.75	629.54
	23	4	2004m11	9030.05	43.11	0.80	2.33	2.75	630.10
	24	4	2004m12	9246.65	39.60	0.84	2.42	2.75	635.69
	25	4	2005m1	9204.05	44.51	0.82	2.13	2.75	641.02
	26	4	2005m2	9668.32	45.48	0.82	1.94	2.75	644.54
	27	4	2005m3	9612.38	53.10	0.81	2.13	2.75	645.96
	28	4	2005m4	9369.30	51.88	0.82	2.31	2.75	650.55

	29	4	2005m5	9607.30	48.65	0.81	2.40	2.75	654.72
	30	4	2005m6	9902.77	54.35	0.80	1.62	2.75	657.16
	31	4	2005m7	10422.93	57.52	0.81	1.71	2.75	657.04
	32	4	2005m8	10668.94	63.98	0.82	2.00	2.75	657.08
	33	4	2005m9	11011.83	62.91	0.83	2.58	3.00	661.66
	34	4	2005m10	10383.32	58.54	0.85	3.24	3.25	666.17
	35	4	2005m11	10824.14	55.24	0.85	2.57	3.25	667.55
	36	4	2005m12	11272.26	56.86	0.85	1.99	3.50	673.35
	37	4	2006m1	11945.64	62.99	0.86	2.09	3.75	675.73
	38	4	2006m2	11688.34	60.21	0.86	2.75	3.75	682.45
	39	4	2006m3	12110.61	62.06	0.87	2.18	4.00	686.63
	40	4	2006m4	12204.17	70.26	0.86	2.16	4.25	693.26
	41	4	2006m5	11744.52	69.78	0.87	2.44	4.50	695.91
	42	4	2006m6	11612.87	68.56	0.90	2.81	4.50	701.20
	43	4	2006m7	11830.96	73.67	0.90	2.43	4.50	708.12
	44	4	2006m8	12073.75	73.23	0.89	2.33	4.50	712.27
	45	4	2006m9	11761.27	61.96	0.89	2.14	4.50	719.87
	46	4	2006m10	12344.59	57.81	0.90	0.74	4.50	724.81
	47	4	2006m11	12752.38	58.76	0.89	1.02	4.50	730.19
	48	4	2006m12	12908.39	62.47	0.88	1.39	4.50	735.83
	49	4	2007m1	13034.12	53.68	0.87	1.67	4.50	737.18
	50	4	2007m2	13045.02	57.56	0.85	1.11	4.50	739.96
	51	4	2007m3	13165.50	62.05	0.85	2.04	4.50	744.93
	52	4	2007m4	13416.68	67.49	0.86	2.30	4.50	750.07
	53	4	2007m5	14056.78	67.21	0.88	2.20	4.50	752.34
	54	4	2007m6	13906.57	71.05	0.91	2.19	4.50	759.52
	55	4	2007m7	13868.63	76.93	0.94	2.19	4.75	768.19
	56	4	2007m8	13660.48	70.76	0.95	2.19	4.75	772.62
	57	4	2007m9	14098.89	77.17	0.94	1.73	4.75	779.08
	58	4	2007m10	14625.00	82.34	0.97	2.47	4.75	775.36
	59	4	2007m11	13689.12	92.41	1.02	2.39	4.75	778.40
	60	4	2007m12	13833.06	90.93	1.04	2.47	4.50	786.29
	61	4	2008m1	13155.10	92.18	1.00	2.38	4.25	791.99
	62	4	2008m2	13582.69	94.99	0.99	2.19	4.25	797.75
	63	4	2008m3	13350.13	103.64	1.00	1.81	3.75	806.02
	64	4	2008m4	13937.04	109.07	1.00	1.35	3.25	813.29
	65	4	2008m5	14714.73	122.80	0.99	1.70	3.25	822.14
	66	4	2008m6	14467.03	132.32	1.00	2.23	3.25	828.95
	67	4	2008m7	13592.91	132.72	0.98	3.13	3.25	833.39
	68	4	2008m8	13771.25	113.24	0.99	3.39	3.25	841.13
	69	4	2008m9	11752.90	97.23	0.95	3.49	3.25	851.12
	70	4	2008m10	9762.76	71.58	0.95	3.40	2.50	864.93
	71	4	2008m11	9270.62	52.45	0.85	2.60	2.50	881.52
	72	4	2008m12	8987.70	39.95	0.82	1.97	1.75	895.06
	73	4	2009m1	8694.90	43.44	0.81	1.16	1.25	907.90
	74	4	2009m2	8123.02	43.32	0.82	1.07	1.25	915.38
	75	4	2009m3	8720.39	46.54	0.80	1.43	0.75	926.91
	76	4	2009m4	9324.83	50.18	0.79	1.24	0.50	934.64
	77	4	2009m5	10370.07	57.30	0.82	0.35	0.50	941.89
	78	4	2009m6	10374.91	68.61	0.87	0.09	0.50	945.40
	79	4	2009m7	10787.15	64.44	0.89	-0.26	0.50	955.17
	80	4	2009m8	10868.21	72.51	0.89	-0.95	0.50	963.44
	81	4	2009m9	11394.96	67.65	0.92	-0.78	0.50	967.70
	82	4	2009m10	10910.75	72.77	0.92	-0.86	0.50	973.57
	83	4	2009m11	11447.20	76.66	0.95	0.09	0.50	977.43
	84	4	2009m12	11746.11	74.46	0.94	0.96	0.50	978.03
	85	4	2010m1	11094.31	76.17	0.95	1.32	0.50	980.65
	86	4	2010m2	11629.63	73.75	0.96	1.86	0.50	987.90
	87	4	2010m3	12037.73	78.83	0.95	1.58	0.50	990.68
	88	4	2010m4	12210.70	84.82	0.98	1.40	0.50	994.03
	89	4	2010m5	11762.99	75.95	1.00	1.84	0.50	1005.63
	90	4	2010m6	11294.42	74.76	0.96	1.39	0.75	1009.72
	91	4	2010m7	11713.43	75.58	0.96	0.96	1.00	1015.26
	92	4	2010m8	11913.86	77.04	0.96	1.83	1.00	1017.81
	93	4	2010m9	12368.65	77.84	0.96	1.74	1.25	1024.31
	94	4	2010m10	12676.24	82.67	0.97	1.92	1.25	1030.15
	95	4	2010m11	12952.88	85.28	0.98	2.44	1.25	1027.26
	96	4	2010m12	13443.22	91.45	0.99	2.00	1.25	1031.73

	97	4	2011m1	13551.99	96.52	0.99	2.35	1.25	1036.09
	98	4	2011m2	14136.50	103.72	1.01	2.35	1.25	1038.63
	99	4	2011m3	14116.10	114.64	1.01	2.16	1.25	1042.99
	100	4	2011m4	13944.79	123.26	1.02	3.29	1.25	1044.66
	101	4	2011m5	13802.88	114.99	1.04	3.28	1.25	1049.25
	102	4	2011m6	13300.87	113.83	1.03	3.70	1.25	1054.78
	103	4	2011m7	12945.63	116.97	1.02	3.10	1.25	1058.46
	104	4	2011m8	12768.70	110.22	1.05	2.74	1.25	1062.69
	105	4	2011m9	11623.84	112.83	1.02	3.08	1.25	1078.93
	106	4	2011m10	12252.06	109.55	1.00	3.17	1.25	1090.94
	107	4	2011m11	12204.11	110.77	0.98	2.90	1.25	1093.23
	108	4	2011m12	11955.09	107.87	0.98	2.89	1.25	1098.83
	109	4	2012m1	12452.15	110.69	0.98	2.30	1.25	1106.61
	110	4	2012m2	12644.01	119.33	0.99	2.46	1.25	1107.11
	111	4	2012m3	12392.18	125.45	1.00	2.62	1.25	1109.82
	112	4	2012m4	12292.69	119.75	1.01	1.93	1.25	1115.62
	113	4	2012m5	11513.21	110.34	1.01	2.00	1.25	1124.09
	114	4	2012m6	11596.56	95.16	0.99	1.24	1.25	1134.75
	115	4	2012m7	11664.71	102.62	0.97	1.50	1.25	1142.74
	116	4	2012m8	11949.26	113.36	0.99	1.25	1.25	1145.19
	117	4	2012m9	12317.46	112.86	1.01	1.25	1.25	1145.72
	118	4	2012m10	12422.91	111.71	1.02	1.16	1.25	1149.82
	119	4	2012m11	12239.36	109.06	1.01	1.16	1.25	1155.53
	120	4	2012m12	12433.53	109.49	1.00	0.83	1.25	1159.73
	121	4	2013m1	12685.24	112.96	1.01	0.83	1.25	1167.02
	122	4	2013m2	12821.83	116.05	1.01	0.50	1.25	1177.63
	123	4	2013m3	12749.90	108.47	0.99	1.24	1.25	1189.84
	124	4	2013m4	12456.50	102.25	0.98	0.99	1.25	1191.97
	125	4	2013m5	12650.42	102.56	0.98	0.41	1.25	1193.50
	126	4	2013m6	12129.11	102.92	0.98	0.74	1.25	1198.28
	127	4	2013m7	12486.64	107.93	0.97	1.15	1.25	1203.10
	128	4	2013m8	12653.90	111.28	0.96	1.32	1.25	1213.65
	129	4	2013m9	12787.19	111.60	0.96	1.07	1.25	1219.63
	130	4	2013m10	13361.26	109.08	0.97	1.07	1.25	1225.52
	131	4	2013m11	13395.40	107.79	0.97	0.65	1.25	1232.66
	132	4	2013m12	13621.55	110.76	0.95	0.90	1.25	1239.26
	133	4	2014m1	13694.94	108.12	0.94	1.24	1.25	1249.31
	134	4	2014m2	14209.59	108.90	0.91	1.48	1.25	1249.00
	135	4	2014m3	14335.31	107.48	0.90	1.14	1.25	1254.34
	136	4	2014m4	14651.87	107.76	0.90	1.55	1.25	1253.23
	137	4	2014m5	14604.16	109.54	0.91	2.04	1.25	1260.75
	138	4	2014m6	15146.01	111.80	0.92	2.28	1.25	1261.42
	139	4	2014m7	15330.74	106.77	0.92	2.36	1.25	1265.60
	140	4	2014m8	15625.73	101.61	0.93	2.11	1.25	1275.96
	141	4	2014m9	14960.51	97.09	0.92	2.11	1.25	1284.91
	142	4	2014m10	14613.32	87.43	0.91	2.03	1.25	1293.21
	143	4	2014m11	14744.70	79.44	0.89	2.36	1.25	1293.25
	144	4	2014m12	14632.44	62.34	0.88	2.00	1.25	1297.43
	145	4	2015m1	14673.48	47.76	0.87	1.50	1.00	1301.35
	146	4	2015m2	15234.34	58.10	0.83	0.97	1.00	1309.94
	147	4	2015m3	14902.44	55.89	0.80	1.05	1.00	1315.24
	148	4	2015m4	15224.52	59.52	0.79	1.20	1.00	1320.01
	149	4	2015m5	15014.09	64.08	0.81	0.80	1.00	1322.83
	150	4	2015m6	14553.33	61.48	0.82	0.87	1.00	1324.98
	151	4	2015m7	14468.44	56.56	0.81	1.03	0.75	1340.90
	152	4	2015m8	13859.12	46.52	0.78	1.27	0.75	1350.75
	153	4	2015m9	13306.96	47.62	0.76	1.27	0.75	1361.02
	154	4	2015m10	13529.17	48.43	0.75	1.03	0.75	1364.11
	155	4	2015m11	13469.83	44.27	0.77	1.03	0.75	1372.36
	156	4	2015m12	13009.95	38.01	0.75	1.36	0.75	1375.32
	157	4	2016m1	12822.13	30.70	0.73	1.61	0.75	1387.90
	158	4	2016m2	12860.35	32.18	0.70	2.01	0.75	1398.66
	159	4	2016m3	13494.36	38.21	0.72	1.36	0.75	1402.39
	160	4	2016m4	13951.45	41.58	0.76	1.27	0.75	1412.05
	161	4	2016m5	14065.78	46.74	0.78	1.66	0.75	1421.89
	162	4	2016m6	14064.54	48.25	0.77	1.50	0.75	1426.80
	163	4	2016m7	14582.74	44.95	0.78	1.49	0.75	1443.75
	164	4	2016m8	14597.95	45.84	0.77	1.26	0.75	1449.44

	165	4	2016m9	14725.86	46.57	0.77	1.10	0.75	1462.24
	166	4	2016m10	14787.27	49.52	0.76	1.34	0.75	1477.22
	167	4	2016m11	15082.85	44.73	0.76	1.49	0.75	1488.68
	168	4	2016m12	15287.59	53.31	0.74	1.18	0.75	1494.09
	169	4	2017m1	15385.96	54.58	0.75	1.50	0.75	1514.64
	170	4	2017m2	15399.24	54.87	0.76	2.13	0.75	1512.33
	171	4	2017m3	15547.75	51.59	0.76	2.05	0.75	1521.99
	172	4	2017m4	15586.13	52.31	0.75	1.56	0.75	1533.60
	173	4	2017m5	15349.91	50.33	0.74	1.64	0.75	1547.63
	174	4	2017m6	15182.19	46.37	0.74	1.32	0.75	1553.74
	175	4	2017m7	15143.87	48.48	0.75	1.01	1.00	1556.03
	176	4	2017m8	15211.87	51.70	0.79	1.16	1.00	1555.42
	177	4	2017m9	15634.94	56.15	0.79	1.40	1.25	1561.27
	178	4	2017m10	16025.59	57.51	0.81	1.55	1.25	1568.54
	179	4	2017m11	16067.48	62.71	0.79	1.39	1.25	1573.79
	180	4	2017m12	16209.13	64.37	0.78	2.10	1.25	1583.19
	181	4	2018m1	15951.70	69.08	0.81	2.57	1.50	1589.67
	182	4	2018m2	15442.70	65.32	0.78	2.32	1.50	1592.69
	183	4	2018m3	15367.30	66.02	0.78	2.47	1.50	1598.96
	184	4	2018m4	15607.90	72.11	0.78	2.62	1.50	1599.63
	185	4	2018m5	16061.50	76.98	0.77	2.30	1.50	1600.88
	186	4	2018m6	16277.70	74.41	0.76	2.38	1.50	1611.72
	187	4	2018m7	16434.00	74.25	0.77	2.99	1.75	1617.71
	188	4	2018m8	16262.90	72.53	0.77	2.91	1.75	1627.51
	189	4	2018m9	16073.10	78.89	0.78	2.45	1.75	1635.99
	190	4	2018m10	15027.30	81.03	0.76	2.52	2.00	1644.51
	191	4	2018m11	15197.80	64.75	0.75	1.99	2.00	1654.17
	192	4	2018m12	14322.90	57.36	0.73	1.60	2.00	1665.34
	193	4	2019m1	15540.60	59.41	0.76	1.44	2.00	1674.03
	194	4	2019m2	15999.00	63.96	0.76	1.51	2.00	1681.61
	195	4	2019m3	16102.10	66.14	0.75	1.88	2.00	1693.15
	196	4	2019m4	16580.70	71.23	0.75	2.03	2.00	1706.98
	197	4	2019m5	16037.50	71.32	0.74	2.40	2.00	1716.69
	198	4	2019m6	16382.20	64.22	0.76	2.02	2.00	1725.11
	199	4	2019m7	16406.60	63.92	0.76	2.01	2.00	1739.64
	200	4	2019m8	16442.10	59.04	0.75	1.94	2.00	1754.76
	201	4	2019m9	16658.60	62.83	0.76	1.87	2.00	1766.06
	202	4	2019m10	16483.20	59.71	0.76	1.86	2.00	1778.54
	203	4	2019m11	17040.20	63.21	0.75	2.17	2.00	1786.05
	204	4	2019m12	17063.40	67.31	0.77	2.25	2.00	1794.91
	205	4	2020m1	17318.50	63.65	0.76	2.40	2.00	1801.02
	206	4	2020m2	16263.10	55.66	0.75	2.16	2.00	1814.32
	207	4	2020m3	13378.80	32.01	0.71	0.89	0.50	1855.52
	208	4	2020m4	14780.70	18.38	0.72	-0.22	0.50	1918.18
	209	4	2020m5	15192.80	29.38	0.73	-0.37	0.50	1963.43
	210	4	2020m6	15515.20	40.27	0.74	0.66	0.50	2005.98
	211	4	2020m7	16169.20	43.24	0.75	0.15	0.50	2030.55
	212	4	2020m8	16514.40	44.74	0.77	0.15	0.50	2061.89
	213	4	2020m9	16121.40	40.91	0.75	0.51	0.50	2085.36
	214	4	2020m10	15580.60	40.19	0.75	0.66	0.50	2105.41
	215	4	2020m11	17190.30	42.69	0.77	0.95	0.50	2121.40
	216	4	2020m12	17433.40	49.99	0.79	0.73	0.50	2120.71
KUWAIT	1	5	2003m1	2498.10	31.18	3.34	0.30	3.25	9606.20
	2	5	2003m2	2585.70	32.77	3.34	0.80	3.25	9676.10
	3	5	2003m3	2873.50	30.61	3.29	0.90	3.25	9762.80
	4	5	2003m4	3455.50	25.00	3.31	1.20	3.25	10009.20
	5	5	2003m5	3736.20	25.86	3.36	0.90	3.25	10413.20
	6	5	2003m6	3590.50	27.65	3.34	1.10	3.25	10520.10
	7	5	2003m7	3702.40	28.35	3.33	0.80	3.25	10707.50
	8	5	2003m8	3942.90	29.89	3.34	1.40	3.25	10614.70
	9	5	2003m9	4359.50	27.11	3.37	1.20	3.25	10691.30
	10	5	2003m10	4387.30	29.61	3.41	0.80	3.25	10644.00
	11	5	2003m11	4521.80	28.75	3.39	0.00	3.25	10593.10
	12	5	2003m12	4790.20	29.81	3.40	0.90	3.25	10401.20
	13	5	2004m1	5139.30	31.28	3.39	0.60	3.25	10669.50
	14	5	2004m2	5219.60	30.86	3.40	0.30	3.25	11014.70
	15	5	2004m3	4947.60	33.63	3.38	0.50	3.25	11183.20
	16	5	2004m4	5050.00	33.59	3.37	1.20	3.25	11169.60

	17	5	2004m5	5282.10	37.57	3.39	0.90	3.25	11290.00
	18	5	2004m6	5455.70	35.18	3.39	0.80	3.25	11123.80
	19	5	2004m7	5679.00	38.22	3.41	0.80	4.25	10996.00
	20	5	2004m8	5904.50	42.74	3.39	0.70	4.25	11035.60
	21	5	2004m9	6064.60	43.20	3.39	1.60	4.25	11175.60
	22	5	2004m10	6127.80	49.78	3.39	2.20	4.75	11256.30
	23	5	2004m11	6366.80	43.11	3.39	3.00	4.75	11343.10
	24	5	2004m12	6409.50	39.60	3.39	2.50	4.75	11655.20
	25	5	2005m1	6506.70	44.51	3.42	3.10	5.25	11879.80
	26	5	2005m2	6741.40	45.48	3.42	3.10	5.25	12048.70
	27	5	2005m3	7869.10	53.10	3.42	3.70	5.25	12392.40
	28	5	2005m4	8651.20	51.88	3.42	3.90	5.25	12584.80
	29	5	2005m5	8299.90	48.65	3.42	4.30	5.25	12703.10
	30	5	2005m6	8811.30	54.35	3.42	4.90	5.25	12723.80
	31	5	2005m7	8973.10	57.52	3.42	4.20	5.50	12967.90
	32	5	2005m8	9642.30	63.98	3.42	4.20	5.50	13010.50
	33	5	2005m9	10233.30	62.91	3.42	4.10	5.50	13045.40
	34	5	2005m10	11470.60	58.54	3.42	4.50	6.00	12784.70
	35	5	2005m11	11869.10	55.24	3.42	4.40	6.00	13734.30
	36	5	2005m12	11445.10	56.86	3.41	4.50	6.00	13086.20
	37	5	2006m1	11855.70	62.99	3.42	4.20	6.00	13261.70
	38	5	2006m2	11542.90	60.21	3.42	3.90	6.00	13559.60
	39	5	2006m3	9896.70	62.06	3.42	3.20	6.00	14524.70
	40	5	2006m4	10235.00	70.26	3.42	1.40	6.00	14541.30
	41	5	2006m5	9920.70	69.78	3.45	2.00	6.00	15035.70
	42	5	2006m6	10001.90	68.56	3.46	3.00	6.00	14880.50
	43	5	2006m7	9427.00	73.67	3.46	4.00	6.25	14660.00
	44	5	2006m8	9670.00	73.23	3.46	3.40	6.25	14992.10
	45	5	2006m9	10172.80	61.96	3.46	3.40	6.25	15312.90
	46	5	2006m10	10465.50	57.81	3.46	2.20	6.25	15378.90
	47	5	2006m11	9755.20	58.76	3.46	2.90	6.25	15778.30
	48	5	2006m12	10067.40	62.47	3.46	3.60	6.25	15920.60
	49	5	2007m1	9711.80	53.68	3.46	3.87	6.25	15731.20
	50	5	2007m2	9752.60	57.56	3.46	4.15	6.25	15997.60
	51	5	2007m3	10221.70	62.05	3.46	5.15	6.25	17130.10
	52	5	2007m4	10710.80	67.49	3.46	5.37	6.25	17205.40
	53	5	2007m5	11489.30	67.21	3.46	5.34	6.25	17365.40
	54	5	2007m6	12131.70	71.05	3.47	4.36	6.25	17553.50
	55	5	2007m7	12550.00	76.93	3.49	4.98	6.25	17981.00
	56	5	2007m8	12686.10	70.76	3.55	4.81	6.25	17878.90
	57	5	2007m9	12848.70	77.17	3.56	6.18	6.25	18248.10
	58	5	2007m10	12767.00	82.34	3.58	7.26	6.25	18641.50
	59	5	2007m11	12052.00	92.41	3.63	6.68	6.25	18992.90
	60	5	2007m12	12558.90	90.93	3.65	7.54	6.25	18959.90
	61	5	2008m1	13499.70	92.18	3.66	9.53	5.75	19970.40
	62	5	2008m2	14009.60	94.99	3.66	10.14	5.75	20186.10
	63	5	2008m3	14288.00	103.64	3.72	10.22	5.75	20393.50
	64	5	2008m4	14691.10	109.07	3.76	11.40	5.75	20752.50
	65	5	2008m5	15014.50	122.80	3.76	11.08	5.75	21369.40
	66	5	2008m6	15456.20	132.32	3.77	11.35	5.75	20697.50
	67	5	2008m7	14977.50	132.72	3.77	11.10	5.75	20730.20
	68	5	2008m8	14446.70	113.24	3.74	11.64	5.75	20594.10
	69	5	2008m9	12839.30	97.23	3.74	11.39	5.75	21414.40
	70	5	2008m10	9789.30	71.58	3.73	10.40	3.75	21371.90
	71	5	2008m11	8875.20	52.45	3.69	10.38	3.75	22410.80
	72	5	2008m12	7782.60	39.95	3.64	9.02	3.75	21950.20
	73	5	2009m1	6764.50	43.44	3.50	6.80	3.75	22784.00
	74	5	2009m2	6444.60	43.32	3.41	5.90	3.75	24033.50
	75	5	2009m3	6745.30	46.54	3.41	5.69	3.75	24862.10
	76	5	2009m4	7556.90	50.18	3.43	5.19	3.00	24919.80
	77	5	2009m5	8150.00	57.30	3.45	5.18	3.00	25182.10
	78	5	2009m6	8080.30	68.61	3.47	4.21	3.00	25151.30
	79	5	2009m7	7679.50	64.44	3.48	3.74	3.00	24603.60
	80	5	2009m8	7914.30	72.51	3.48	3.42	3.00	24451.40
	81	5	2009m9	7817.30	67.65	3.49	1.72	3.00	24492.70
	82	5	2009m10	7347.50	72.77	3.49	1.94	3.00	24726.20
	83	5	2009m11	6933.70	76.66	3.50	1.64	3.00	24991.50
	84	5	2009m12	7005.30	74.46	3.50	2.07	3.00	24895.80

	85	5	2010m1	7025.30	76.17	3.48	2.81	2.50	25133.30
	86	5	2010m2	7378.80	73.75	3.46	2.82	2.50	25645.10
	87	5	2010m3	7533.60	78.83	3.47	2.88	2.50	25637.90
	88	5	2010m4	7299.40	84.82	3.47	2.80	2.50	25345.10
	89	5	2010m5	6699.70	75.95	3.44	2.87	2.50	25268.30
	90	5	2010m6	6543.20	74.76	3.43	3.38	2.50	25268.80
	91	5	2010m7	6654.90	75.58	3.46	3.97	2.50	24901.00
	92	5	2010m8	6688.60	77.04	3.47	4.42	2.50	25095.80
	93	5	2010m9	6985.00	77.84	3.49	5.28	2.50	25159.40
	94	5	2010m10	7063.90	82.67	3.54	5.06	2.50	25209.00
	95	5	2010m11	6891.00	85.28	3.56	5.87	2.50	25437.60
	96	5	2010m12	6955.50	91.45	3.55	6.01	2.50	25634.20
	97	5	2011m1	6859.20	96.52	3.56	5.19	2.50	25373.90
	98	5	2011m2	6481.10	103.72	3.57	5.35	2.50	26981.00
	99	5	2011m3	6295.60	114.64	3.60	5.09	2.50	27009.40
	100	5	2011m4	6521.70	123.26	3.62	5.30	2.50	27079.00
	101	5	2011m5	6378.20	114.99	3.63	5.36	2.50	26912.90
	102	5	2011m6	6211.70	113.83	3.64	5.05	2.50	26451.60
	103	5	2011m7	6030.60	116.97	3.65	4.60	2.50	26776.70
	104	5	2011m8	5791.30	110.22	3.67	4.58	2.50	26627.30
	105	5	2011m9	5833.10	112.83	3.63	4.53	2.50	27259.60
	106	5	2011m10	5919.60	109.55	3.63	4.82	2.50	27379.10
	107	5	2011m11	5811.60	110.77	3.62	4.16	2.50	27516.20
	108	5	2011m12	5814.20	107.87	3.60	3.07	2.50	27746.60
	109	5	2012m1	5869.10	110.69	3.59	3.49	2.50	27605.30
	110	5	2012m2	6126.90	119.33	3.60	3.84	2.50	27823.20
	111	5	2012m3	6165.00	125.45	3.59	4.09	2.50	28587.60
	112	5	2012m4	6368.60	119.75	3.60	3.27	2.50	28475.00
	113	5	2012m5	6193.82	110.34	3.58	2.78	2.50	28946.60
	114	5	2012m6	5789.21	95.16	3.57	2.78	2.50	28725.90
	115	5	2012m7	5720.37	102.62	3.55	3.11	2.50	28529.70
	116	5	2012m8	5862.56	113.36	3.54	2.83	2.50	28828.10
	117	5	2012m9	5982.69	112.86	3.56	1.93	2.50	28861.20
	118	5	2012m10	5766.96	111.71	3.56	2.06	2.00	29012.20
	119	5	2012m11	5943.94	109.06	3.55	2.33	2.00	29102.00
	120	5	2012m12	5934.28	109.49	3.55	2.58	2.00	29888.10
	121	5	2013m1	6245.11	112.96	3.55	2.37	2.00	30169.60
	122	5	2013m2	6463.47	116.05	3.54	2.25	2.00	30749.80
	123	5	2013m3	6721.52	108.47	3.51	1.67	2.00	31066.40
	124	5	2013m4	7430.54	102.25	3.51	2.60	2.00	31403.70
	125	5	2013m5	8300.51	102.56	3.50	2.88	2.00	32067.50
	126	5	2013m6	7772.85	102.92	3.52	2.76	2.00	31949.90
	127	5	2013m7	8070.17	107.93	3.50	2.60	2.00	31554.10
	128	5	2013m8	7632.57	111.28	3.51	2.61	2.00	31190.70
	129	5	2013m9	7766.98	111.60	3.52	2.57	2.00	31633.00
	130	5	2013m10	7946.39	109.08	3.54	3.32	2.00	32098.60
	131	5	2013m11	7785.48	107.79	3.53	3.13	2.00	32330.30
	132	5	2013m12	7549.52	110.76	3.54	2.56	2.00	32866.90
	133	5	2014m1	7755.80	108.12	3.54	3.04	2.00	32647.80
	134	5	2014m2	7692.75	108.90	3.54	3.04	2.00	32812.50
	135	5	2014m3	7572.81	107.48	3.55	2.97	2.00	33787.40
	136	5	2014m4	7407.68	107.76	3.55	2.88	2.00	33457.70
	137	5	2014m5	7291.09	109.54	3.55	2.73	2.00	34011.90
	138	5	2014m6	6971.44	111.80	3.55	2.88	2.00	34305.30
	139	5	2014m7	7130.89	106.77	3.54	2.58	2.00	33651.40
	140	5	2014m8	7430.51	101.61	3.53	2.58	2.00	33196.20
	141	5	2014m9	7621.51	97.09	3.49	3.27	2.00	33002.00
	142	5	2014m10	7361.61	87.43	3.46	2.25	2.00	32895.80
	143	5	2014m11	6752.86	79.44	3.43	2.32	2.00	33770.50
	144	5	2014m12	6535.72	62.34	3.42	3.16	2.00	33972.60
	145	5	2015m1	6572.26	47.76	3.40	2.69	2.00	33502.00
	146	5	2015m2	6601.43	58.10	3.38	2.76	2.00	34066.40
	147	5	2015m3	6282.46	55.89	3.34	3.35	2.00	35002.50
	148	5	2015m4	6377.00	59.52	3.31	3.27	2.00	35385.10
	149	5	2015m5	6292.46	64.08	3.31	3.34	2.00	35697.20
	150	5	2015m6	6202.95	61.48	3.31	3.56	2.00	35717.90
	151	5	2015m7	6253.71	56.56	3.30	3.63	2.00	35226.30
	152	5	2015m8	5820.56	46.52	3.31	3.85	2.00	34339.00

	153	5	2015m9	5725.96	47.62	3.31	3.15	2.00	34766.60
	154	5	2015m10	5775.36	48.43	3.31	3.22	2.00	33926.40
	155	5	2015m11	5802.36	44.27	3.29	3.14	2.00	33514.40
	156	5	2015m12	5615.12	38.01	3.29	3.04	2.25	34540.60
	157	5	2016m1	5114.52	30.70	3.29	3.25	2.25	34329.90
	158	5	2016m2	5207.39	32.18	3.33	3.10	2.25	35078.40
	159	5	2016m3	5228.75	38.21	3.32	3.08	2.25	36431.70
	160	5	2016m4	5391.81	41.58	3.31	2.85	2.25	36086.60
	161	5	2016m5	5400.33	46.74	3.32	2.78	2.25	36394.60
	162	5	2016m6	5364.57	48.25	3.32	3.06	2.25	36328.70
	163	5	2016m7	5450.98	44.95	3.31	3.06	2.25	35560.70
	164	5	2016m8	5419.68	45.84	3.32	1.78	2.25	35290.10
	165	5	2016m9	5398.39	46.57	3.32	1.74	2.25	35659.20
	166	5	2016m10	5401.07	49.52	3.30	2.47	2.25	35633.00
	167	5	2016m11	5554.46	44.73	3.29	2.01	2.25	35681.80
	168	5	2016m12	5748.09	53.31	3.27	1.38	2.50	35778.70
	169	5	2017m1	6832.22	54.58	3.27	1.52	2.50	35501.10
	170	5	2017m2	6783.08	54.87	3.28	1.52	2.50	35734.30
	171	5	2017m3	7029.43	51.59	3.28	1.11	2.75	36704.20
	172	5	2017m4	6843.01	52.31	3.28	1.03	2.75	36401.60
	173	5	2017m5	6785.37	50.33	3.29	1.03	2.75	36574.30
	174	5	2017m6	6762.82	46.37	3.29	0.86	2.75	36501.50
	175	5	2017m7	6851.62	48.48	3.30	0.88	2.75	35972.00
	176	5	2017m8	6892.10	51.70	3.31	1.26	2.75	36313.10
	177	5	2017m9	6679.73	56.15	3.31	1.71	2.75	36563.20
	178	5	2017m10	6513.83	57.51	3.31	0.80	2.75	36319.50
	179	5	2017m11	6196.50	62.71	3.31	1.43	2.75	36723.20
	180	5	2017m12	6408.01	64.37	3.31	1.44	2.75	37147.90
	181	5	2018m1	6687.81	69.08	3.33	0.98	2.75	36691.30
	182	5	2018m2	6772.83	65.32	3.34	0.89	2.75	36950.70
	183	5	2018m3	6633.44	66.02	3.34	0.45	3.00	37079.90
	184	5	2018m4	4778.66	72.11	3.33	0.72	3.00	37839.80
	185	5	2018m5	4690.55	76.98	3.31	0.81	3.00	38016.00
	186	5	2018m6	4904.82	74.41	3.31	0.62	3.00	38403.60
	187	5	2018m7	5296.99	74.25	3.30	0.71	3.00	38019.80
	188	5	2018m8	5261.82	72.53	3.30	0.89	3.00	37908.50
	189	5	2018m9	5343.91	78.89	3.30	0.27	3.00	38307.50
	190	5	2018m10	5234.18	81.03	3.30	0.18	3.00	38359.80
	191	5	2018m11	5317.81	64.75	3.29	0.09	2.75	38335.90
	192	5	2018m12	5267.36	57.36	3.29	0.44	2.75	38606.40
	193	5	2019m1	5430.1	59.41	3.30	0.44	2.75	38597.00
	194	5	2019m2	5482.19	63.96	3.29	0.62	2.75	38680.90
	195	5	2019m3	5986.87	66.14	3.29	0.80	1.50	38947.30
	196	5	2019m4	6047.33	71.23	3.29	0.71	1.50	38815.40
	197	5	2019m5	6242.24	71.32	3.29	0.80	1.50	38242.30
	198	5	2019m6	6377.02	64.22	3.29	1.06	1.50	38999.60
	199	5	2019m7	6744.08	63.92	3.29	1.15	1.50	38421.10
	200	5	2019m8	6234.5	59.04	3.29	1.24	1.50	37787.90
	201	5	2019m9	6009.9	62.83	3.29	1.68	1.50	38310.60
	202	5	2019m10	6291.54	59.71	3.29	1.50	1.50	38470.50
	203	5	2019m11	6644.18	63.21	3.29	1.59	1.50	38219.20
	204	5	2019m12	6975.54	67.31	3.29	1.50	1.50	38129.20
	205	5	2020m1	7033.48	63.65	3.30	1.68	1.50	35056.90
	206	5	2020m2	6801.01	55.66	3.28	1.67	1.50	37426.60
	207	5	2020m3	5281.2	32.01	3.24	1.94	1.50	38022.60
	208	5	2020m4	5119.94	18.38	3.22	1.85	1.50	38766.90
	209	5	2020m5	5295.99	29.38	3.24	1.94	1.50	39510.40
	210	5	2020m6	5566.39	40.27	3.25	1.75	1.50	40176.10
	211	5	2020m7	5430.88	43.24	3.26	1.92	1.50	39826.90
	212	5	2020m8	5853.06	44.74	3.27	2.18	1.50	40335.00
	213	5	2020m9	5882.28	40.91	3.27	2.00	1.50	40508.60
	214	5	2020m10	6230.87	40.19	3.27	2.52	1.50	40487.60
	215	5	2020m11	6132.65	42.69	3.27	2.78	1.50	40068.00
	216	5	2020m12	6030.79	49.99	3.28	2.95	1.50	39566.60

A.4 Oil-Importing Countries' Stock Index, Oil Prices and Macroeconomic Variables

Country	S/N	DATE	ID	STINDEX	OILPRICE	EXRATE	INFLAT	INTRATE	M2
USA	1	2003m1	1	855.70	31.18	0.00	2.60	1.24	5790.40
	2	2003m2	1	841.15	32.77	0.00	2.98	1.26	5826.70
	3	2003m3	1	848.18	30.61	0.00	3.02	1.25	5847.30
	4	2003m4	1	916.92	25.00	0.00	2.22	1.26	5884.90
	5	2003m5	1	963.59	25.86	0.00	2.06	1.26	5945.10
	6	2003m6	1	974.50	27.65	0.00	2.11	1.22	5981.70
	7	2003m7	1	990.31	28.35	0.00	2.11	1.01	6028.40
	8	2003m8	1	1008.01	29.89	0.00	2.16	1.03	6086.50
	9	2003m9	1	995.97	27.11	0.00	2.32	1.01	6058.30
	10	2003m10	1	1050.71	29.61	0.00	2.04	1.01	6049.40
	11	2003m11	1	1058.20	28.75	0.00	1.77	1.00	6054.50
	12	2003m12	1	1111.92	29.81	0.00	1.88	0.98	6052.60
	13	2004m1	1	1131.13	31.28	0.00	1.93	1.00	6061.10
	14	2004m2	1	1144.94	30.86	0.00	1.69	1.01	6100.20
	15	2004m3	1	1126.21	33.63	0.00	1.74	1.00	6136.10
	16	2004m4	1	1107.30	33.59	0.00	2.29	1.00	6177.10
	17	2004m5	1	1120.68	37.57	0.00	3.05	1.00	6254.00
	18	2004m6	1	1140.84	35.18	0.00	3.27	1.03	6256.30
	19	2004m7	1	1101.72	38.22	0.00	2.99	1.26	6270.00
	20	2004m8	1	1104.24	42.74	0.00	2.65	1.43	6296.30
	21	2004m9	1	1114.58	43.20	0.00	2.54	1.61	6331.00
	22	2004m10	1	1130.20	49.78	0.00	3.19	1.76	6359.10
	23	2004m11	1	1173.82	43.11	0.00	3.52	1.93	6385.70
	24	2004m12	1	1211.92	39.60	0.00	3.26	2.16	6404.30
	25	2005m1	1	1181.27	44.51	0.00	2.97	2.28	6410.60
	26	2005m2	1	1203.60	45.48	0.00	3.01	2.50	6419.00
	27	2005m3	1	1180.59	53.10	0.00	3.15	2.63	6427.90
	28	2005m4	1	1156.85	51.88	0.00	3.51	2.79	6442.00
	29	2005m5	1	1191.50	48.65	0.00	2.80	3.00	6459.20
	30	2005m6	1	1191.33	54.35	0.00	2.53	3.04	6491.60
	31	2005m7	1	1234.18	57.52	0.00	3.17	3.26	6523.20
	32	2005m8	1	1220.33	63.98	0.00	3.64	3.50	6556.00
	33	2005m9	1	1228.81	62.91	0.00	4.69	3.62	6589.80
	34	2005m10	1	1207.01	58.54	0.00	4.35	3.78	6624.20
	35	2005m11	1	1249.48	55.24	0.00	3.46	4.00	6640.70
	36	2005m12	1	1248.29	56.86	0.00	3.42	4.16	6667.40
	37	2006m1	1	1280.08	62.99	0.00	3.99	4.29	6709.90
	38	2006m2	1	1280.66	60.21	0.00	3.60	4.49	6734.20
	39	2006m3	1	1294.87	62.06	0.00	3.36	4.59	6748.50
	40	2006m4	1	1310.61	70.26	0.00	3.55	4.79	6785.60
	41	2006m5	1	1270.09	69.78	0.00	4.17	4.94	6792.30
	42	2006m6	1	1270.20	68.56	0.00	4.32	4.99	6830.20
	43	2006m7	1	1276.66	73.67	0.00	4.15	5.24	6871.60
	44	2006m8	1	1303.82	73.23	0.00	3.82	5.25	6902.30
	45	2006m9	1	1335.85	61.96	0.00	2.06	5.25	6929.40
	46	2006m10	1	1377.94	57.81	0.00	1.31	5.25	6978.90
	47	2006m11	1	1400.63	58.76	0.00	1.97	5.25	7013.60
	48	2006m12	1	1418.30	62.47	0.00	2.54	5.24	7056.80
	49	2007m1	1	1438.24	53.68	0.00	2.08	5.25	7094.90
	50	2007m2	1	1406.82	57.56	0.00	2.42	5.26	7110.60
	51	2007m3	1	1420.86	62.05	0.00	2.78	5.26	7144.40
	52	2007m4	1	1482.37	67.49	0.00	2.57	5.25	7216.40
	53	2007m5	1	1530.62	67.21	0.00	2.69	5.25	7230.10
	54	2007m6	1	1503.35	71.05	0.00	2.69	5.25	7263.20
	55	2007m7	1	1455.27	76.93	0.00	2.36	5.26	7293.50
	56	2007m8	1	1473.99	70.76	0.00	1.97	5.02	7370.00
	57	2007m9	1	1526.75	77.17	0.00	2.76	4.94	7388.00
	58	2007m10	1	1549.38	82.34	0.00	3.54	4.76	7402.30
	59	2007m11	1	1481.14	92.41	0.00	4.31	4.49	7427.10
	60	2007m12	1	1468.36	90.93	0.00	4.08	4.24	7457.40
	61	2008m1	1	1378.55	92.18	0.00	4.28	3.94	7491.20
	62	2008m2	1	1330.63	94.99	0.00	4.03	2.98	7575.70
	63	2008m3	1	1322.70	103.64	0.00	3.98	2.61	7641.70
	64	2008m4	1	1385.59	109.07	0.00	3.94	2.28	7684.60
	65	2008m5	1	1400.38	122.80	0.00	4.18	1.98	7696.40

	66	2008m6	1	1280.00	132.32	0.00	5.02	2.00	7713.90
	67	2008m7	1	1267.38	132.72	0.00	5.60	2.01	7760.30
	68	2008m8	1	1282.83	113.24	0.00	5.37	2.00	7775.40
	69	2008m9	1	1166.36	97.23	0.00	4.94	1.81	7845.40
	70	2008m10	1	968.75	71.58	0.00	3.66	0.97	7954.10
	71	2008m11	1	896.24	52.45	0.00	1.07	0.39	8004.70
	72	2008m12	1	903.25	39.95	0.00	0.09	0.16	8181.30
	73	2009m1	1	825.88	43.44	0.00	0.03	0.15	8262.60
	74	2009m2	1	735.09	43.32	0.00	0.24	0.22	8291.70
	75	2009m3	1	797.87	46.54	0.00	-0.38	0.18	8357.70
	76	2009m4	1	872.81	50.18	0.00	-0.74	0.15	8360.60
	77	2009m5	1	919.14	57.30	0.00	-1.28	0.18	8417.90
	78	2009m6	1	919.32	68.61	0.00	-1.43	0.21	8427.50
	79	2009m7	1	987.48	64.44	0.00	-2.10	0.16	8432.30
	80	2009m8	1	1020.62	72.51	0.00	-1.48	0.16	8432.00
	81	2009m9	1	1057.08	67.65	0.00	-1.29	0.15	8431.00
	82	2009m10	1	1036.19	72.77	0.00	-0.18	0.12	8458.40
	83	2009m11	1	1095.63	76.66	0.00	1.84	0.12	8488.50
	84	2009m12	1	1115.10	74.46	0.00	2.72	0.12	8483.70
	85	2010m1	1	1073.87	76.17	0.00	2.63	0.11	8446.00
	86	2010m2	1	1104.49	73.75	0.00	2.14	0.13	8495.50
	87	2010m3	1	1169.43	78.83	0.00	2.31	0.16	8491.90
	88	2010m4	1	1186.69	84.82	0.00	2.24	0.20	8522.20
	89	2010m5	1	1089.41	75.95	0.00	2.02	0.20	8577.10
	90	2010m6	1	1030.71	74.76	0.00	1.05	0.18	8596.30
	91	2010m7	1	1101.60	75.58	0.00	1.24	0.18	8606.30
	92	2010m8	1	1049.33	77.04	0.00	1.15	0.19	8656.40
	93	2010m9	1	1141.20	77.84	0.00	1.14	0.19	8687.50
	94	2010m10	1	1183.26	82.67	0.00	1.17	0.19	8736.60
	95	2010m11	1	1180.55	85.28	0.00	1.14	0.19	8757.50
	96	2010m12	1	1257.64	91.45	0.00	1.50	0.18	8789.30
	97	2011m1	1	1286.12	96.52	0.00	1.63	0.17	8826.30
	98	2011m2	1	1327.22	103.72	0.00	2.11	0.16	8871.50
	99	2011m3	1	1325.83	114.64	0.00	2.68	0.14	8915.00
	100	2011m4	1	1363.61	123.26	0.00	3.16	0.10	8977.30
	101	2011m5	1	1345.20	114.99	0.00	3.57	0.09	9028.70
	102	2011m6	1	1320.64	113.83	0.00	3.56	0.09	9113.10
	103	2011m7	1	1292.28	116.97	0.00	3.63	0.07	9301.50
	104	2011m8	1	1218.89	110.22	0.00	3.77	0.10	9515.00
	105	2011m9	1	1131.42	112.83	0.00	3.87	0.08	9539.60
	106	2011m10	1	1253.30	109.55	0.00	3.53	0.07	9570.90
	107	2011m11	1	1246.96	110.77	0.00	3.39	0.08	9612.40
	108	2011m12	1	1257.60	107.87	0.00	2.96	0.07	9651.10
	109	2012m1	1	1312.41	110.69	0.00	2.93	0.08	9731.00
	110	2012m2	1	1365.68	119.33	0.00	2.87	0.10	9773.00
	111	2012m3	1	1408.47	125.45	0.00	2.65	0.13	9817.10
	112	2012m4	1	1397.91	119.75	0.00	2.30	0.14	9871.60
	113	2012m5	1	1310.33	110.34	0.00	1.70	0.16	9903.30
	114	2012m6	1	1362.16	95.16	0.00	1.66	0.16	9973.50
	115	2012m7	1	1379.32	102.62	0.00	1.41	0.16	10047.10
	116	2012m8	1	1406.58	113.36	0.00	1.69	0.13	10117.80
	117	2012m9	1	1440.67	112.86	0.00	1.99	0.14	10200.10
	118	2012m10	1	1412.16	111.71	0.00	2.16	0.16	10260.90
	119	2012m11	1	1416.18	109.06	0.00	1.76	0.16	10320.20
	120	2012m12	1	1426.19	109.49	0.00	1.74	0.16	10445.90
	121	2013m1	1	1498.11	112.96	0.00	1.59	0.14	10472.20
	122	2013m2	1	1514.68	116.05	0.00	1.98	0.15	10467.80
	123	2013m3	1	1569.19	108.47	0.00	1.47	0.14	10539.10
	124	2013m4	1	1597.57	102.25	0.00	1.06	0.15	10574.60
	125	2013m5	1	1630.74	102.56	0.00	1.36	0.11	10611.00
	126	2013m6	1	1606.28	102.92	0.00	1.75	0.09	10666.00
	127	2013m7	1	1685.73	107.93	0.00	1.96	0.09	10722.40
	128	2013m8	1	1632.97	111.28	0.00	1.52	0.08	10780.50
	129	2013m9	1	1681.55	111.60	0.00	1.18	0.08	10832.60
	130	2013m10	1	1756.54	109.08	0.00	0.96	0.09	10944.50
	131	2013m11	1	1805.81	107.79	0.00	1.24	0.08	10953.20
	132	2013m12	1	1848.36	110.76	0.00	1.50	0.09	11015.60
	133	2014m1	1	1782.59	108.12	0.00	1.58	0.07	11066.30

	134	2014m2	1	1859.45	108.90	0.00	1.13	0.07	11147.30
	135	2014m3	1	1872.34	107.48	0.00	1.51	0.08	11188.70
	136	2014m4	1	1883.95	107.76	0.00	1.95	0.09	11245.80
	137	2014m5	1	1923.57	109.54	0.00	2.13	0.09	11314.20
	138	2014m6	1	1960.23	111.80	0.00	2.07	0.10	11367.70
	139	2014m7	1	1930.67	106.77	0.00	1.99	0.09	11428.90
	140	2014m8	1	2003.37	101.61	0.00	1.70	0.09	11458.00
	141	2014m9	1	1972.29	97.09	0.00	1.66	0.09	11492.10
	142	2014m10	1	2018.05	87.43	0.00	1.66	0.09	11551.00
	143	2014m11	1	2067.56	79.44	0.00	1.32	0.09	11592.20
	144	2014m12	1	2058.90	62.34	0.00	0.76	0.12	11670.80
	145	2015m1	1	1994.99	47.76	0.00	-0.09	0.11	11732.20
	146	2015m2	1	2104.50	58.10	0.00	-0.03	0.11	11849.40
	147	2015m3	1	2067.89	55.89	0.00	-0.07	0.11	11866.80
	148	2015m4	1	2085.51	59.52	0.00	-0.20	0.12	11914.00
	149	2015m5	1	2107.39	64.08	0.00	-0.04	0.12	11947.70
	150	2015m6	1	2063.11	61.48	0.00	0.12	0.13	11996.50
	151	2015m7	1	2103.84	56.56	0.00	0.17	0.13	12047.70
	152	2015m8	1	1972.18	46.52	0.00	0.19	0.14	12099.80
	153	2015m9	1	1920.03	47.62	0.00	-0.04	0.14	12154.10
	154	2015m10	1	2079.36	48.43	0.00	0.17	0.12	12184.40
	155	2015m11	1	2080.41	44.27	0.00	0.50	0.12	12277.80
	156	2015m12	1	2043.94	38.01	0.00	0.73	0.24	12337.30
	157	2016m1	1	1940.24	30.70	0.00	1.37	0.34	12459.00
	158	2016m2	1	1932.23	32.18	0.00	1.02	0.38	12528.90
	159	2016m3	1	2059.74	38.21	0.00	0.85	0.36	12594.30
	160	2016m4	1	2065.30	41.58	0.00	1.13	0.37	12682.90
	161	2016m5	1	2096.95	46.74	0.00	1.02	0.37	12754.10
	162	2016m6	1	2098.86	48.25	0.00	1.00	0.38	12829.60
	163	2016m7	1	2173.60	44.95	0.00	0.83	0.39	12888.80
	164	2016m8	1	2170.95	45.84	0.00	1.06	0.40	12977.50
	165	2016m9	1	2168.27	46.57	0.00	1.46	0.40	13036.20
	166	2016m10	1	2126.15	49.52	0.00	1.64	0.40	13102.20
	167	2016m11	1	2198.81	44.73	0.00	1.69	0.41	13176.00
	168	2016m12	1	2238.83	53.31	0.00	2.07	0.54	13210.50
	169	2017m1	1	2278.87	54.58	0.00	2.50	0.65	13277.10
	170	2017m2	1	2363.64	54.87	0.00	2.74	0.66	13320.20
	171	2017m3	1	2362.72	51.59	0.00	2.38	0.79	13393.30
	172	2017m4	1	2384.20	52.31	0.00	2.20	0.90	13449.10
	173	2017m5	1	2411.80	50.33	0.00	1.87	0.91	13508.80
	174	2017m6	1	2423.41	46.37	0.00	1.63	1.04	13543.60
	175	2017m7	1	2470.30	48.48	0.00	1.73	1.15	13615.30
	176	2017m8	1	2471.65	51.70	0.00	1.94	1.16	13665.10
	177	2017m9	1	2519.36	56.15	0.00	2.23	1.15	13707.70
	178	2017m10	1	2575.26	57.51	0.00	2.04	1.15	13755.30
	179	2017m11	1	2647.58	62.71	0.00	2.20	1.16	13783.60
	180	2017m12	1	2673.61	64.37	0.00	2.11	1.30	13834.00
	181	2018m1	1	2713.83	69.08	0.00	2.10	1.41	13854.50
	182	2018m2	1	2640.87	65.32	0.00	2.20	1.42	14036.30
	183	2018m3	1	2648.05	66.02	0.00	2.40	1.51	14080.40
	184	2018m4	1	2705.27	72.11	0.00	2.50	1.69	14001.30
	185	2018m5	1	2718.37	76.98	0.00	2.80	1.70	14095.50
	186	2018m6	1	2816.29	74.41	0.00	2.90	1.82	14130.10
	187	2018m7	1	2901.52	74.25	0.00	2.90	1.91	14186.40
	188	2018m8	1	2913.98	72.53	0.00	2.70	1.91	14221.40
	189	2018m9	1	2711.74	78.89	0.00	2.30	1.95	14223.70
	190	2018m10	1	2760.17	81.03	0.00	2.50	2.19	14277.20
	191	2018m11	1	2506.85	64.75	0.00	2.20	2.20	14470.60
	192	2018m12	1	2704.10	57.36	0.00	1.90	2.27	14446.40
	193	2019m1	1	2784.49	59.41	0.00	1.60	2.40	14424.00
	194	2019m2	1	2834.40	63.96	0.00	1.50	2.40	14595.80
	195	2019m3	1	2945.83	66.14	0.00	1.90	2.41	14646.80
	196	2019m4	1	2752.06	71.23	0.00	2.00	2.42	14597.40
	197	2019m5	1	2941.76	71.32	0.00	1.80	2.39	14757.50
	198	2019m6	1	2980.38	64.22	0.00	1.60	2.38	14836.80
	199	2019m7	1	2926.46	63.92	0.00	1.80	2.40	14918.10
	200	2019m8	1	2976.74	59.04	0.00	1.70	2.13	15008.90
	201	2019m9	1	3037.56	62.83	0.00	1.70	2.04	15135.30

	202	2019m10	1	3140.98	59.71	0.00	1.80	1.83	15282.30
	203	2019m11	1	3230.78	63.21	0.00	2.10	1.55	15435.60
	204	2019m12	1	3225.52	67.31	0.00	2.30	1.55	15419.80
	205	2020m1	1	2954.22	63.65	0.00	2.50	1.55	15405.70
	206	2020m2	1	2584.59	55.66	0.00	2.30	1.58	16079.10
	207	2020m3	1	2912.43	32.01	0.00	1.50	0.65	17126.60
	208	2020m4	1	3044.31	18.38	0.00	0.30	0.05	17791.80
	209	2020m5	1	3100.29	29.38	0.00	0.10	0.05	18130.90
	210	2020m6	1	3271.12	40.27	0.00	0.60	0.08	18280.40
	211	2020m7	1	3500.31	43.24	0.00	1.00	0.09	18349.40
	212	2020m8	1	3363.00	44.74	0.00	1.30	0.10	18573.00
	213	2020m9	1	3269.96	40.91	0.00	1.40	0.09	18723.30
	214	2020m10	1	3621.63	40.19	0.00	1.20	0.09	19020.00
	215	2020m11	1	3756.07	42.69	0.00	1.20	0.09	19289.80
	216	2020m12	1	3714.24	49.99	0.00	1.40	0.09	19412.10
CHINA	1	2003m1	2	1511.93	31.18	0.12	0.37	5.31	19054.51
	2	2003m2	2	1510.58	32.77	0.12	0.17	5.31	19010.84
	3	2003m3	2	1521.44	30.61	0.12	0.88	5.31	19448.73
	4	2003m4	2	1576.26	25.00	0.12	0.98	5.31	19613.01
	5	2003m5	2	1486.02	25.86	0.12	0.57	5.31	19950.52
	6	2003m6	2	1476.74	27.65	0.12	0.27	5.31	20490.74
	7	2003m7	2	1421.98	28.35	0.12	0.47	5.31	20619.31
	8	2003m8	2	1367.16	29.89	0.12	0.87	5.31	21059.19
	9	2003m9	2	1348.30	27.11	0.12	1.07	5.31	21356.71
	10	2003m10	2	1397.22	29.61	0.12	1.78	5.31	21446.94
	11	2003m11	2	1497.04	28.75	0.12	2.90	5.31	21635.17
	12	2003m12	2	1590.73	29.81	0.12	3.21	5.31	22122.28
	13	2004m1	2	1675.07	31.28	0.12	3.21	5.31	22510.19
	14	2004m2	2	1741.62	30.86	0.12	2.08	5.31	22705.07
	15	2004m3	2	1595.59	33.63	0.12	3.01	5.31	23165.46
	16	2004m4	2	1555.91	33.59	0.12	3.73	5.31	23362.79
	17	2004m5	2	1399.16	37.57	0.12	4.36	5.31	23484.24
	18	2004m6	2	1386.20	35.18	0.12	4.88	5.31	23842.75
	19	2004m7	2	1342.06	38.22	0.12	5.20	5.31	23812.70
	20	2004m8	2	1396.70	42.74	0.12	5.20	5.31	23972.92
	21	2004m9	2	1320.54	43.20	0.12	5.10	5.31	24375.69
	22	2004m10	2	1340.77	49.78	0.12	4.16	5.58	24374.03
	23	2004m11	2	1266.50	43.11	0.12	2.82	5.58	24713.56
	24	2004m12	2	1191.82	39.60	0.12	2.31	5.58	25320.77
	25	2005m1	2	1306.00	44.51	0.12	1.80	5.58	25770.85
	26	2005m2	2	1181.24	45.48	0.12	3.84	5.58	25935.73
	27	2005m3	2	1159.15	53.10	0.12	2.60	5.58	26458.89
	28	2005m4	2	1060.74	51.88	0.12	1.78	5.58	26699.27
	29	2005m5	2	1080.94	48.65	0.12	1.68	5.58	26924.05
	30	2005m6	2	1083.03	54.35	0.12	1.58	5.58	27578.55
	31	2005m7	2	1162.80	57.52	0.12	1.78	5.58	27696.63
	32	2005m8	2	1155.61	63.98	0.12	1.28	5.58	28128.82
	33	2005m9	2	1092.82	62.91	0.12	0.87	5.58	28743.83
	34	2005m10	2	1099.26	58.54	0.12	1.28	5.58	28759.16
	35	2005m11	2	1161.06	55.24	0.12	1.28	5.58	29235.04
	36	2005m12	2	1258.05	56.86	0.12	1.58	5.58	29875.57
	37	2006m1	2	1299.03	62.99	0.12	2.29	5.58	30357.17
	38	2006m2	2	1298.30	60.21	0.12	0.98	5.58	30451.63
	39	2006m3	2	1440.22	62.06	0.12	0.98	5.58	31049.07
	40	2006m4	2	1641.30	70.26	0.12	1.49	5.58	31370.23
	41	2006m5	2	1672.21	69.78	0.12	1.59	5.85	31670.98
	42	2006m6	2	1612.73	68.56	0.12	1.90	5.85	32275.64
	43	2006m7	2	1658.64	73.67	0.13	1.59	5.85	32401.08
	44	2006m8	2	1752.42	73.23	0.13	1.69	6.12	32788.57
	45	2006m9	2	1837.99	61.96	0.13	1.49	6.12	33186.54
	46	2006m10	2	2099.29	57.81	0.13	1.19	6.12	33274.72
	47	2006m11	2	2675.47	58.76	0.13	1.80	6.12	33750.42
	48	2006m12	2	2786.33	62.47	0.13	2.81	6.12	34560.36
	49	2007m1	2	2881.07	53.68	0.13	2.20	6.12	35149.88
	50	2007m2	2	3183.98	57.56	0.13	2.71	6.12	35865.93
	51	2007m3	2	3841.27	62.05	0.13	3.33	6.39	36409.37
	52	2007m4	2	4109.65	67.49	0.13	3.02	6.39	36732.65
	53	2007m5	2	3820.70	67.21	0.13	3.44	6.57	36971.82

	54	2007m6	2	4471.03	71.05	0.13	4.37	6.57	37783.22
	55	2007m7	2	5218.83	76.93	0.13	5.63	6.84	38388.49
	56	2007m8	2	5552.30	70.76	0.13	6.58	7.02	38720.52
	57	2007m9	2	5954.77	77.17	0.13	6.36	7.29	39309.89
	58	2007m10	2	4871.78	82.34	0.13	6.58	7.29	39420.42
	59	2007m11	2	5261.56	92.41	0.13	7.00	7.29	39975.79
	60	2007m12	2	4383.39	90.93	0.14	6.58	7.47	40344.22
	61	2008m1	2	4348.54	92.18	0.14	7.11	7.47	41781.87
	62	2008m2	2	3472.71	94.99	0.14	8.80	7.47	42103.78
	63	2008m3	2	3693.11	103.64	0.14	8.37	7.47	42305.45
	64	2008m4	2	3433.35	109.07	0.14	8.57	7.47	42931.37
	65	2008m5	2	2736.10	122.80	0.14	7.83	7.47	43622.16
	66	2008m6	2	2775.72	132.32	0.15	7.18	7.47	44314.10
	67	2008m7	2	2397.37	132.72	0.15	6.33	7.47	44636.22
	68	2008m8	2	2293.78	113.24	0.15	4.97	7.47	44884.67
	69	2008m9	2	1728.79	97.23	0.15	4.65	7.20	45289.87
	70	2008m10	2	1871.16	71.58	0.15	4.03	6.93	45313.33
	71	2008m11	2	1820.81	52.45	0.15	2.48	6.66	45864.47
	72	2008m12	2	1990.66	39.95	0.15	1.26	5.58	47516.66
	73	2009m1	2	2082.85	43.44	0.15	0.96	5.31	49613.53
	74	2009m2	2	2373.21	43.32	0.15	-1.60	5.31	50670.81
	75	2009m3	2	2477.57	46.54	0.15	-1.20	5.31	53062.67
	76	2009m4	2	2632.93	50.18	0.15	-1.50	5.31	54048.12
	77	2009m5	2	2959.36	57.30	0.15	-1.40	5.31	54826.35
	78	2009m6	2	3412.06	68.61	0.15	-1.70	5.31	56891.62
	79	2009m7	2	2667.75	64.44	0.15	-1.79	5.31	57310.29
	80	2009m8	2	2779.43	72.51	0.15	-1.20	5.31	57669.90
	81	2009m9	2	2995.85	67.65	0.15	-0.80	5.31	58540.53
	82	2009m10	2	3195.30	72.77	0.15	-0.61	5.31	58664.33
	83	2009m11	2	3277.14	76.66	0.15	0.50	5.31	59460.47
	84	2009m12	2	2989.29	74.46	0.15	1.70	5.31	60622.50
	85	2010m1	2	3051.94	76.17	0.15	1.40	5.31	62560.93
	86	2010m2	2	3109.10	73.75	0.15	2.62	5.31	63607.23
	87	2010m3	2	2870.61	78.83	0.15	2.20	5.31	64994.75
	88	2010m4	2	2592.15	84.82	0.15	2.62	5.31	65656.12
	89	2010m5	2	2398.37	75.95	0.15	2.82	5.31	66335.14
	90	2010m6	2	2637.50	74.76	0.15	2.72	5.31	67392.17
	91	2010m7	2	2638.80	75.58	0.15	3.13	5.31	67405.15
	92	2010m8	2	2655.66	77.04	0.15	3.23	5.31	68750.69
	93	2010m9	2	2978.83	77.84	0.15	3.43	5.31	69647.15
	94	2010m10	2	2820.18	82.67	0.15	4.26	5.56	72350.00
	95	2010m11	2	2808.08	85.28	0.15	5.09	5.56	71033.90
	96	2010m12	2	2790.69	91.45	0.15	4.57	5.81	72585.18
	97	2011m1	2	2905.05	96.52	0.15	5.00	5.81	73388.48
	98	2011m2	2	2928.11	103.72	0.15	4.98	6.06	73613.09
	99	2011m3	2	2911.51	114.64	0.15	5.52	6.06	75813.09
	100	2011m4	2	2743.47	123.26	0.15	5.41	6.31	75738.46
	101	2011m5	2	2762.08	114.99	0.15	5.62	6.31	76340.92
	102	2011m6	2	2701.73	113.83	0.15	6.58	6.31	78082.09
	103	2011m7	2	2567.34	116.97	0.16	6.68	6.56	77292.37
	104	2011m8	2	2359.22	110.22	0.16	6.37	6.56	78085.23
	105	2011m9	2	2468.25	112.83	0.16	6.27	6.56	78740.62
	106	2011m10	2	2333.41	109.55	0.16	5.63	6.56	81682.92
	107	2011m11	2	2199.42	110.77	0.16	4.27	6.56	82549.39
	108	2011m12	2	2292.61	107.87	0.16	4.06	6.56	85159.09
	109	2012m1	2	2428.49	110.69	0.16	4.60	6.56	85589.89
	110	2012m2	2	2262.79	119.33	0.16	3.27	6.56	86717.14
	111	2012m3	2	2396.32	125.45	0.16	3.67	6.56	89556.55
	112	2012m4	2	2372.23	119.75	0.16	3.47	6.56	88960.40
	113	2012m5	2	2225.43	110.34	0.16	3.08	6.56	90004.88
	114	2012m6	2	2103.64	95.16	0.16	2.20	6.31	92499.12
	115	2012m7	2	2047.52	102.62	0.16	1.78	6.00	91907.24
	116	2012m8	2	2086.17	113.36	0.16	2.14	6.00	92489.46
	117	2012m9	2	2068.88	112.86	0.16	1.94	6.00	94368.88
	118	2012m10	2	1980.12	111.71	0.16	1.73	6.00	93640.43
	119	2012m11	2	2269.13	109.06	0.16	2.10	6.00	94483.24
	120	2012m12	2	2385.42	109.49	0.16	2.55	6.00	97414.88
	121	2013m1	2	2365.59	112.96	0.16	2.02	6.00	99212.93

	122	2013m2	2	2236.62	116.05	0.16	3.24	6.00	99860.08
	123	2013m3	2	2177.91	108.47	0.16	2.12	6.00	103585.84
	124	2013m4	2	2300.59	102.25	0.16	2.42	6.00	103255.19
	125	2013m5	2	1979.21	102.56	0.16	2.09	6.00	104216.92
	126	2013m6	2	1993.80	102.92	0.16	2.66	6.00	105440.37
	127	2013m7	2	2098.38	107.93	0.16	2.67	6.00	105221.23
	128	2013m8	2	2174.67	111.28	0.16	2.52	6.00	106125.64
	129	2013m9	2	2141.61	111.60	0.16	3.02	6.00	107737.92
	130	2013m10	2	2220.50	109.08	0.16	3.23	6.00	107024.22
	131	2013m11	2	2115.98	107.79	0.16	2.95	6.00	107925.71
	132	2013m12	2	2033.08	110.76	0.17	2.51	6.00	110652.50
	133	2014m1	2	2056.30	108.12	0.17	2.51	6.00	112352.12
	134	2014m2	2	2033.31	108.90	0.16	1.91	6.00	113176.08
	135	2014m3	2	2026.36	107.48	0.16	2.31	6.00	116068.74
	136	2014m4	2	2039.21	107.76	0.16	1.70	6.00	116881.27
	137	2014m5	2	2048.33	109.54	0.16	2.41	6.00	118229.40
	138	2014m6	2	2201.56	111.80	0.16	2.31	6.00	120958.72
	139	2014m7	2	2217.20	106.77	0.16	2.21	6.00	119424.92
	140	2014m8	2	2363.87	101.61	0.16	1.90	6.00	119749.91
	141	2014m9	2	2420.18	97.09	0.16	1.61	6.00	120205.14
	142	2014m10	2	2682.92	87.43	0.16	1.51	6.00	119923.63
	143	2014m11	2	3234.68	79.44	0.16	1.30	5.60	120860.60
	144	2014m12	2	3210.36	62.34	0.16	1.41	5.60	122840.00
	145	2015m1	2	3310.30	47.76	0.16	0.71	5.60	124270.00
	146	2015m2	2	3747.90	58.10	0.16	1.41	5.60	125740.00
	147	2015m3	2	4441.65	55.89	0.16	1.32	5.35	127530.00
	148	2015m4	2	4611.74	59.52	0.16	1.53	5.35	128080.00
	149	2015m5	2	4277.22	64.08	0.16	1.22	5.10	130740.00
	150	2015m6	2	3663.73	61.48	0.16	1.32	4.85	133337.54
	151	2015m7	2	3205.99	56.56	0.16	1.73	4.85	135321.09
	152	2015m8	2	3052.78	46.52	0.16	2.03	4.60	135690.80
	153	2015m9	2	3382.56	47.62	0.16	1.62	4.60	135980.00
	154	2015m10	2	3445.41	48.43	0.16	1.21	4.35	136100.00
	155	2015m11	2	3539.18	44.27	0.16	1.52	4.35	137400.00
	156	2015m12	2	2737.60	38.01	0.15	1.62	4.35	139230.00
	157	2016m1	2	2687.98	30.70	0.15	1.81	4.35	141630.00
	158	2016m2	2	3003.92	32.18	0.15	2.19	4.35	142460.00
	159	2016m3	2	2938.32	38.21	0.16	2.30	4.35	144620.00
	160	2016m4	2	2916.62	41.58	0.15	2.31	4.35	144520.00
	161	2016m5	2	2929.61	46.74	0.15	2.11	4.35	146170.00
	162	2016m6	2	2979.34	48.25	0.15	1.91	4.35	149050.00
	163	2016m7	2	3085.49	44.95	0.15	1.70	4.35	149160.00
	164	2016m8	2	3004.70	45.84	0.15	1.29	4.35	151098.29
	165	2016m9	2	3100.49	46.57	0.15	1.89	4.35	151636.05
	166	2016m10	2	3250.03	49.52	0.15	2.20	4.35	151948.54
	167	2016m11	2	3103.64	44.73	0.14	2.30	4.35	153043.21
	168	2016m12	2	3159.17	53.31	0.14	1.99	4.35	155006.67
	169	2017m1	2	3241.73	54.58	0.15	2.57	4.35	157594.56
	170	2017m2	2	3222.51	54.87	0.15	0.78	4.35	158291.31
	171	2017m3	2	3154.66	51.59	0.15	0.98	4.35	159960.96
	172	2017m4	2	3117.18	52.31	0.15	1.18	4.35	159633.19
	173	2017m5	2	3192.43	50.33	0.15	1.67	4.35	160136.04
	174	2017m6	2	3273.03	46.37	0.15	1.68	4.35	163128.25
	175	2017m7	2	3360.81	48.48	0.15	1.38	4.35	162899.66
	176	2017m8	2	3348.94	51.70	0.15	1.77	4.35	164515.66
	177	2017m9	2	3393.34	56.15	0.15	1.66	4.35	165566.21
	178	2017m10	2	3317.19	57.51	0.15	1.86	4.35	165343.42
	179	2017m11	2	3307.17	62.71	0.15	1.76	4.35	167001.34
	180	2017m12	2	3480.83	64.37	0.15	1.85	4.35	167676.85
	181	2018m1	2	3259.41	69.08	0.16	1.47	4.35	172081.45
	182	2018m2	2	3168.90	65.32	0.16	2.90	4.35	172907.01
	183	2018m3	2	3082.23	66.02	0.16	2.06	4.35	173985.95
	184	2018m4	2	3095.47	72.11	0.16	1.80	4.35	173768.37
	185	2018m5	2	2847.42	76.98	0.16	1.75	4.35	174306.38
	186	2018m6	2	2876.40	74.41	0.15	1.85	4.35	177017.84
	187	2018m7	2	2725.25	74.25	0.15	2.06	4.35	177619.61
	188	2018m8	2	2821.35	72.53	0.15	2.30	4.35	178867.04
	189	2018m9	2	2602.78	78.89	0.14	2.47	4.35	180166.56

	190	2018m10	2	2588.19	81.03	0.14	2.54	4.35	179556.16
	191	2018m11	2	2493.90	64.75	0.14	2.18	4.35	181317.51
	192	2018m12	2	2584.57	57.36	0.15	1.86	4.35	182674.42
	193	2019m1	2	2940.95	59.41	0.15	1.74	4.35	186593.53
	194	2019m2	2	3090.76	63.96	0.15	1.49	4.35	186742.74
	195	2019m3	2	3078.34	66.14	0.15	2.28	4.35	188941.21
	196	2019m4	2	2898.70	71.23	0.15	2.54	4.35	188467.03
	197	2019m5	2	2978.88	71.32	0.14	2.74	4.35	189115.37
	198	2019m6	2	2932.51	64.22	0.15	2.68	4.35	192136.02
	199	2019m7	2	2886.24	63.92	0.15	2.78	4.35	191941.08
	200	2019m8	2	2905.19	59.04	0.14	2.84	4.25	193549.24
	201	2019m9	2	2929.06	62.83	0.14	3.02	4.25	195230.00
	202	2019m10	2	2871.98	59.71	0.14	3.76	4.20	194560.00
	203	2019m11	2	3050.12	63.21	0.14	4.49	4.15	196140.00
	204	2019m12	2	2976.53	67.31	0.14	4.46	4.15	198650.00
	205	2020m1	2	2880.30	63.65	0.14	5.38	4.15	202310.00
	206	2020m2	2	2750.30	55.66	0.14	5.17	4.05	203080.00
	207	2020m3	2	2860.08	32.01	0.14	4.27	4.05	208090.00
	208	2020m4	2	2852.35	18.38	0.14	3.30	3.85	209350.00
	209	2020m5	2	2984.67	29.38	0.14	2.40	3.85	210020.00
	210	2020m6	2	3310.00	40.27	0.14	2.50	3.85	213490.00
	211	2020m7	2	3395.68	43.24	0.14	2.70	3.85	212550.00
	212	2020m8	2	3218.05	44.74	0.15	2.40	3.85	213680.00
	213	2020m9	2	3224.53	40.91	0.15	1.70	3.85	216410.00
	214	2020m10	2	3391.76	40.19	0.15	0.50	3.85	214970.00
	215	2020m11	2	3473.07	42.69	0.15	-0.50	3.85	217200.00
	216	2020m12	2	3483.07	49.99	0.15	0.20	3.85	218680.00
JAPAN	1	2003m1	3	8339.94	31.18	0.01	-0.40	0.00	675662.30
	2	2003m2	3	8363.04	32.77	0.01	-0.20	0.00	671495.20
	3	2003m3	3	7972.71	30.61	0.01	-0.10	0.00	674083.70
	4	2003m4	3	7831.42	25.00	0.01	-0.10	0.00	676706.70
	5	2003m5	3	8424.51	25.86	0.01	-0.20	0.00	677086.90
	6	2003m6	3	9083.11	27.65	0.01	-0.40	0.00	677755.00
	7	2003m7	3	9563.21	28.35	0.01	-0.20	0.00	681305.50
	8	2003m8	3	10343.55	29.89	0.01	-0.30	0.00	680734.40
	9	2003m9	3	10219.05	27.11	0.01	-0.20	0.00	676845.90
	10	2003m10	3	10559.59	29.61	0.01	0.00	0.00	675573.10
	11	2003m11	3	10100.57	28.75	0.01	-0.50	0.00	675728.40
	12	2003m12	3	10676.64	29.81	0.01	-0.40	0.00	682584.00
	13	2004m1	3	10783.61	31.28	0.01	-0.30	0.00	683311.90
	14	2004m2	3	11041.92	30.86	0.01	0.00	0.00	679776.70
	15	2004m3	3	11715.39	33.63	0.01	-0.10	0.00	682591.60
	16	2004m4	3	11761.79	33.59	0.01	-0.40	0.00	689188.30
	17	2004m5	3	11236.37	37.57	0.01	-0.49	0.00	690384.30
	18	2004m6	3	11858.87	35.18	0.01	0.00	0.00	689482.40
	19	2004m7	3	11325.78	38.22	0.01	-0.10	0.00	693787.50
	20	2004m8	3	11081.79	42.74	0.01	-0.20	0.00	693368.90
	21	2004m9	3	10823.57	43.20	0.01	0.00	0.00	690728.20
	22	2004m10	3	10771.42	49.78	0.01	0.50	0.00	689050.60
	23	2004m11	3	10899.25	43.11	0.01	0.80	0.00	689478.60
	24	2004m12	3	11488.76	39.60	0.01	0.20	0.00	696062.20
	25	2005m1	3	11387.59	44.51	0.01	0.20	0.00	696571.20
	26	2005m2	3	11740.60	45.48	0.01	-0.10	0.00	692050.20
	27	2005m3	3	11668.95	53.10	0.01	0.00	0.00	696511.90
	28	2005m4	3	11008.90	51.88	0.01	0.10	0.00	701535.60
	29	2005m5	3	11276.59	48.65	0.01	0.10	0.00	700316.90
	30	2005m6	3	11584.01	54.35	0.01	-0.50	0.00	700681.90
	31	2005m7	3	11899.60	57.52	0.01	-0.30	0.00	705060.40
	32	2005m8	3	12413.60	63.98	0.01	-0.30	0.00	704374.70
	33	2005m9	3	13574.30	62.91	0.01	-0.30	0.00	704618.40
	34	2005m10	3	13606.50	58.54	0.01	-0.79	0.00	702174.60
	35	2005m11	3	14872.15	55.24	0.01	-0.99	0.00	703601.40
	36	2005m12	3	16111.43	56.86	0.01	-0.40	0.00	708989.90
	37	2006m1	3	16649.82	62.99	0.01	-0.10	0.00	708779.50
	38	2006m2	3	16205.43	60.21	0.01	-0.10	0.00	703796.10
	39	2006m3	3	17059.66	62.06	0.01	-0.20	0.00	706119.50
	40	2006m4	3	16906.23	70.26	0.01	-0.10	0.00	712911.00
	41	2006m5	3	15467.33	69.78	0.01	0.10	0.00	709318.10

	42	2006m6	3	15505.18	68.56	0.01	0.50	0.00	708588.80
	43	2006m7	3	15456.81	73.67	0.01	0.30	0.25	708518.60
	44	2006m8	3	16140.76	73.23	0.01	0.90	0.25	707307.00
	45	2006m9	3	16127.58	61.96	0.01	0.60	0.25	708193.30
	46	2006m10	3	16399.39	57.81	0.01	0.40	0.25	705977.50
	47	2006m11	3	16274.33	58.76	0.01	0.30	0.25	707825.10
	48	2006m12	3	17225.83	62.47	0.01	0.30	0.25	713793.40
	49	2007m1	3	17383.42	53.68	0.01	0.00	0.25	715142.30
	50	2007m2	3	17604.12	57.56	0.01	-0.20	0.50	710892.30
	51	2007m3	3	17287.65	62.05	0.01	-0.10	0.50	713841.50
	52	2007m4	3	17400.41	67.49	0.01	0.00	0.50	721096.70
	53	2007m5	3	17875.75	67.21	0.01	0.00	0.50	719519.20
	54	2007m6	3	18138.36	71.05	0.01	-0.20	0.50	721636.70
	55	2007m7	3	17248.89	76.93	0.01	0.00	0.50	722881.10
	56	2007m8	3	16569.09	70.76	0.01	-0.20	0.50	719815.60
	57	2007m9	3	16785.69	77.17	0.01	-0.20	0.50	720192.10
	58	2007m10	3	16737.63	82.34	0.01	0.30	0.50	719343.60
	59	2007m11	3	15680.67	92.41	0.01	0.60	0.50	722066.20
	60	2007m12	3	15307.78	90.93	0.01	0.70	0.50	728558.80
	61	2008m1	3	13592.47	92.18	0.01	0.70	0.50	730445.70
	62	2008m2	3	13603.02	94.99	0.01	1.00	0.50	727661.70
	63	2008m3	3	12525.54	103.64	0.01	1.20	0.50	729947.40
	64	2008m4	3	13849.99	109.07	0.01	0.80	0.50	734591.90
	65	2008m5	3	14338.54	122.80	0.01	1.29	0.50	734298.20
	66	2008m6	3	13481.38	132.32	0.01	1.99	0.50	737829.80
	67	2008m7	3	13376.81	132.72	0.01	2.29	0.50	738143.50
	68	2008m8	3	13072.87	113.24	0.01	2.08	0.50	737173.20
	69	2008m9	3	11259.86	97.23	0.01	2.08	0.50	735856.90
	70	2008m10	3	8576.98	71.58	0.01	1.68	0.50	732532.20
	71	2008m11	3	8512.27	52.45	0.01	0.99	0.30	734996.00
	72	2008m12	3	8859.56	39.95	0.01	0.39	0.30	741732.50
	73	2009m1	3	7994.05	43.44	0.01	0.00	0.10	744735.90
	74	2009m2	3	7568.42	43.32	0.01	-0.10	0.10	743234.50
	75	2009m3	3	8109.53	46.54	0.01	-0.30	0.10	746284.50
	76	2009m4	3	8828.26	50.18	0.01	-0.10	0.10	754219.50
	77	2009m5	3	9522.50	57.30	0.01	-1.08	0.10	753954.40
	78	2009m6	3	9958.44	68.61	0.01	-1.75	0.10	756465.10
	79	2009m7	3	10356.83	64.44	0.01	-2.24	0.10	758172.10
	80	2009m8	3	10492.53	72.51	0.01	-2.23	0.10	757911.40
	81	2009m9	3	10133.23	67.65	0.01	-2.23	0.10	757758.20
	82	2009m10	3	10034.74	72.77	0.01	-2.52	0.10	757448.80
	83	2009m11	3	9345.55	76.66	0.01	-1.86	0.10	759286.80
	84	2009m12	3	10546.44	74.46	0.01	-1.67	0.10	764435.20
	85	2010m1	3	10198.04	76.17	0.01	-0.99	0.10	766855.60
	86	2010m2	3	10126.03	73.75	0.01	-0.79	0.10	763565.60
	87	2010m3	3	11089.94	78.83	0.01	-0.79	0.10	766219.30
	88	2010m4	3	11057.40	84.82	0.01	-0.79	0.10	775967.50
	89	2010m5	3	9768.70	75.95	0.01	-0.69	0.10	777364.10
	90	2010m6	3	9382.64	74.76	0.01	-0.69	0.10	778428.00
	91	2010m7	3	9537.30	75.58	0.01	-1.00	0.10	778807.90
	92	2010m8	3	8824.06	77.04	0.01	-1.09	0.10	778965.70
	93	2010m9	3	9369.35	77.84	0.01	-0.89	0.10	778863.80
	94	2010m10	3	9202.45	82.67	0.01	-0.20	0.00	778469.90
	95	2010m11	3	9937.04	85.28	0.01	-0.30	0.00	778897.80
	96	2010m12	3	10228.92	91.45	0.01	-0.40	0.00	782287.50
	97	2011m1	3	10237.92	96.52	0.01	-0.60	0.00	784399.10
	98	2011m2	3	10624.09	103.72	0.01	-0.50	0.00	781829.00
	99	2011m3	3	9755.10	114.64	0.01	-0.50	0.00	786081.10
	100	2011m4	3	9849.74	123.26	0.01	-0.50	0.00	797076.30
	101	2011m5	3	9693.73	114.99	0.01	-0.40	0.00	798320.10
	102	2011m6	3	9816.09	113.83	0.01	-0.40	0.00	800543.20
	103	2011m7	3	9833.03	116.97	0.01	0.20	0.00	801804.60
	104	2011m8	3	8955.20	110.22	0.01	0.20	0.00	799773.70
	105	2011m9	3	8700.29	112.83	0.01	0.00	0.00	800028.70
	106	2011m10	3	8988.39	109.55	0.01	-0.20	0.00	800282.80
	107	2011m11	3	8434.61	110.77	0.01	-0.50	0.00	802482.30
	108	2011m12	3	8455.35	107.87	0.01	-0.20	0.00	806995.30
	109	2012m1	3	8802.51	110.69	0.01	0.10	0.00	808364.30

	110	2012m2	3	9723.24	119.33	0.01	0.30	0.00	804882.10
	111	2012m3	3	10083.56	125.45	0.01	0.50	0.00	809383.90
	112	2012m4	3	9520.89	119.75	0.01	0.50	0.00	817937.10
	113	2012m5	3	8542.73	110.34	0.01	0.20	0.00	815791.80
	114	2012m6	3	9006.78	95.16	0.01	-0.10	0.00	818672.60
	115	2012m7	3	8695.06	102.62	0.01	-0.40	0.00	820106.00
	116	2012m8	3	8839.91	113.36	0.01	-0.50	0.00	819236.60
	117	2012m9	3	8870.16	112.86	0.01	-0.30	0.00	819359.90
	118	2012m10	3	8928.29	111.71	0.01	-0.40	0.00	818449.60
	119	2012m11	3	9446.01	109.06	0.01	-0.20	0.00	819499.30
	120	2012m12	3	10395.18	109.49	0.01	-0.10	0.00	827847.90
	121	2013m1	3	11138.66	112.96	0.01	-0.25	0.00	830134.20
	122	2013m2	3	11559.36	116.05	0.01	-0.66	0.00	828433.40
	123	2013m3	3	12397.91	108.47	0.01	-0.94	0.00	834119.40
	124	2013m4	3	13860.86	102.25	0.01	-0.73	0.00	843998.50
	125	2013m5	3	13774.54	102.56	0.01	-0.33	0.00	844218.90
	126	2013m6	3	13677.32	102.92	0.01	0.17	0.00	849857.90
	127	2013m7	3	13668.32	107.93	0.01	0.68	0.00	850705.90
	128	2013m8	3	13388.86	111.28	0.01	0.89	0.00	850056.80
	129	2013m9	3	14455.80	111.60	0.01	1.00	0.00	850996.80
	130	2013m10	3	14327.94	109.08	0.01	1.10	0.00	852277.00
	131	2013m11	3	15661.87	107.79	0.01	1.62	0.00	855204.30
	132	2013m12	3	16291.31	110.76	0.01	1.62	0.00	863031.40
	133	2014m1	3	14914.53	108.12	0.01	1.36	0.00	866164.90
	134	2014m2	3	14841.07	108.90	0.01	1.57	0.00	861445.40
	135	2014m3	3	14827.83	107.48	0.01	1.67	0.00	863861.80
	136	2014m4	3	14304.11	107.76	0.01	3.43	0.00	873163.20
	137	2014m5	3	14632.38	109.54	0.01	3.74	0.00	871878.00
	138	2014m6	3	15162.10	111.80	0.01	3.63	0.00	875663.70
	139	2014m7	3	15620.77	106.77	0.01	3.52	0.00	876061.90
	140	2014m8	3	15424.59	101.61	0.01	3.31	0.00	875471.30
	141	2014m9	3	16173.52	97.09	0.01	3.30	0.00	877120.10
	142	2014m10	3	16413.76	87.43	0.01	2.88	0.00	879261.20
	143	2014m11	3	17459.85	79.44	0.01	2.36	0.00	885745.30
	144	2014m12	3	17450.77	62.34	0.01	2.36	0.00	893857.50
	145	2015m1	3	17674.39	47.76	0.01	2.47	0.00	895441.10
	146	2015m2	3	18797.94	58.10	0.01	2.26	0.00	891301.10
	147	2015m3	3	19206.99	55.89	0.01	2.26	0.00	894788.20
	148	2015m4	3	19520.01	59.52	0.01	0.70	0.00	904577.70
	149	2015m5	3	20563.15	64.08	0.01	0.50	0.00	906687.30
	150	2015m6	3	20235.73	61.48	0.01	0.40	0.00	908745.30
	151	2015m7	3	20585.24	56.56	0.01	0.20	0.00	911430.70
	152	2015m8	3	18890.48	46.52	0.01	0.20	0.00	912260.80
	153	2015m9	3	17388.15	47.62	0.01	0.00	0.00	910502.20
	154	2015m10	3	19083.10	48.43	0.01	0.20	0.00	910996.10
	155	2015m11	3	19747.47	44.27	0.01	0.30	0.00	915277.60
	156	2015m12	3	19033.71	38.01	0.01	0.10	0.00	921095.40
	157	2016m1	3	17518.30	30.70	0.01	-0.10	-0.10	923733.00
	158	2016m2	3	16026.76	32.18	0.01	0.20	-0.10	919312.10
	159	2016m3	3	16758.67	38.21	0.01	0.00	-0.10	923096.30
	160	2016m4	3	16666.05	41.58	0.01	-0.30	-0.10	934765.20
	161	2016m5	3	17234.98	46.74	0.01	-0.40	-0.10	937894.50
	162	2016m6	3	15575.92	48.25	0.01	-0.30	-0.10	940571.80
	163	2016m7	3	16569.27	44.95	0.01	-0.50	-0.10	941789.40
	164	2016m8	3	16887.40	45.84	0.01	-0.50	-0.10	942006.90
	165	2016m9	3	16449.84	46.57	0.01	-0.50	-0.10	943235.30
	166	2016m10	3	17425.02	49.52	0.01	0.20	-0.10	945101.00
	167	2016m11	3	18308.48	44.73	0.01	0.50	-0.10	951833.90
	168	2016m12	3	19114.37	53.31	0.01	0.30	-0.10	958732.00
	169	2017m1	3	19041.34	54.58	0.01	0.50	-0.10	961574.90
	170	2017m2	3	19118.99	54.87	0.01	0.20	-0.10	958324.60
	171	2017m3	3	18909.26	51.59	0.01	0.20	-0.10	962827.60
	172	2017m4	3	19196.74	52.31	0.01	0.40	-0.10	975541.40
	173	2017m5	3	19650.57	50.33	0.01	0.40	-0.10	973785.20
	174	2017m6	3	20033.43	46.37	0.01	0.30	-0.10	976595.00
	175	2017m7	3	19925.18	48.48	0.01	0.50	-0.10	978484.70
	176	2017m8	3	19646.24	51.70	0.01	0.60	-0.10	977953.20
	177	2017m9	3	20356.28	56.15	0.01	0.70	-0.10	979274.80

	178	2017m10	3	22011.61	57.51	0.01	0.20	-0.10	981902.80
	179	2017m11	3	22724.96	62.71	0.01	0.50	-0.10	987783.80
	180	2017m12	3	22764.94	64.37	0.01	1.10	-0.10	991096.00
	181	2018m1	3	23098.29	69.08	0.01	1.40	-0.10	991786.00
	182	2018m2	3	22068.24	65.32	0.01	1.50	-0.10	986652.00
	183	2018m3	3	21454.30	66.02	0.01	1.10	-0.10	989105.00
	184	2018m4	3	22467.87	72.11	0.01	0.60	-0.10	1001143.00
	185	2018m5	3	22201.82	76.98	0.01	0.70	-0.10	1003237.19
	186	2018m6	3	22304.51	74.41	0.01	0.70	-0.10	1007170.85
	187	2018m7	3	22553.72	74.25	0.01	0.90	-0.10	1007514.69
	188	2018m8	3	22865.15	72.53	0.01	1.30	-0.10	1006108.00
	189	2018m9	3	24120.04	78.89	0.01	1.20	-0.10	1006523.63
	190	2018m10	3	21920.46	81.03	0.01	1.40	-0.10	1007530.81
	191	2018m11	3	22351.06	64.75	0.01	0.80	-0.10	1010519.38
	192	2018m12	3	20014.77	57.36	0.01	0.30	-0.10	1014179.81
	193	2019m1	3	20773.49	59.41	0.01	0.20	-0.10	1015093.00
	194	2019m2	3	21385.16	63.96	0.01	0.20	-0.10	1010052.63
	195	2019m3	3	21205.81	66.14	0.01	0.50	-0.10	1012747.00
	196	2019m4	3	22258.73	71.23	0.01	0.90	-0.10	1026628.69
	197	2019m5	3	20601.19	71.32	0.01	0.70	-0.10	1029768.31
	198	2019m6	3	21275.92	64.22	0.01	0.70	-0.10	1030880.00
	199	2019m7	3	21521.53	63.92	0.01	0.50	-0.10	1032131.00
	200	2019m8	3	20704.37	59.04	0.01	0.30	-0.10	1029153.00
	201	2019m9	3	21755.84	62.83	0.01	0.20	-0.10	1030171.00
	202	2019m10	3	22927.04	59.71	0.01	0.20	-0.10	1031580.00
	203	2019m11	3	23293.91	63.21	0.01	0.50	-0.10	1038378.00
	204	2019m12	3	23656.62	67.31	0.01	0.80	-0.10	1041624.00
	205	2020m1	3	23205.18	63.65	0.01	0.70	-0.10	1042932.00
	206	2020m2	3	21142.96	55.66	0.01	0.40	-0.10	1039864.00
	207	2020m3	3	18917.01	32.01	0.01	0.40	-0.10	1046008.00
	208	2020m4	3	20193.69	18.38	0.01	0.10	-0.10	1064034.00
	209	2020m5	3	21877.89	29.38	0.01	0.10	-0.10	1082233.00
	210	2020m6	3	22288.14	40.27	0.01	0.10	-0.10	1104552.00
	211	2020m7	3	21710.00	43.24	0.01	0.30	-0.10	1111136.00
	212	2020m8	3	23139.76	44.74	0.01	0.20	-0.10	1118268.00
	213	2020m9	3	23185.12	40.91	0.01	0.00	-0.10	1123103.00
	214	2020m10	3	22977.13	40.19	0.01	-0.40	-0.10	1124365.00
	215	2020m11	3	26433.62	42.69	0.01	-0.90	-0.10	1132148.00
	216	2020m12	3	27444.17	49.99	0.01	-1.20	-0.10	1137027.00
GERMANY	1	2003m1	4	2747.83	31.18	1.06	4.51	2.75	1333.90
	2	2003m2	4	2547.05	32.77	1.08	4.68	2.75	1343.80
	3	2003m3	4	2423.87	30.61	1.08	4.25	2.50	1348.30
	4	2003m4	4	2942.04	25.00	1.08	2.91	2.50	1360.90
	5	2003m5	4	2982.68	25.86	1.16	2.81	2.50	1372.50
	6	2003m6	4	3220.58	27.65	1.17	2.60	2.00	1376.90
	7	2003m7	4	3487.86	28.35	1.14	2.09	2.00	1376.70
	8	2003m8	4	3484.58	29.89	1.11	1.98	2.00	1386.50
	9	2003m9	4	3256.78	27.11	1.12	2.18	2.00	1383.00
	10	2003m10	4	3655.99	29.61	1.17	1.58	2.00	1385.60
	11	2003m11	4	3745.95	28.75	1.17	1.58	2.00	1383.80
	12	2003m12	4	3965.16	29.81	1.23	2.08	2.00	1370.50
	13	2004m1	4	4058.60	31.28	1.26	1.27	2.00	1385.00
	14	2004m2	4	4018.16	30.86	1.26	0.68	2.00	1387.00
	15	2004m3	4	3856.70	33.63	1.23	0.78	2.00	1395.70
	16	2004m4	4	3985.21	33.59	1.20	1.66	2.00	1398.80
	17	2004m5	4	3921.41	37.57	1.20	2.44	2.00	1401.10
	18	2004m6	4	4052.73	35.18	1.21	2.54	2.00	1397.00
	19	2004m7	4	3895.61	38.22	1.23	2.34	2.00	1402.70
	20	2004m8	4	3785.21	42.74	1.22	1.85	2.00	1407.30
	21	2004m9	4	3892.90	43.20	1.22	1.84	2.00	1413.50
	22	2004m10	4	3960.25	49.78	1.25	2.33	2.00	1412.40
	23	2004m11	4	4126.00	43.11	1.30	2.42	2.00	1410.20
	24	2004m12	4	4256.08	39.60	1.34	2.13	2.00	1400.60
	25	2005m1	4	4254.85	44.51	1.31	1.44	2.00	1422.70
	26	2005m2	4	4350.49	45.48	1.30	1.66	2.00	1425.00
	27	2005m3	4	4348.77	53.10	1.32	1.77	2.00	1425.30
	28	2005m4	4	4184.84	51.88	1.29	1.21	2.00	1436.30
	29	2005m5	4	4460.63	48.65	1.27	1.21	2.00	1447.60

	30	2005m6	4	4586.28	54.35	1.22	1.32	2.00	1450.10
	31	2005m7	4	4886.50	57.52	1.20	1.53	2.00	1461.90
	32	2005m8	4	4829.69	63.98	1.23	1.53	2.00	1469.90
	33	2005m9	4	5044.12	62.91	1.23	1.86	2.00	1474.40
	34	2005m10	4	4929.07	58.54	1.20	1.86	2.00	1474.30
	35	2005m11	4	5193.40	55.24	1.18	1.76	2.00	1473.40
	36	2005m12	4	5408.26	56.86	1.19	1.41	2.25	1469.10
	37	2006m1	4	5674.15	62.99	1.21	1.86	2.25	1485.60
	38	2006m2	4	5796.04	60.21	1.19	1.85	2.25	1486.50
	39	2006m3	4	5970.08	62.06	1.20	1.41	2.50	1498.80
	40	2006m4	4	6009.89	70.26	1.23	1.96	2.50	1514.10
	41	2006m5	4	5692.86	69.78	1.28	1.74	2.50	1519.10
	42	2006m6	4	5683.31	68.56	1.26	1.84	2.75	1524.90
	43	2006m7	4	5681.97	73.67	1.27	1.83	2.75	1520.30
	44	2006m8	4	5859.57	73.23	1.28	1.51	3.00	1524.40
	45	2006m9	4	6004.33	61.96	1.27	1.08	3.00	1529.40
	46	2006m10	4	6268.92	57.81	1.26	1.08	3.25	1527.10
	47	2006m11	4	6309.19	58.76	1.29	1.40	3.25	1535.60
	48	2006m12	4	6596.92	62.47	1.32	1.39	3.50	1544.80
	49	2007m1	4	6789.11	53.68	1.30	1.72	3.50	1561.50
	50	2007m2	4	6715.44	57.56	1.31	1.71	3.50	1564.30
	51	2007m3	4	6917.03	62.05	1.32	1.93	3.75	1574.80
	52	2007m4	4	7408.87	67.49	1.35	2.13	3.75	1579.60
	53	2007m5	4	7883.04	67.21	1.35	2.13	3.75	1593.90
	54	2007m6	4	8007.32	71.05	1.34	1.91	4.00	1613.80
	55	2007m7	4	7584.14	76.93	1.37	2.01	4.00	1628.70
	56	2007m8	4	7638.17	70.76	1.36	2.12	4.00	1646.60
	57	2007m9	4	7861.51	77.17	1.39	2.66	4.00	1662.80
	58	2007m10	4	8019.22	82.34	1.42	2.77	4.00	1667.80
	59	2007m11	4	7870.52	92.41	1.47	3.30	4.00	1687.80
	60	2007m12	4	8067.32	90.93	1.46	3.17	4.00	1708.10
	61	2008m1	4	6851.75	92.18	1.47	2.85	4.00	1726.40
	62	2008m2	4	6748.13	94.99	1.47	2.84	4.00	1747.20
	63	2008m3	4	6534.97	103.64	1.55	3.15	4.00	1752.90
	64	2008m4	4	6948.82	109.07	1.58	2.40	4.00	1763.40
	65	2008m5	4	7096.79	122.80	1.56	3.03	4.00	1782.40
	66	2008m6	4	6418.32	132.32	1.56	3.24	4.00	1784.00
	67	2008m7	4	6479.56	132.72	1.58	3.32	4.25	1802.60
	68	2008m8	4	6422.30	113.24	1.50	3.12	4.25	1811.00
	69	2008m9	4	5831.02	97.23	1.44	2.80	4.25	1822.20
	70	2008m10	4	4987.97	71.58	1.33	2.38	3.75	1872.20
	71	2008m11	4	4669.44	52.45	1.27	1.34	3.25	1865.90
	72	2008m12	4	4810.20	39.95	1.34	1.13	2.50	1856.20
	73	2009m1	4	4338.35	43.44	1.32	0.92	2.00	1894.80
	74	2009m2	4	3843.74	43.32	1.28	1.12	2.00	1899.50
	75	2009m3	4	4084.76	46.54	1.30	0.41	1.50	1883.80
	76	2009m4	4	4769.45	50.18	1.32	0.71	1.25	1896.40
	77	2009m5	4	4940.82	57.30	1.37	0.00	1.00	1884.40
	78	2009m6	4	4808.64	68.61	1.40	0.10	1.00	1876.30
	79	2009m7	4	5332.14	64.44	1.41	-0.50	1.00	1876.60
	80	2009m8	4	5464.61	72.51	1.43	0.00	1.00	1867.30
	81	2009m9	4	5675.16	67.65	1.46	-0.20	1.00	1863.50
	82	2009m10	4	5414.96	72.77	1.48	0.00	1.00	1868.70
	83	2009m11	4	5625.95	76.66	1.49	0.41	1.00	1849.90
	84	2009m12	4	5957.43	74.46	1.46	0.81	1.00	1847.80
	85	2010m1	4	5608.79	76.17	1.43	0.71	1.00	1867.10
	86	2010m2	4	5598.46	73.75	1.37	0.51	1.00	1870.10
	87	2010m3	4	6153.55	78.83	1.36	1.22	1.00	1863.10
	88	2010m4	4	6135.70	84.82	1.34	1.21	1.00	1882.20
	89	2010m5	4	5964.33	75.95	1.26	1.22	1.00	1889.50
	90	2010m6	4	5965.52	74.76	1.22	0.91	1.00	1898.00
	91	2010m7	4	6147.97	75.58	1.28	1.11	1.00	1907.90
	92	2010m8	4	5925.22	77.04	1.29	1.01	1.00	1914.90
	93	2010m9	4	6229.02	77.84	1.31	1.21	1.00	1912.50
	94	2010m10	4	6601.37	82.67	1.39	1.31	1.00	1922.00
	95	2010m11	4	6688.49	85.28	1.37	1.52	1.00	1922.60
	96	2010m12	4	6914.19	91.45	1.32	1.31	1.00	1927.00
	97	2011m1	4	7077.48	96.52	1.34	1.72	1.00	1945.50

	98	2011m2	4	7272.32	103.72	1.36	1.91	1.00	1939.90
	99	2011m3	4	7041.31	114.64	1.40	2.00	1.00	1954.00
	100	2011m4	4	7514.46	123.26	1.44	1.90	1.25	1968.10
	101	2011m5	4	7293.69	114.99	1.43	2.00	1.25	1982.60
	102	2011m6	4	7376.24	113.83	1.44	2.10	1.25	1987.60
	103	2011m7	4	7158.77	116.97	1.43	2.10	1.50	2005.20
	104	2011m8	4	5784.85	110.22	1.43	2.10	1.50	2027.20
	105	2011m9	4	5502.02	112.83	1.38	2.40	1.50	2039.90
	106	2011m10	4	6141.34	109.55	1.37	2.30	1.50	2042.10
	107	2011m11	4	6088.84	110.77	1.36	2.39	1.25	2049.00
	108	2011m12	4	5898.35	107.87	1.32	1.98	1.00	2053.20
	109	2012m1	4	6458.91	110.69	1.29	2.09	1.00	2070.40
	110	2012m2	4	6856.08	119.33	1.32	2.17	1.00	2085.00
	111	2012m3	4	6946.83	125.45	1.32	2.16	1.00	2094.60
	112	2012m4	4	6761.19	119.75	1.32	1.96	1.00	2097.10
	113	2012m5	4	6264.38	110.34	1.28	1.96	1.00	2131.00
	114	2012m6	4	6416.28	95.16	1.25	1.67	1.00	2158.50
	115	2012m7	4	6772.26	102.62	1.23	1.86	0.75	2186.60
	116	2012m8	4	6970.79	113.36	1.24	2.15	0.75	2202.00
	117	2012m9	4	7216.15	112.86	1.29	2.05	0.75	2197.80
	118	2012m10	4	7260.63	111.71	1.30	2.05	0.75	2253.70
	119	2012m11	4	7405.50	109.06	1.28	1.95	0.75	2242.90
	120	2012m12	4	7612.39	109.49	1.31	2.04	0.75	2203.80
	121	2013m1	4	7776.05	112.96	1.33	1.65	0.75	2216.10
	122	2013m2	4	7741.70	116.05	1.34	1.54	0.75	2218.80
	123	2013m3	4	7795.31	108.47	1.30	1.43	0.75	2219.90
	124	2013m4	4	7913.71	102.25	1.30	1.15	0.75	2243.80
	125	2013m5	4	8348.84	102.56	1.30	1.53	0.50	2248.60
	126	2013m6	4	7959.22	102.92	1.32	1.82	0.50	2242.80
	127	2013m7	4	8275.97	107.93	1.31	1.91	0.50	2252.20
	128	2013m8	4	8103.15	111.28	1.33	1.52	0.50	2269.80
	129	2013m9	4	8594.40	111.60	1.33	1.43	0.50	2263.70
	130	2013m10	4	9033.92	109.08	1.36	1.23	0.50	2286.30
	131	2013m11	4	9405.30	107.79	1.35	1.33	0.25	2267.60
	132	2013m12	4	9552.16	110.76	1.37	1.42	0.25	2273.60
	133	2014m1	4	9306.48	108.12	1.36	1.34	0.25	2291.00
	134	2014m2	4	9692.08	108.90	1.37	1.24	0.25	2311.30
	135	2014m3	4	9555.91	107.48	1.38	1.04	0.25	2309.50
	136	2014m4	4	9603.23	107.76	1.38	1.33	0.25	2335.80
	137	2014m5	4	9943.27	109.54	1.37	0.85	0.25	2356.00
	138	2014m6	4	9833.07	111.80	1.36	1.04	0.15	2344.80
	139	2014m7	4	9407.48	106.77	1.35	0.85	0.15	2355.60
	140	2014m8	4	9470.17	101.61	1.33	0.85	0.15	2377.30
	141	2014m9	4	9474.30	97.09	1.29	0.85	0.05	2373.80
	142	2014m10	4	9326.87	87.43	1.27	0.76	0.05	2373.90
	143	2014m11	4	9980.85	79.44	1.25	0.57	0.05	2389.60
	144	2014m12	4	9805.55	62.34	1.23	0.19	0.05	2387.20
	145	2015m1	4	10694.32	47.76	1.16	-0.28	0.05	2425.20
	146	2015m2	4	11401.66	58.10	1.13	0.09	0.05	2452.90
	147	2015m3	4	11966.17	55.89	1.08	0.28	0.05	2470.80
	148	2015m4	4	11454.38	59.52	1.08	0.47	0.05	2484.60
	149	2015m5	4	11413.82	64.08	1.11	0.66	0.05	2506.90
	150	2015m6	4	10944.97	61.48	1.12	0.28	0.05	2521.50
	151	2015m7	4	11308.99	56.56	1.10	0.19	0.05	2540.90
	152	2015m8	4	10315.62	46.52	1.11	0.19	0.05	2543.10
	153	2015m9	4	9660.44	47.62	1.12	0.00	0.05	2555.30
	154	2015m10	4	10850.14	48.43	1.12	0.28	0.05	2568.50
	155	2015m11	4	11382.23	44.27	1.07	0.37	0.05	2600.00
	156	2015m12	4	10743.01	38.01	1.09	0.28	0.05	2602.80
	157	2016m1	4	9798.11	30.70	1.09	0.47	0.05	2633.40
	158	2016m2	4	9495.40	32.18	1.11	0.00	0.05	2646.50
	159	2016m3	4	9965.51	38.21	1.11	0.28	0.00	2657.80
	160	2016m4	4	10038.97	41.58	1.13	-0.09	0.00	2663.20
	161	2016m5	4	10262.74	46.74	1.13	0.09	0.00	2680.90
	162	2016m6	4	9680.09	48.25	1.12	0.28	0.00	2693.10
	163	2016m7	4	10337.50	44.95	1.11	0.37	0.00	2713.00
	164	2016m8	4	10592.69	45.84	1.12	0.37	0.00	2717.40
	165	2016m9	4	10511.02	46.57	1.12	0.65	0.00	2726.70

	166	2016m10	4	10665.01	49.52	1.10	0.84	0.00	2715.00
	167	2016m11	4	10640.30	44.73	1.08	0.84	0.00	2739.90
	168	2016m12	4	11481.06	53.31	1.05	1.68	0.00	2756.20
	169	2017m1	4	11535.31	54.58	1.06	1.89	0.00	2784.60
	170	2017m2	4	11834.41	54.87	1.06	2.16	0.00	2796.40
	171	2017m3	4	12312.87	51.59	1.07	1.58	0.00	2816.90
	172	2017m4	4	12438.01	52.31	1.07	1.96	0.00	2802.90
	173	2017m5	4	12615.06	50.33	1.11	1.49	0.00	2813.30
	174	2017m6	4	12325.12	46.37	1.12	1.58	0.00	2846.20
	175	2017m7	4	12118.25	48.48	1.15	1.67	0.00	2843.50
	176	2017m8	4	12055.84	51.70	1.18	1.77	0.00	2850.80
	177	2017m9	4	12828.86	56.15	1.19	1.76	0.00	2860.60
	178	2017m10	4	13229.57	57.51	1.18	1.58	0.00	2858.90
	179	2017m11	4	13023.98	62.71	1.17	1.76	0.00	2867.30
	180	2017m12	4	12917.64	64.37	1.18	1.65	0.00	2883.30
	181	2018m1	4	13189.48	69.08	1.24	1.40	0.00	2894.19
	182	2018m2	4	12435.85	65.32	1.22	1.10	0.00	2896.61
	183	2018m3	4	12096.73	66.02	1.23	1.50	0.00	2901.13
	184	2018m4	4	12612.11	72.11	1.21	1.30	0.00	2906.96
	185	2018m5	4	12604.89	76.98	1.17	2.10	0.00	2946.76
	186	2018m6	4	12306.00	74.41	1.17	1.90	0.00	2954.53
	187	2018m7	4	12805.50	74.25	1.17	1.90	0.00	2954.07
	188	2018m8	4	12364.06	72.53	1.16	1.90	0.00	2953.01
	189	2018m9	4	12246.73	78.89	1.16	1.90	0.00	2978.42
	190	2018m10	4	11447.51	81.03	1.13	2.30	0.00	2989.97
	191	2018m11	4	11257.24	64.75	1.13	2.10	0.00	3024.89
	192	2018m12	4	10558.96	57.36	1.15	1.60	0.00	3021.66
	193	2019m1	4	11173.10	59.41	1.14	1.40	0.00	3017.28
	194	2019m2	4	11515.64	63.96	1.14	1.50	0.00	3030.93
	195	2019m3	4	11526.04	66.14	1.12	1.30	0.00	3054.72
	196	2019m4	4	12344.08	71.23	1.12	2.00	0.00	3068.98
	197	2019m5	4	11726.84	71.32	1.12	1.40	0.00	3093.02
	198	2019m6	4	12398.80	64.22	1.14	1.60	0.00	3100.65
	199	2019m7	4	12189.04	63.92	1.11	1.70	0.00	3104.70
	200	2019m8	4	11939.28	59.04	1.10	1.40	0.00	3135.93
	201	2019m9	4	12428.08	62.83	1.09	1.20	0.00	3131.24
	202	2019m10	4	12866.79	59.71	1.12	1.10	0.00	3147.73
	203	2019m11	4	13236.38	63.21	1.10	1.10	0.00	3168.51
	204	2019m12	4	13249.01	67.31	1.12	1.50	0.00	3161.13
	205	2020m1	4	12981.97	63.65	1.11	1.70	0.00	3157.15
	206	2020m2	4	11890.35	55.66	1.10	1.70	0.00	3174.62
	207	2020m3	4	9935.84	32.01	1.10	1.40	0.00	3263.94
	208	2020m4	4	10861.64	18.38	1.10	0.90	0.00	3266.43
	209	2020m5	4	11586.85	29.38	1.11	0.60	0.00	3323.21
	210	2020m6	4	12310.93	40.27	1.12	0.90	0.00	3325.19
	211	2020m7	4	12313.36	43.24	1.18	-0.10	0.00	3336.78
	212	2020m8	4	12945.38	44.74	1.19	0.00	0.00	3350.22
	213	2020m9	4	12760.73	40.91	1.17	-0.20	0.00	3371.82
	214	2020m10	4	11556.48	40.19	1.17	-0.20	0.00	3403.55
	215	2020m11	4	13291.16	42.69	1.19	-0.30	0.00	3433.24
	216	2020m12	4	13718.78	49.99	1.22	-0.30	0.00	3426.25
FRANCE	1	2003m1	5	2754.07	31.18	1.06	2.00	2.75	764.97
	2	2003m2	5	2618.46	32.77	1.08	2.57	2.75	763.91
	3	2003m3	5	2953.67	30.61	1.08	2.56	2.50	771.53
	4	2003m4	5	2991.75	25.00	1.08	1.98	2.50	781.67
	5	2003m5	5	3084.10	25.86	1.16	1.79	2.50	786.40
	6	2003m6	5	3210.27	27.65	1.17	1.98	2.00	772.26
	7	2003m7	5	3311.42	28.35	1.14	1.89	2.00	778.42
	8	2003m8	5	3134.99	29.89	1.11	1.89	2.00	772.28
	9	2003m9	5	3373.20	27.11	1.12	2.07	2.00	772.27
	10	2003m10	5	3424.79	29.61	1.17	2.16	2.00	772.23
	11	2003m11	5	3557.90	28.75	1.17	2.25	2.00	771.76
	12	2003m12	5	3638.44	29.81	1.23	2.16	2.00	803.04
	13	2004m1	5	3725.44	31.28	1.26	1.96	2.00	787.75
	14	2004m2	5	3625.23	30.86	1.26	1.77	2.00	789.30
	15	2004m3	5	3674.28	33.63	1.23	1.67	2.00	798.09
	16	2004m4	5	3669.63	33.59	1.20	2.13	2.00	804.07
	17	2004m5	5	3732.99	37.57	1.20	2.60	2.00	807.01

	18	2004m6	5	3647.10	35.18	1.21	2.41	2.00	809.30
	19	2004m7	5	3594.28	38.22	1.23	2.32	2.00	813.66
	20	2004m8	5	3640.61	42.74	1.22	2.41	2.00	808.79
	21	2004m9	5	3706.82	43.20	1.22	2.12	2.00	814.56
	22	2004m10	5	3753.75	49.78	1.25	2.11	2.00	827.58
	23	2004m11	5	3821.16	43.11	1.30	2.02	2.00	828.57
	24	2004m12	5	3913.69	39.60	1.34	2.11	2.00	851.19
	25	2005m1	5	4027.16	44.51	1.31	1.56	2.00	853.44
	26	2005m2	5	4067.78	45.48	1.30	1.64	2.00	845.98
	27	2005m3	5	3911.71	53.10	1.32	1.91	2.00	852.29
	28	2005m4	5	4120.73	51.88	1.29	1.81	2.00	865.26
	29	2005m5	5	4229.35	48.65	1.27	1.54	2.00	860.38
	30	2005m6	5	4451.74	54.35	1.22	1.72	2.00	874.21
	31	2005m7	5	4399.36	57.52	1.20	1.72	2.00	887.90
	32	2005m8	5	4600.02	63.98	1.23	1.81	2.00	878.38
	33	2005m9	5	4436.45	62.91	1.23	2.17	2.00	878.44
	34	2005m10	5	4567.41	58.54	1.20	1.80	2.00	888.59
	35	2005m11	5	4715.23	55.24	1.18	1.62	2.00	879.14
	36	2005m12	5	4947.99	56.86	1.19	1.53	2.25	918.26
	37	2006m1	5	5000.45	62.99	1.21	2.02	2.25	911.85
	38	2006m2	5	5220.85	60.21	1.19	1.85	2.25	905.65
	39	2006m3	5	5188.40	62.06	1.20	1.51	2.50	912.30
	40	2006m4	5	4930.18	70.26	1.23	1.75	2.50	943.35
	41	2006m5	5	4965.96	69.78	1.28	2.10	2.50	926.59
	42	2006m6	5	5009.42	68.56	1.26	1.91	2.75	941.30
	43	2006m7	5	5165.04	73.67	1.27	1.92	2.75	939.83
	44	2006m8	5	5250.01	73.23	1.28	1.91	3.00	935.37
	45	2006m9	5	5348.73	61.96	1.27	1.23	3.00	947.45
	46	2006m10	5	5327.64	57.81	1.26	1.10	3.25	949.60
	47	2006m11	5	5541.76	58.76	1.29	1.39	3.25	948.17
	48	2006m12	5	5608.31	62.47	1.32	1.53	3.50	989.87
	49	2007m1	5	5516.32	53.68	1.30	1.24	3.50	976.62
	50	2007m2	5	5634.16	57.56	1.31	1.05	3.50	978.89
	51	2007m3	5	5960.04	62.05	1.32	1.19	3.75	1009.88
	52	2007m4	5	6104.00	67.49	1.35	1.26	3.75	1021.01
	53	2007m5	5	6054.93	67.21	1.35	1.07	3.75	1017.37
	54	2007m6	5	5751.08	71.05	1.34	1.20	4.00	1047.17
	55	2007m7	5	5662.70	76.93	1.37	1.12	4.00	1056.40
	56	2007m8	5	5715.69	70.76	1.36	1.18	4.00	1046.20
	57	2007m9	5	5847.95	77.17	1.39	1.52	4.00	1065.02
	58	2007m10	5	5670.57	82.34	1.42	1.99	4.00	1076.70
	59	2007m11	5	5614.08	92.41	1.47	2.44	4.00	1085.22
	60	2007m12	5	4869.79	90.93	1.46	2.59	4.00	1131.98
	61	2008m1	5	4790.66	92.18	1.47	2.82	4.00	1121.95
	62	2008m2	5	4707.07	94.99	1.47	2.85	4.00	1127.55
	63	2008m3	5	4996.54	103.64	1.55	3.18	4.00	1138.04
	64	2008m4	5	5014.28	109.07	1.58	3.03	4.00	1144.93
	65	2008m5	5	4434.85	122.80	1.56	3.31	4.00	1144.54
	66	2008m6	5	4392.36	132.32	1.56	3.57	4.00	1153.24
	67	2008m7	5	4482.60	132.72	1.58	3.61	4.25	1162.36
	68	2008m8	5	4032.10	113.24	1.50	3.17	4.25	1160.25
	69	2008m9	5	3487.07	97.23	1.44	2.98	4.25	1172.71
	70	2008m10	5	3262.68	71.58	1.33	2.67	3.75	1187.50
	71	2008m11	5	3217.97	52.45	1.27	1.63	3.25	1184.73
	72	2008m12	5	2973.92	39.95	1.34	1.00	2.50	1218.43
	73	2009m1	5	2702.48	43.44	1.32	0.71	2.00	1165.89
	74	2009m2	5	2807.34	43.32	1.28	0.87	2.00	1159.12
	75	2009m3	5	3159.85	46.54	1.30	0.30	1.50	1159.92
	76	2009m4	5	3277.65	50.18	1.32	0.13	1.25	1177.78
	77	2009m5	5	3140.44	57.30	1.37	-0.25	1.00	1168.36
	78	2009m6	5	3426.27	68.61	1.40	-0.49	1.00	1160.98
	79	2009m7	5	3653.54	64.44	1.41	-0.73	1.00	1168.35
	80	2009m8	5	3795.41	72.51	1.43	-0.18	1.00	1170.77
	81	2009m9	5	3607.69	67.65	1.46	-0.36	1.00	1171.19
	82	2009m10	5	3680.15	72.77	1.48	-0.21	1.00	1179.04
	83	2009m11	5	3936.33	76.66	1.49	0.39	1.00	1172.12
	84	2009m12	5	3739.46	74.46	1.46	0.91	1.00	1208.16
	85	2010m1	5	3708.80	76.17	1.43	1.10	1.00	1195.57

	86	2010m2	5	3974.01	73.75	1.37	1.28	1.00	1185.04
	87	2010m3	5	3816.99	78.83	1.36	1.58	1.00	1190.77
	88	2010m4	5	3507.56	84.82	1.34	1.69	1.00	1222.24
	89	2010m5	5	3442.89	75.95	1.26	1.64	1.00	1212.41
	90	2010m6	5	3643.14	74.76	1.22	1.51	1.00	1223.40
	91	2010m7	5	3490.79	75.58	1.28	1.67	1.00	1241.97
	92	2010m8	5	3715.18	77.04	1.29	1.39	1.00	1246.24
	93	2010m9	5	3833.50	77.84	1.31	1.56	1.00	1248.53
	94	2010m10	5	3610.44	82.67	1.39	1.60	1.00	1267.39
	95	2010m11	5	3804.78	85.28	1.37	1.58	1.00	1265.47
	96	2010m12	5	4005.50	91.45	1.32	1.77	1.00	1303.28
	97	2011m1	5	4110.35	96.52	1.34	1.75	1.00	1281.61
	98	2011m2	5	3989.18	103.72	1.36	1.66	1.00	1276.33
	99	2011m3	5	4106.92	114.64	1.40	2.00	1.00	1289.09
	100	2011m4	5	4006.94	123.26	1.44	2.08	1.25	1305.78
	101	2011m5	5	3982.21	114.99	1.43	2.03	1.25	1299.31
	102	2011m6	5	3672.77	113.83	1.44	2.12	1.25	1305.56
	103	2011m7	5	3256.76	116.97	1.43	1.95	1.50	1321.67
	104	2011m8	5	2981.96	110.22	1.43	2.24	1.50	1319.73
	105	2011m9	5	3242.84	112.83	1.38	2.24	1.50	1324.71
	106	2011m10	5	3154.62	109.55	1.37	2.35	1.50	1321.22
	107	2011m11	5	3159.81	110.77	1.36	2.51	1.25	1320.33
	108	2011m12	5	3298.55	107.87	1.32	2.47	1.00	1352.73
	109	2012m1	5	3452.45	110.69	1.29	2.35	1.00	1368.09
	110	2012m2	5	3423.81	119.33	1.32	2.29	1.00	1353.59
	111	2012m3	5	3212.80	125.45	1.32	2.30	1.00	1364.23
	112	2012m4	5	3017.01	119.75	1.32	2.09	1.00	1363.86
	113	2012m5	5	3196.65	110.34	1.28	1.98	1.00	1366.42
	114	2012m6	5	3291.66	95.16	1.25	1.94	1.00	1366.73
	115	2012m7	5	3413.07	102.62	1.23	1.94	0.75	1389.12
	116	2012m8	5	3354.82	113.36	1.24	2.09	0.75	1378.52
	117	2012m9	5	3429.27	112.86	1.29	1.90	0.75	1377.04
	118	2012m10	5	3557.28	111.71	1.30	1.86	0.75	1383.24
	119	2012m11	5	3641.07	109.06	1.28	1.42	0.75	1375.64
	120	2012m12	5	3732.60	109.49	1.31	1.34	0.75	1435.04
	121	2013m1	5	3723.00	112.96	1.33	1.17	0.75	1417.02
	122	2013m2	5	3731.42	116.05	1.34	1.04	0.75	1407.36
	123	2013m3	5	3856.75	108.47	1.30	0.97	0.75	1426.06
	124	2013m4	5	3948.59	102.25	1.30	68.00	0.75	1453.63
	125	2013m5	5	3738.91	102.56	1.30	0.80	0.50	1446.03
	126	2013m6	5	3992.69	102.92	1.32	0.92	0.50	1449.55
	127	2013m7	5	3933.78	107.93	1.31	1.06	0.50	1460.71
	128	2013m8	5	4143.44	111.28	1.33	0.86	0.50	1457.89
	129	2013m9	5	4299.89	111.60	1.33	0.88	0.50	1456.33
	130	2013m10	5	4295.21	109.08	1.36	0.56	0.50	1445.08
	131	2013m11	5	4295.95	107.79	1.35	0.67	0.25	1441.15
	132	2013m12	5	4165.72	110.76	1.37	0.69	0.25	1472.12
	133	2014m1	5	4408.08	108.12	1.36	0.65	0.25	1444.22
	134	2014m2	5	4391.50	108.90	1.37	0.92	0.25	1442.26
	135	2014m3	5	4487.39	107.48	1.38	0.61	0.25	1453.82
	136	2014m4	5	4519.57	107.76	1.38	0.72	0.25	1456.30
	137	2014m5	5	4422.84	109.54	1.37	0.68	0.25	1457.67
	138	2014m6	5	4246.14	111.80	1.36	0.48	0.15	1470.96
	139	2014m7	5	4381.04	106.77	1.35	0.46	0.15	1474.99
	140	2014m8	5	4416.24	101.61	1.33	0.44	0.15	1483.97
	141	2014m9	5	4233.09	97.09	1.29	0.29	0.05	1478.20
	142	2014m10	5	4390.18	87.43	1.27	0.45	0.05	1475.88
	143	2014m11	5	4272.75	79.44	1.25	0.32	0.05	1491.88
	144	2014m12	5	4604.25	62.34	1.23	0.06	0.05	1524.69
	145	2015m1	5	4951.48	47.76	1.16	-0.38	0.05	1516.85
	146	2015m2	5	5033.64	58.10	1.13	-0.27	0.05	1484.28
	147	2015m3	5	5046.49	55.89	1.08	-0.07	0.05	1511.59
	148	2015m4	5	5007.89	59.52	1.08	0.08	0.05	1525.33
	149	2015m5	5	4790.20	64.08	1.11	0.30	0.05	1522.32
	150	2015m6	5	5082.61	61.48	1.12	0.26	0.05	1544.10
	151	2015m7	5	4652.95	56.56	1.10	0.17	0.05	1558.83
	152	2015m8	5	4455.29	46.52	1.11	0.05	0.05	1558.22
	153	2015m9	5	4897.66	47.62	1.12	0.03	0.05	1557.64

	154	2015m10	5	4957.60	48.43	1.12	0.06	0.05	1567.00
	155	2015m11	5	4637.06	44.27	1.07	0.04	0.05	1565.70
	156	2015m12	5	4417.02	38.01	1.09	0.18	0.05	1591.97
	157	2016m1	5	4353.55	30.70	1.09	0.22	0.05	1586.77
	158	2016m2	5	4385.06	32.18	1.11	-0.19	0.05	1583.69
	159	2016m3	5	4428.96	38.21	1.11	-0.15	0.00	1607.08
	160	2016m4	5	4505.62	41.58	1.13	-0.19	0.00	1618.48
	161	2016m5	5	4237.48	46.74	1.13	-0.02	0.00	1616.66
	162	2016m6	5	4439.81	48.25	1.12	0.19	0.00	1626.35
	163	2016m7	5	4438.22	44.95	1.11	0.22	0.00	1648.24
	164	2016m8	5	4448.26	45.84	1.12	0.23	0.00	1644.57
	165	2016m9	5	4509.26	46.57	1.12	0.39	0.00	1632.67
	166	2016m10	5	4578.34	49.52	1.10	0.36	0.00	1633.17
	167	2016m11	5	4862.31	44.73	1.08	0.53	0.00	1648.25
	168	2016m12	5	4748.90	53.31	1.05	0.61	0.00	1677.64
	169	2017m1	5	4858.58	54.58	1.06	1.39	0.00	1671.44
	170	2017m2	5	5122.51	54.87	1.06	1.21	0.00	1687.84
	171	2017m3	5	5267.33	51.59	1.07	1.15	0.00	1710.94
	172	2017m4	5	5283.63	52.31	1.07	1.17	0.00	1758.55
	173	2017m5	5	5120.68	50.33	1.11	0.81	0.00	1750.94
	174	2017m6	5	5093.77	46.37	1.12	0.69	0.00	1771.73
	175	2017m7	5	5085.59	48.48	1.15	0.72	0.00	1788.89
	176	2017m8	5	5329.81	51.70	1.18	0.90	0.00	1803.03
	177	2017m9	5	5503.29	56.15	1.19	0.99	0.00	1793.82
	178	2017m10	5	5372.79	57.51	1.18	1.06	0.00	1795.01
	179	2017m11	5	5312.56	62.71	1.17	1.18	0.00	1805.15
	180	2017m12	5	5481.93	64.37	1.18	1.19	0.00	1837.20
	181	2018m1	5	5320.49	69.08	1.24	1.28	0.00	1831.63
	182	2018m2	5	5167.30	65.32	1.22	1.18	0.00	1830.86
	183	2018m3	5	5520.50	66.02	1.23	1.56	0.00	1836.24
	184	2018m4	5	5398.40	72.11	1.21	1.64	0.00	1866.95
	185	2018m5	5	5323.53	76.98	1.17	2.02	0.00	1869.96
	186	2018m6	5	5511.30	74.41	1.17	2.02	0.00	1890.81
	187	2018m7	5	5406.85	74.25	1.17	2.29	0.00	1922.76
	188	2018m8	5	5493.49	72.53	1.16	2.26	0.00	1922.65
	189	2018m9	5	5093.44	78.89	1.16	2.20	0.00	1888.32
	190	2018m10	5	5003.92	81.03	1.13	2.21	0.00	1903.55
	191	2018m11	5	4730.69	64.75	1.13	1.89	0.00	1918.87
	192	2018m12	5	4992.72	57.36	1.15	1.59	0.00	1939.99
	193	2019m1	5	5240.53	59.41	1.14	1.24	0.00	1945.08
	194	2019m2	5	5350.53	63.96	1.14	1.32	0.00	1953.11
	195	2019m3	5	5586.41	66.14	1.12	1.11	0.00	1975.32
	196	2019m4	5	5207.63	71.23	1.12	1.26	0.00	2002.70
	197	2019m5	5	5538.97	71.32	1.12	0.94	0.00	2005.32
	198	2019m6	5	5518.90	64.22	1.14	1.17	0.00	2029.39
	199	2019m7	5	5480.48	63.92	1.11	1.07	0.00	2051.98
	200	2019m8	5	5677.79	59.04	1.10	1.04	0.00	2078.58
	201	2019m9	5	5729.86	62.83	1.09	0.91	0.00	2071.00
	202	2019m10	5	5906.17	59.71	1.12	0.76	0.00	2072.17
	203	2019m11	5	5978.06	63.21	1.10	1.03	0.00	2080.50
	204	2019m12	5	5806.34	67.31	1.12	1.46	0.00	2087.91
	205	2020m1	5	5309.90	63.65	1.11	1.49	0.00	2081.38
	206	2020m2	5	4396.12	55.66	1.10	1.43	0.00	2098.74
	207	2020m3	5	4572.18	32.01	1.10	0.67	0.00	2198.17
	208	2020m4	5	4695.44	18.38	1.10	0.33	0.00	2259.50
	209	2020m5	5	4935.99	29.38	1.11	0.36	0.00	2324.92
	210	2020m6	5	4783.69	40.27	1.12	0.20	0.00	2352.05
	211	2020m7	5	4947.22	43.24	1.18	0.78	0.00	2369.19
	212	2020m8	5	4803.44	44.74	1.19	0.22	0.00	2373.31
	213	2020m9	5	4594.24	40.91	1.17	0.05	0.00	2410.26
	214	2020m10	5	5518.55	40.19	1.17	0.05	0.00	2386.77
	215	2020m11	5	5551.41	42.69	1.19	0.20	0.00	2395.98
	216	2020m12	5	5399.21	49.99	1.22	-0.02	0.00	2429.54

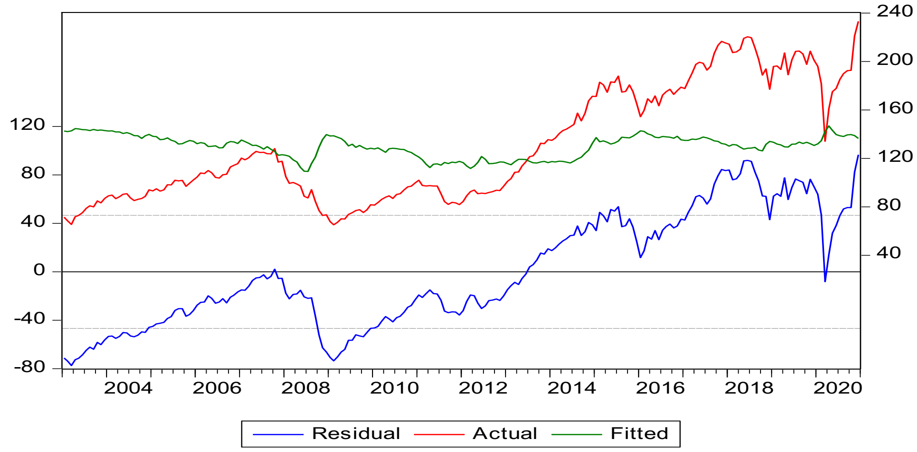
A.5 World Crude Oil Reserves by Year	
Year	Billion Barrels
1980	682.60
1981	691.10
1982	722.20
1983	734.10
1984	746.40
1985	774.30
1986	879.60
1987	911.10
1988	999.50
1989	1,000.20
1990	1,000.90
1991	1,072.90
1992	1,076.90
1993	1,076.30
1994	1,090.20
1995	1,098.70
1996	1,121.30
1997	1,149.20
1998	1,157.60
1999	1,280.30
2000	1,300.90
2001	1,307.20
2002	1,357.10
2003	1,358.30
2004	1,365.30
2005	1,372.50
2006	1,383.30
2007	1,418.30
2008	1,488.90
2009	1,530.30
2010	1,636.90
2011	1,674.30
2012	1,683.60
2013	1,691.90
2014	1,694.40
2015	1,683.90
2016	1,690.30
2017	1,728.20
2018	1,736.10
2019	1,734.80
2020	1,732.40

Appendix B: Output of Empirical Analysis

B.1 Stock Market Sectors and Oil Prices

Consumer Discretionary Sector

Plot of Estimated Residuals



Heteroskedasticity Test: ARCH

F-statistic	1713.777	Prob. F(1,213)	0.0000
Obs*R-squared	191.2323	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	90.19936	67.96703	1.327105	0.1859
RESID^2(-1)	0.966906	0.023356	41.39779	0.0000

R-squared	0.889453	Mean dependent var	2143.379
Adjusted R-squared	0.888934	S.D. dependent var	2044.686
S.E. of regression	681.4246	Akaike info criterion	15.89551
Sum squared resid	98904310	Schwarz criterion	15.92686
Log likelihood	-1706.767	Hannan-Quinn criter.	15.90818
F-statistic	1713.777	Durbin-Watson stat	1.589570
Prob(F-statistic)	0.000000		

Dependent Variable: CONDIS
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Failure to improve likelihood (non-zero gradients) after 46 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*OILPRI

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.192173	0.947697	0.202779	0.8393
CONDIS(-1)	1.007459	0.008277	121.7155	0.0000

Variance Equation

C(3)	-0.277770	0.109406	-2.538906	0.0111
C(4)	0.410243	0.095841	4.280453	0.0000
C(5)	-0.036987	0.061690	-0.599562	0.5488
C(6)	0.974845	0.013929	69.98485	0.0000
C(7)	0.000916	0.000662	1.382727	0.1667

R-squared	0.979596	Mean dependent var	130.2479
Adjusted R-squared	0.979500	S.D. dependent var	47.35747
S.E. of regression	6.780556	Akaike info criterion	6.057814
Sum squared resid	9792.874	Schwarz criterion	6.167556
Log likelihood	-644.2151	Hannan-Quinn criter.	6.102155
Durbin-Watson stat	2.016571		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	0.040	0.040	0.3440	0.558
.|* |	.|* |	2	0.100	0.098	2.5198	0.284
.|. |	.|. |	3	0.049	0.042	3.0380	0.386
.|. |	.|. |	4	-0.001	-0.014	3.0381	0.551
.|* |	.|* |	5	0.122	0.115	6.3476	0.274
.|. |	.|. |	6	0.025	0.017	6.4825	0.371
.|* |	.|. |	7	0.078	0.056	7.8509	0.346
.|. |	.|. |	8	0.001	-0.017	7.8512	0.448
.|. |	.|. |	9	0.005	-0.006	7.8567	0.549
.|. |	.|. |	10	-0.006	-0.023	7.8650	0.642
*|. |	*|. |	11	-0.089	-0.094	9.6948	0.558
.|. |	.|. |	12	-0.054	-0.065	10.375	0.583
.|. |	.|. |	13	0.001	0.021	10.375	0.663
.|. |	.|. |	14	0.054	0.069	11.049	0.682
.|. |	.|. |	15	0.041	0.045	11.447	0.720
.|. |	.|. |	16	-0.003	0.004	11.449	0.781
.|. |	.|. |	17	0.030	0.040	11.664	0.820
.|. |	.|. |	18	-0.035	-0.027	11.953	0.850
.|. |	.|. |	19	0.042	0.031	12.364	0.869
.|. |	*|. |	20	-0.060	-0.079	13.215	0.868
.|. |	*|. |	21	-0.064	-0.082	14.194	0.861
*|. |	*|. |	22	-0.093	-0.113	16.303	0.801
.|. |	.|. |	23	-0.017	-0.002	16.375	0.839
.|. |	.|. |	24	-0.035	-0.027	16.670	0.862
.|. |	.|. |	25	-0.028	0.017	16.858	0.887
.|. |	.|. |	26	-0.049	-0.011	17.439	0.895
*|. |	.|. |	27	-0.101	-0.053	19.987	0.831
.|. |	.|. |	28	-0.010	0.020	20.011	0.864
.|. |	.|. |	29	-0.050	-0.018	20.627	0.872
.|. |	.|. |	30	-0.064	-0.061	21.659	0.866
.|. |	.|. |	31	0.032	0.038	21.918	0.886
.|. |	.|. |	32	0.053	0.063	22.646	0.889
.|. |	.|. |	33	-0.009	-0.037	22.666	0.912
.|. |	.|. |	34	0.048	0.045	23.261	0.918
*|. |	.|. |	35	-0.072	-0.054	24.622	0.905
.|. |	.|. |	36	-0.025	-0.023	24.782	0.921

*Probabilities may not be valid for this equation specification.

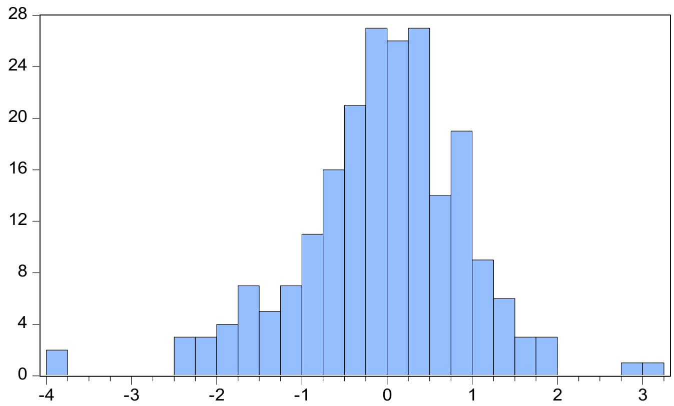
Heteroskedasticity Test: ARCH

F-statistic	0.120756	Prob. F(1,212)	0.7286
Obs*R-squared	0.121826	Prob. Chi-Square(1)	0.7271

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

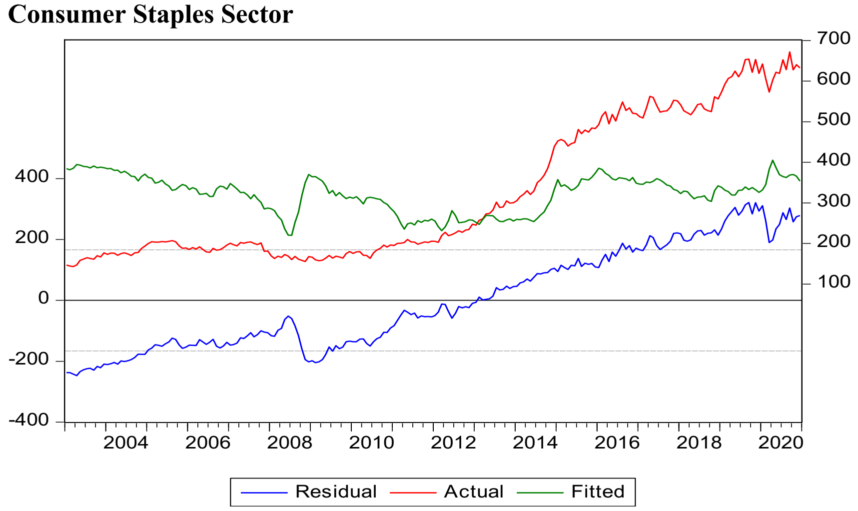
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.972050	0.152986	6.353865	0.0000
WGT_RESID^2(-1)	0.023862	0.068668	0.347500	0.7286

R-squared	0.000569	Mean dependent var	0.995869
Adjusted R-squared	-0.004145	S.D. dependent var	1.996653
S.E. of regression	2.000787	Akaike info criterion	4.234260
Sum squared resid	848.6675	Schwarz criterion	4.265718
Log likelihood	-451.0658	Hannan-Quinn criter.	4.246972
F-statistic	0.120756	Durbin-Watson stat	2.000085
Prob(F-statistic)	0.728560		



Series: Standardized Residuals	
Sample 2003M02 2020M12	
Observations 215	
Mean	-0.060177
Median	0.047698
Maximum	3.032528
Minimum	-3.996371
Std. Dev.	0.998616
Skewness	-0.609567
Kurtosis	4.846836
Jarque-Bera	43.86975
Probability	0.000000

Consumer Staples Sector



Heteroskedasticity Test: ARCH

F-statistic	2820.744	Prob. F(1,213)	0.0000
Obs*R-squared	199.9048	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12

Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	885.8743	659.2957	1.343668	0.1805
RESID^2(-1)	0.971028	0.018283	53.11068	0.0000

R-squared	0.929790	Mean dependent var	27235.03
Adjusted R-squared	0.929460	S.D. dependent var	23971.83
S.E. of regression	6366.761	Akaike info criterion	20.36483
Sum squared resid	8.63E+09	Schwarz criterion	20.39618
Log likelihood	-2187.219	Hannan-Quinn criter.	20.37750
F-statistic	2820.744	Durbin-Watson stat	2.225350
Prob(F-statistic)	0.000000		

Dependent Variable: CONSTA
Method: ML ARCH - Normal distribution (Marquardt / EViews legacy)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Convergence achieved after 16 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*OILPRI

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.485296	1.254882	-0.386727	0.6990
CONSTA(-1)	1.008707	0.005605	179.9763	0.0000
		Variance Equation		
C(3)	-0.006946	0.023405	-0.296790	0.7666
C(4)	-0.009643	0.011782	-0.818424	0.4131
C(5)	0.024983	0.021302	1.172843	0.2409
C(6)	1.006072	0.004842	207.7599	0.0000
C(7)	6.51E-05	0.000138	0.471125	0.6376

R-squared	0.994735	Mean dependent var	322.7573
Adjusted R-squared	0.994710	S.D. dependent var	171.6858
S.E. of regression	12.48713	Akaike info criterion	7.324795
Sum squared resid	33212.76	Schwarz criterion	7.434536
Log likelihood	-780.4154	Hannan-Quinn criter.	7.369135
Durbin-Watson stat	2.420914		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
*|. |	*|. |	1	-0.084	-0.084	1.5373	0.215
.|* |	.|* |	2	0.093	0.086	3.4188	0.181
.|. |	.|. |	3	-0.007	0.007	3.4309	0.330
.|. |	*|. |	4	-0.061	-0.070	4.2518	0.373
.|* |	.|* |	5	0.098	0.090	6.3912	0.270
.|. |	.|. |	6	0.026	0.054	6.5455	0.365
.|. |	.|. |	7	0.011	-0.002	6.5708	0.475
.|* |	.|* |	8	0.198	0.194	15.370	0.052
.|. |	.|. |	9	-0.046	-0.006	15.856	0.070
.|. |	*|. |	10	-0.037	-0.087	16.162	0.095

*|. |	*|. |	11	-0.102	-0.113	18.559	0.069
.|. |	.|. |	12	0.021	0.038	18.664	0.097
.|. |	*|. |	13	-0.044	-0.069	19.120	0.119
.|* |	.|* |	14	0.119	0.097	22.417	0.070
.|* |	.|* |	15	0.083	0.122	24.015	0.065
.|. |	.|. |	16	-0.018	-0.041	24.095	0.087
.|. |	.|. |	17	-0.024	-0.046	24.235	0.113
.|. |	.|* |	18	0.035	0.098	24.532	0.138
.|* |	.|* |	19	0.075	0.128	25.859	0.134
.|* |	.|* |	20	0.123	0.085	29.451	0.079
.|. |	.|. |	21	-0.001	0.009	29.451	0.104
.|. |	.|. |	22	0.012	-0.057	29.486	0.131
.|. |	*|. |	23	-0.018	-0.077	29.563	0.162
.|. |	.|. |	24	0.016	0.025	29.623	0.198
.|. |	.|. |	25	-0.003	0.045	29.625	0.239
.|. |	.|. |	26	0.021	-0.006	29.736	0.279
.|. |	*|. |	27	-0.037	-0.092	30.067	0.311
.|* |	.|* |	28	0.193	0.181	39.398	0.075
.|. |	.|* |	29	0.051	0.121	40.063	0.083
*|. |	*|. |	30	-0.132	-0.153	44.443	0.043
.|. |	.|. |	31	0.012	0.026	44.482	0.055
.|. |	.|. |	32	-0.020	0.053	44.580	0.069
.|. |	*|. |	33	0.029	-0.070	44.791	0.083
.|. |	*|. |	34	0.026	-0.074	44.968	0.099
*|. |	.|. |	35	-0.092	-0.041	47.164	0.082
.|. |	*|. |	36	-0.036	-0.155	47.506	0.095

*Probabilities may not be valid for this equation specification.

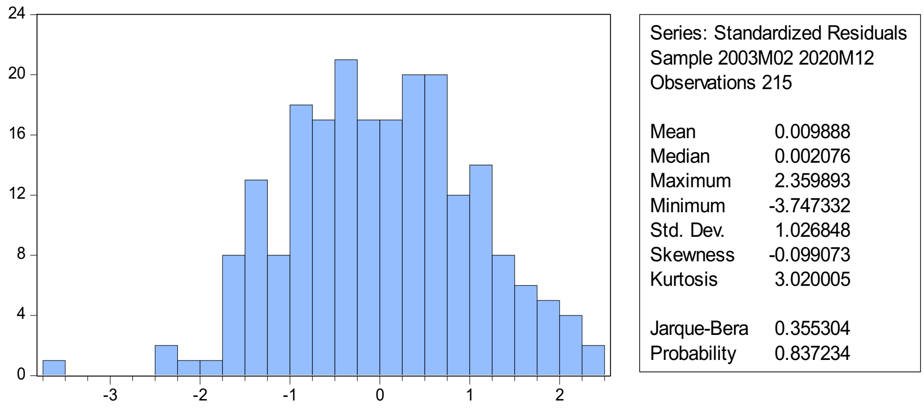
Heteroskedasticity Test: ARCH

F-statistic	0.071375	Prob. F(1,212)	0.7896
Obs*R-squared	0.072024	Prob. Chi-Square(1)	0.7884

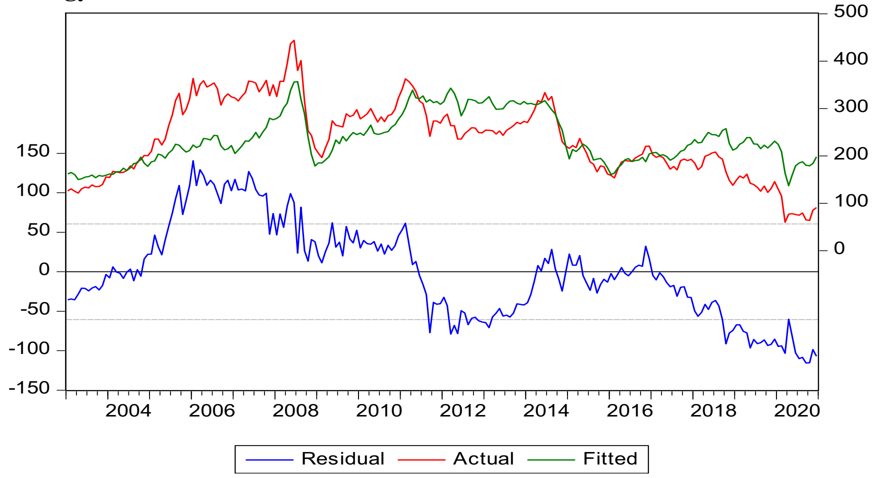
Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.071191	0.125518	8.534136	0.0000
WGT_RESID^2(-1)	-0.018354	0.068700	-0.267160	0.7896

R-squared	0.000337	Mean dependent var	1.051857
Adjusted R-squared	-0.004379	S.D. dependent var	1.496979
S.E. of regression	1.500253	Akaike info criterion	3.658446
Sum squared resid	477.1608	Schwarz criterion	3.689904
Log likelihood	-389.4537	Hannan-Quinn criter.	3.671158
F-statistic	0.071375	Durbin-Watson stat	1.994714
Prob(F-statistic)	0.789605		



Energy Sector



Heteroskedasticity Test: ARCH

F-statistic	758.4982	Prob. F(1,213)	0.0000
Obs*R-squared	167.8615	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	443.5777	181.0385	2.450185	0.0151
RESID^2(-1)	0.889759	0.032307	27.54085	0.0000

R-squared	0.780751	Mean dependent var	3641.677
Adjusted R-squared	0.779722	S.D. dependent var	4339.166
S.E. of regression	2036.536	Akaike info criterion	18.08515
Sum squared resid	8.83E+08	Schwarz criterion	18.11650
Log likelihood	-1942.153	Hannan-Quinn criter.	18.09782
F-statistic	758.4982	Durbin-Watson stat	2.541009
Prob(F-statistic)	0.000000		

Dependent Variable: ENERGY
Method: ML ARCH - Normal distribution (Marquardt / EViews legacy)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Convergence achieved after 23 iterations
Presample variance: backcast (parameter = 0.7)

LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*OILPRI

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	4.247428	2.584396	1.643490	0.1003
ENERGY(-1)	0.984242	0.011815	83.30246	0.0000
		Variance Equation		
C(3)	0.079679	0.206681	0.385517	0.6999
C(4)	0.428476	0.138664	3.090018	0.0020
C(5)	0.079332	0.065475	1.211638	0.2257
C(6)	0.911650	0.050826	17.93659	0.0000
C(7)	0.000997	0.001257	0.793148	0.4277

R-squared	0.951448	Mean dependent var	236.3488
Adjusted R-squared	0.951220	S.D. dependent var	80.08306
S.E. of regression	17.68729	Akaike info criterion	8.298633
Sum squared resid	66634.97	Schwarz criterion	8.408374
Log likelihood	-885.1030	Hannan-Quinn criter.	8.342973
Durbin-Watson stat	1.798455		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|* |	.|* |	1	0.098	0.098	2.0813	0.149
.|* |	.|* |	2	0.108	0.100	4.6430	0.098
.|. |	.|. |	3	-0.015	-0.035	4.6924	0.196
.|. |	.|. |	4	-0.016	-0.023	4.7511	0.314
.|. |	.|. |	5	-0.034	-0.026	5.0124	0.414
.|. |	.|. |	6	-0.011	-0.002	5.0374	0.539
.|* |	.|* |	7	0.079	0.088	6.4484	0.488
*|. |	*|. |	8	-0.088	-0.106	8.1937	0.415
.|. |	.|. |	9	-0.025	-0.027	8.3316	0.501
.|. |	.|* |	10	0.063	0.095	9.2220	0.511
.|* |	.|* |	11	0.119	0.114	12.473	0.329
.|. |	.|. |	12	0.002	-0.038	12.474	0.408
.|. |	.|. |	13	0.007	-0.023	12.486	0.488
.|. |	.|. |	14	-0.021	-0.019	12.590	0.559
.|. |	.|. |	15	-0.040	-0.006	12.956	0.606
.|. |	.|. |	16	0.054	0.073	13.647	0.625
.|. |	.|. |	17	0.040	0.013	14.026	0.665
.|. |	.|. |	18	0.052	0.020	14.666	0.685
.|. |	.|. |	19	0.050	0.072	15.266	0.706
.|. |	.|. |	20	-0.005	-0.022	15.273	0.761
.|. |	.|. |	21	0.062	0.045	16.195	0.759
.|. |	*|. |	22	-0.051	-0.068	16.830	0.773
.|. |	.|. |	23	-0.028	-0.043	17.014	0.809
.|. |	.|. |	24	-0.032	0.005	17.265	0.837
.|. |	.|* |	25	0.049	0.081	17.866	0.848
.|. |	*|. |	26	-0.050	-0.067	18.474	0.858
.|. |	*|. |	27	-0.045	-0.067	18.982	0.871
.|. |	.|. |	28	0.003	0.006	18.983	0.899
.|. |	.|. |	29	0.040	0.065	19.386	0.911
.|. |	*|. |	30	-0.047	-0.069	19.948	0.918
.|* |	.|* |	31	0.114	0.107	23.266	0.839
.|* |	.|. |	32	0.077	0.046	24.791	0.814

.|. |	.|. |	33	0.015	0.024	24.849	0.845
.|. |	.|. |	34	0.057	0.064	25.699	0.846
.|. |	.|. |	35	0.020	-0.022	25.800	0.871
.|. |	*|. |	36	-0.035	-0.075	26.115	0.887

*Probabilities may not be valid for this equation specification.

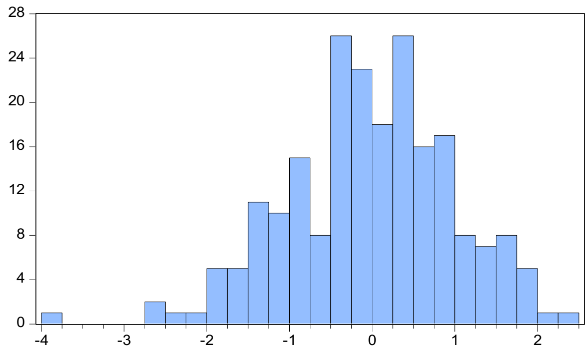
Heteroskedasticity Test: ARCH

F-statistic	0.160528	Prob. F(1,212)	0.6891
Obs*R-squared	0.161920	Prob. Chi-Square(1)	0.6874

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

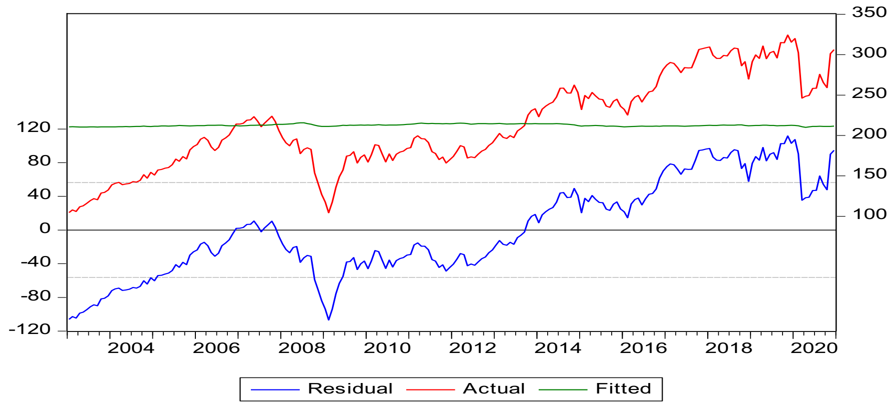
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.028501	0.126108	8.155726	0.0000
WGT_RESID^2(-1)	-0.027511	0.068665	-0.400659	0.6891

R-squared	0.000757	Mean dependent var	1.000953
Adjusted R-squared	-0.003957	S.D. dependent var	1.543422
S.E. of regression	1.546472	Akaike info criterion	3.719131
Sum squared resid	507.0141	Schwarz criterion	3.750589
Log likelihood	-395.9471	Hannan-Quinn criter.	3.731843
F-statistic	0.160528	Durbin-Watson stat	1.993502
Prob(F-statistic)	0.689075		



Series: Standardized Residuals	
Sample 2003M02 2020M12	
Observations 215	
Mean	-0.015521
Median	-0.003921
Maximum	2.360134
Minimum	-3.801057
Std. Dev.	1.000622
Skewness	-0.322011
Kurtosis	3.358859
Jarque-Bera	4.869260
Probability	0.087630

Financials Sector



Heteroskedasticity Test: ARCH

F-statistic	1609.528	Prob. F(1,213)	0.0000
Obs*R-squared	189.8728	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	198.6992	104.4711	1.901953	0.0585
RESID^2(-1)	0.932954	0.023255	40.11893	0.0000

R-squared	0.883129	Mean dependent var	3113.124
Adjusted R-squared	0.882581	S.D. dependent var	3212.715
S.E. of regression	1100.885	Akaike info criterion	16.85488
Sum squared resid	2.58E+08	Schwarz criterion	16.88623
Log likelihood	-1809.899	Hannan-Quinn criter.	16.86754
F-statistic	1609.528	Durbin-Watson stat	1.837583
Prob(F-statistic)	0.000000		

Dependent Variable: FINANC
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Convergence achieved after 71 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*OILPRI

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.306173	1.028477	0.297695	0.7659
FINANC(-1)	1.004926	0.005444	184.5919	0.0000
		Variance Equation		
C(3)	0.228782	0.123762	1.848561	0.0645
C(4)	0.075382	0.070874	1.063609	0.2875
C(5)	-0.288150	0.064376	-4.476072	0.0000
C(6)	0.924499	0.020992	44.04099	0.0000
C(7)	0.000301	0.000481	0.625286	0.5318

R-squared	0.973037	Mean dependent var	213.1176
Adjusted R-squared	0.972911	S.D. dependent var	55.92287
S.E. of regression	9.204267	Akaike info criterion	6.960916
Sum squared resid	18045.05	Schwarz criterion	7.070658
Log likelihood	-741.2985	Hannan-Quinn criter.	7.005257
Durbin-Watson stat	1.864339		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	0.064	0.064	0.8970	0.344

.|. |	.|. |	2	0.040	0.036	1.2511	0.535
.|. |	.|. |	3	-0.022	-0.027	1.3599	0.715
.|. |	.|. |	4	-0.033	-0.031	1.5994	0.809
.|. |	.|. |	5	-0.050	-0.045	2.1631	0.826
*|. |	*|. |	6	-0.182	-0.176	9.5341	0.146
.|* |	.|* |	7	0.108	0.136	12.137	0.096
.|. |	.|. |	8	0.017	0.012	12.203	0.142
.|. |	.|. |	9	0.062	0.042	13.063	0.160
.|. |	.|. |	10	0.041	0.028	13.441	0.200
.|. |	.|. |	11	0.029	0.011	13.629	0.254
.|. |	.|. |	12	0.055	0.032	14.331	0.280
*|. |	.|. |	13	-0.093	-0.055	16.316	0.232
.|. |	.|. |	14	-0.025	-0.022	16.462	0.286
.|. |	.|. |	15	-0.059	-0.033	17.282	0.302
.|. |	.|. |	16	0.009	0.019	17.303	0.366
.|. |	.|. |	17	0.040	0.042	17.682	0.409
.|. |	.|. |	18	0.036	0.031	17.989	0.456
.|. |	*|. |	19	-0.025	-0.080	18.135	0.513
.|. |	.|. |	20	0.052	0.066	18.787	0.536
.|. |	.|. |	21	0.014	-0.002	18.834	0.596
.|. |	.|. |	22	-0.058	-0.045	19.653	0.605
*|. |	.|. |	23	-0.066	-0.043	20.715	0.598
.|. |	.|. |	24	-0.012	0.006	20.749	0.654
.|. |	.|. |	25	-0.004	-0.015	20.753	0.706
*|. |	*|. |	26	-0.086	-0.068	22.583	0.656
.|. |	*|. |	27	-0.058	-0.072	23.424	0.662
.|. |	.|. |	28	-0.022	-0.042	23.539	0.706
.|. |	.|. |	29	0.023	0.017	23.670	0.745
.|. |	.|. |	30	0.000	0.008	23.670	0.787
.|* |	.|* |	31	0.076	0.087	25.135	0.762
.|. |	.|. |	32	0.043	-0.002	25.600	0.781
.|. |	.|. |	33	-0.040	-0.044	26.001	0.802
.|. |	.|* |	34	0.053	0.078	26.728	0.808
.|. |	.|. |	35	-0.029	-0.011	26.952	0.833
*|. |	*|. |	36	-0.073	-0.080	28.343	0.815

*Probabilities may not be valid for this equation specification.

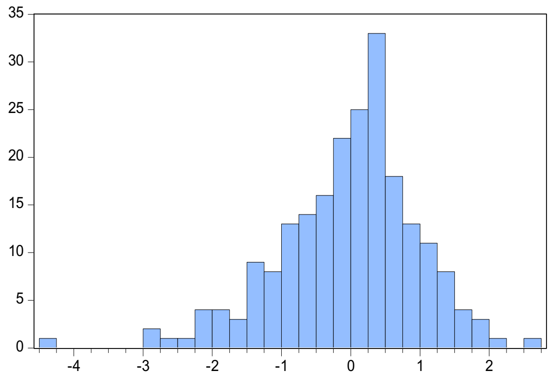
Heteroskedasticity Test: ARCH

F-statistic	0.386720	Prob. F(1,212)	0.5347
Obs*R-squared	0.389658	Prob. Chi-Square(1)	0.5325

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.951055	0.146740	6.481226	0.0000
WGT_RESID^2(-1)	0.042690	0.068648	0.621868	0.5347

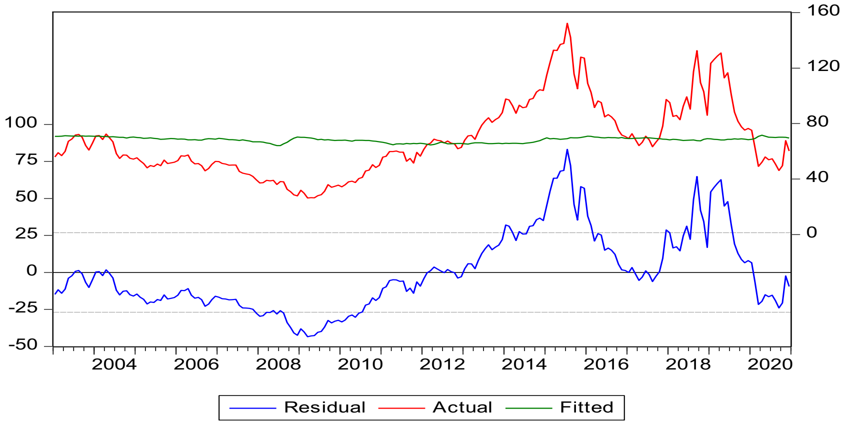
R-squared	0.001821	Mean dependent var	0.993578
Adjusted R-squared	-0.002888	S.D. dependent var	1.896575
S.E. of regression	1.899311	Akaike info criterion	4.130161
Sum squared resid	764.7651	Schwarz criterion	4.161619
Log likelihood	-439.9273	Hannan-Quinn criter.	4.142873
F-statistic	0.386720	Durbin-Watson stat	1.992012
Prob(F-statistic)	0.534697		



Series: Standardized Residuals
Sample 2003M02 2020M12
Observations 215

Mean	-0.036459
Median	0.094807
Maximum	2.673414
Minimum	-4.438123
Std. Dev.	0.997587
Skewness	-0.711789
Kurtosis	4.522801
Jarque-Bera	38.92840
Probability	0.000000

Health Care Sector



Heteroskedasticity Test: ARCH

F-statistic	698.7437	Prob. F(1,213)	0.0000
Obs*R-squared	164.7721	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	88.63274	42.50610	2.085177	0.0382
RESID^2(-1)	0.875699	0.033128	26.43376	0.0000

R-squared	0.766382	Mean dependent var	717.3570
Adjusted R-squared	0.765285	S.D. dependent var	1066.210
S.E. of regression	516.5512	Akaike info criterion	15.34148
Sum squared resid	56833746	Schwarz criterion	15.37284
Log likelihood	-1647.210	Hannan-Quinn criter.	15.35415
F-statistic	698.7437	Durbin-Watson stat	1.767212
Prob(F-statistic)	0.000000		

Dependent Variable: HEACAR
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Convergence achieved after 39 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)

LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*OILPRI

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.739283	0.600871	1.230352	0.2186
HEACAR(-1)	0.989330	0.010987	90.04940	0.0000
		Variance Equation		
C(3)	-0.162357	0.066130	-2.455096	0.0141
C(4)	0.195766	0.050223	3.897930	0.0001
C(5)	0.096069	0.036710	2.616941	0.0089
C(6)	0.992916	0.008757	113.3903	0.0000
C(7)	0.000605	0.000492	1.230923	0.2184

R-squared	0.938132	Mean dependent var	68.34651
Adjusted R-squared	0.937842	S.D. dependent var	26.91293
S.E. of regression	6.709818	Akaike info criterion	5.946428
Sum squared resid	9589.612	Schwarz criterion	6.056170
Log likelihood	-632.2410	Hannan-Quinn criter.	5.990769
Durbin-Watson stat	1.868456		

Heteroskedasticity Test: ARCH

F-statistic	0.078646	Prob. F(1,212)	0.7794
Obs*R-squared	0.079359	Prob. Chi-Square(1)	0.7782

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.018984	0.134188	7.593710	0.0000
WGT_RESID^2(-1)	-0.019257	0.068668	-0.280439	0.7794

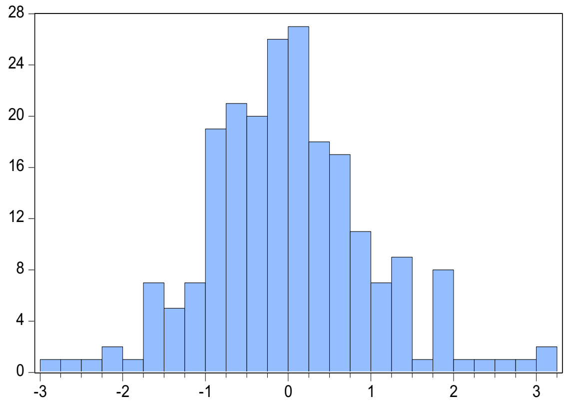
R-squared	0.000371	Mean dependent var	0.999730
Adjusted R-squared	-0.004344	S.D. dependent var	1.682966
S.E. of regression	1.686618	Akaike info criterion	3.892630
Sum squared resid	603.0724	Schwarz criterion	3.924088
Log likelihood	-414.5114	Hannan-Quinn criter.	3.905342
F-statistic	0.078646	Durbin-Watson stat	1.996492
Prob(F-statistic)	0.779414		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|* |	.|* |	1	0.120	0.120	3.1280	0.077
.|. |	.|. |	2	-0.038	-0.053	3.4420	0.179
.|. |	.|. |	3	-0.024	-0.013	3.5674	0.312
.|. |	.|. |	4	0.051	0.055	4.1512	0.386
.|* |	.|* |	5	0.196	0.185	12.706	0.026
.|. |	.|. |	6	0.038	-0.004	13.027	0.043
.|. |	.|. |	7	-0.034	-0.022	13.291	0.065

<table>
<tr><td>.|. |</td><td>.|* |</td><td>8</td><td>0.061</td><td>0.078</td><td>14.135</td><td>0.078</td></tr>
<tr><td>.|* |</td><td>.|* |</td><td>9</td><td>0.127</td><td>0.099</td><td>17.761</td><td>0.038</td></tr>
<tr><td>.|* |</td><td>.|. |</td><td>10</td><td>0.093</td><td>0.036</td><td>19.718</td><td>0.032</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>11</td><td>0.011</td><td>0.003</td><td>19.745</td><td>0.049</td></tr>
<tr><td>*|. |</td><td>*|. |</td><td>12</td><td>-0.161</td><td>-0.156</td><td>25.675</td><td>0.012</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>13</td><td>0.051</td><td>0.064</td><td>26.272</td><td>0.016</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>14</td><td>0.038</td><td>-0.035</td><td>26.604</td><td>0.022</td></tr>
<tr><td>.|* |</td><td>.|. |</td><td>15</td><td>0.090</td><td>0.070</td><td>28.476</td><td>0.019</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>16</td><td>0.064</td><td>0.057</td><td>29.446</td><td>0.021</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>17</td><td>-0.036</td><td>-0.003</td><td>29.753</td><td>0.028</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>18</td><td>-0.030</td><td>-0.058</td><td>29.970</td><td>0.038</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>19</td><td>0.043</td><td>0.030</td><td>30.414</td><td>0.047</td></tr>
<tr><td>.|. |</td><td>*|. |</td><td>20</td><td>-0.061</td><td>-0.095</td><td>31.305</td><td>0.051</td></tr>
<tr><td>*|. |</td><td>*|. |</td><td>21</td><td>-0.115</td><td>-0.104</td><td>34.511</td><td>0.032</td></tr>
<tr><td>*|. |</td><td>*|. |</td><td>22</td><td>-0.101</td><td>-0.077</td><td>36.977</td><td>0.024</td></tr>
<tr><td>*|. |</td><td>*|. |</td><td>23</td><td>-0.082</td><td>-0.079</td><td>38.630</td><td>0.022</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>24</td><td>0.044</td><td>-0.005</td><td>39.107</td><td>0.027</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>25</td><td>0.027</td><td>0.051</td><td>39.289</td><td>0.034</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>26</td><td>-0.058</td><td>-0.029</td><td>40.116</td><td>0.038</td></tr>
<tr><td>*|. |</td><td>.|. |</td><td>27</td><td>-0.118</td><td>-0.048</td><td>43.548</td><td>0.023</td></tr>
<tr><td>*|. |</td><td>.|. |</td><td>28</td><td>-0.081</td><td>-0.027</td><td>45.166</td><td>0.021</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>29</td><td>0.049</td><td>0.066</td><td>45.774</td><td>0.025</td></tr>
<tr><td>.|* |</td><td>.|* |</td><td>30</td><td>0.104</td><td>0.113</td><td>48.493</td><td>0.018</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>31</td><td>-0.055</td><td>-0.012</td><td>49.266</td><td>0.020</td></tr>
<tr><td>*|. |</td><td>.|. |</td><td>32</td><td>-0.073</td><td>-0.037</td><td>50.627</td><td>0.019</td></tr>
<tr><td>.|. |</td><td>.|* |</td><td>33</td><td>0.067</td><td>0.098</td><td>51.793</td><td>0.020</td></tr>
<tr><td>.|* |</td><td>.|* |</td><td>34</td><td>0.162</td><td>0.133</td><td>58.594</td><td>0.005</td></tr>
<tr><td>.|* |</td><td>.|. |</td><td>35</td><td>0.092</td><td>0.053</td><td>60.788</td><td>0.004</td></tr>
<tr><td>*|. |</td><td>.|. |</td><td>36</td><td>-0.096</td><td>-0.023</td><td>63.178</td><td>0.003</td></tr>
</table>

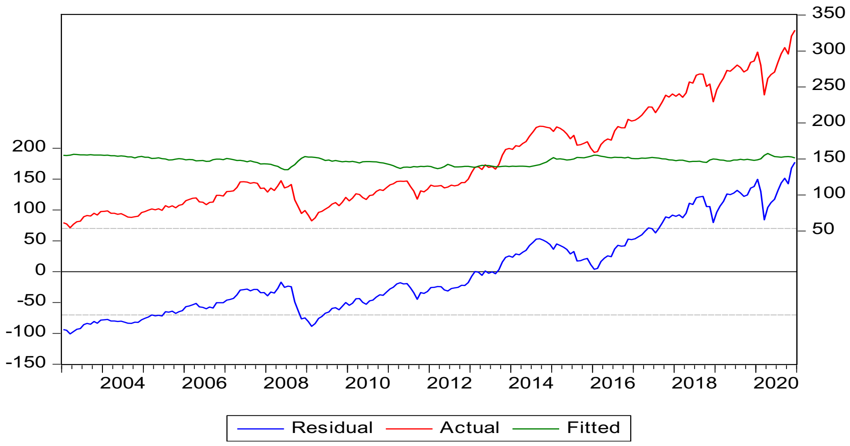
*Probabilities may not be valid for this equation specification.



Series: Standardized Residuals
Sample 2003M02 2020M12
Observations 215

Mean	0.015726
Median	-0.020421
Maximum	3.163111
Minimum	-2.875814
Std. Dev.	1.001372
Skewness	0.318844
Kurtosis	3.796175
Jarque-Bera	9.321500
Probability	0.009459

Industrials Sector



Heteroskedasticity Test: ARCH

F-statistic	3257.499	Prob. F(1,213)	0.0000
Obs*R-squared	201.8045	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-10.80756	126.8829	-0.085177	0.9322
RESID^2(-1)	1.024438	0.017949	57.07450	0.0000

R-squared	0.938626	Mean dependent var	4861.700
Adjusted R-squared	0.938337	S.D. dependent var	5542.716
S.E. of regression	1376.365	Akaike info criterion	17.30154
Sum squared resid	4.04E+08	Schwarz criterion	17.33289
Log likelihood	-1857.915	Hannan-Quinn criter.	17.31421
F-statistic	3257.499	Durbin-Watson stat	1.815536
Prob(F-statistic)	0.000000		

Dependent Variable: INDUST
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Convergence achieved after 36 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*OILPRI

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-1.916976	0.522313	-3.670168	0.0002
INDUST(-1)	1.022422	0.003816	267.9058	0.0000
		Variance Equation		
C(3)	0.330321	0.150964	2.188085	0.0287
C(4)	0.009608	0.091611	0.104876	0.9165
C(5)	-0.436820	0.073688	-5.927952	0.0000
C(6)	0.884234	0.026505	33.36156	0.0000
C(7)	0.000842	0.000517	1.629165	0.1033

R-squared	0.990104	Mean dependent var	147.9553
Adjusted R-squared	0.990057	S.D. dependent var	70.14612
S.E. of regression	6.994559	Akaike info criterion	6.311259
Sum squared resid	10420.78	Schwarz criterion	6.421000
Log likelihood	-671.4603	Hannan-Quinn criter.	6.355600
Durbin-Watson stat	1.995542		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob*

.|. |	.|. |	1	0.036	0.036	0.2863	0.593
.|. |	.|. |	2	0.067	0.066	1.2656	0.531
.|. |	.|. |	3	-0.015	-0.020	1.3139	0.726
.|. |	.|. |	4	0.015	0.012	1.3657	0.850
*|. |	*|. |	5	-0.103	-0.102	3.7270	0.589
.|. |	.|. |	6	-0.051	-0.046	4.2972	0.637
.|* |	.|* |	7	0.077	0.096	5.6381	0.583
.|. |	.|. |	8	0.020	0.017	5.7250	0.678
.|. |	.|. |	9	0.069	0.059	6.7915	0.659
.|. |	.|. |	10	-0.026	-0.041	6.9510	0.730
.|. |	.|. |	11	-0.001	-0.021	6.9511	0.803
*|. |	*|. |	12	-0.088	-0.068	8.7169	0.727
.|. |	.|. |	13	0.029	0.047	8.9131	0.779
.|. |	.|. |	14	-0.017	0.001	8.9830	0.832
.|* |	.|* |	15	0.088	0.083	10.794	0.767
.|. |	.|. |	16	0.024	0.007	10.930	0.814
.|. |	.|. |	17	-0.011	-0.042	10.957	0.859
.|. |	.|. |	18	-0.009	-0.012	10.978	0.895
.|. |	.|. |	19	0.024	0.046	11.119	0.920
*|. |	*|. |	20	-0.109	-0.100	13.957	0.833
.|. |	.|. |	21	-0.011	0.018	13.986	0.870
.|. |	.|. |	22	-0.032	-0.046	14.228	0.893
.|. |	.|. |	23	-0.001	-0.010	14.228	0.920
.|. |	.|. |	24	0.028	0.032	14.414	0.937
.|. |	.|. |	25	-0.004	-0.012	14.417	0.954
.|. |	.|. |	26	0.032	0.018	14.676	0.963
.|. |	.|. |	27	-0.041	-0.020	15.103	0.968
.|. |	.|. |	28	0.001	-0.015	15.103	0.977
.|. |	.|. |	29	-0.050	-0.024	15.730	0.978
.|. |	.|. |	30	-0.004	-0.010	15.735	0.985
.|. |	.|. |	31	0.043	0.060	16.213	0.987
.|. |	.|. |	32	0.060	0.041	17.119	0.985
.|. |	.|. |	33	-0.005	-0.015	17.124	0.990
.|. |	.|. |	34	0.038	0.017	17.499	0.991
*|. |	*|. |	35	-0.077	-0.078	19.045	0.987
*|. |	.|. |	36	-0.082	-0.057	20.805	0.980

*Probabilities may not be valid for this equation specification.

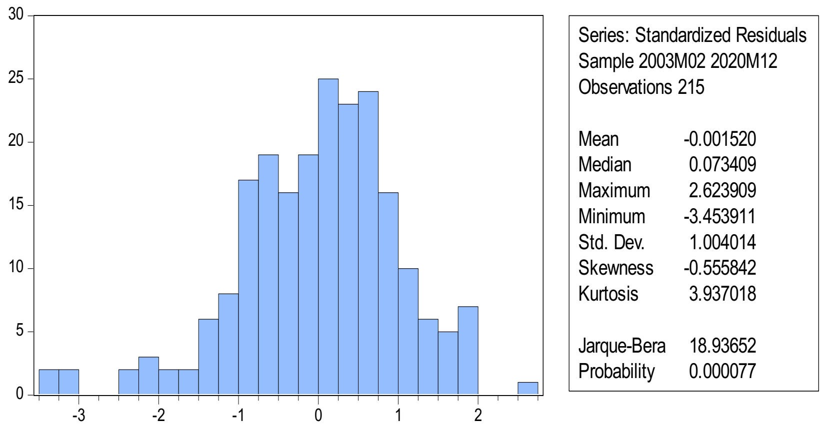
Heteroskedasticity Test: ARCH

F-statistic	2.855490	Prob. F(1,212)	0.0925
Obs*R-squared	2.844121	Prob. Chi-Square(1)	0.0917

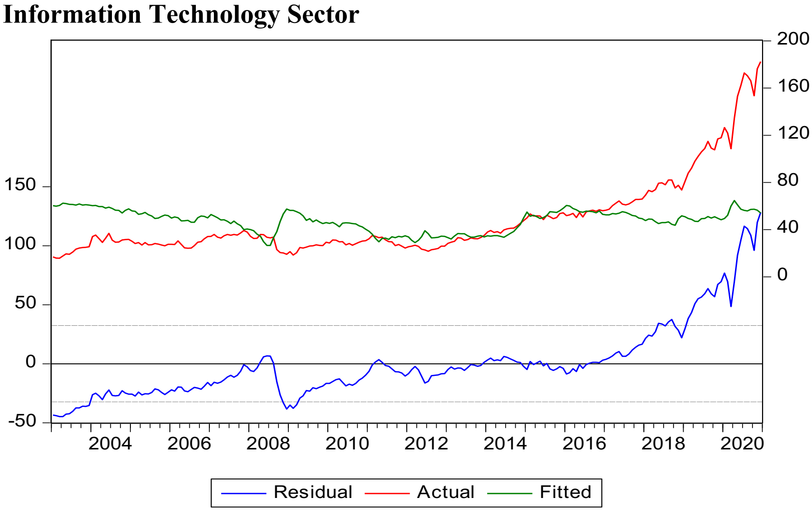
Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.891654	0.136166	6.548282	0.0000
WGT_RESID^2(-1)	0.115261	0.068209	1.689820	0.0925

R-squared	0.013290	Mean dependent var	1.007731
Adjusted R-squared	0.008636	S.D. dependent var	1.727376
S.E. of regression	1.719901	Akaike info criterion	3.931712
Sum squared resid	627.1086	Schwarz criterion	3.963170
Log likelihood	-418.6932	Hannan-Quinn criter.	3.944424
F-statistic	2.855490	Durbin-Watson stat	1.986728
Prob(F-statistic)	0.092532		



Information Technology Sector



Heteroskedasticity Test: ARCH

F-statistic	3256.262	Prob. F(1,213)	0.0000
Obs*R-squared	201.7998	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.233917	45.57047	-0.027077	0.9784
RESID^2(-1)	1.071452	0.018776	57.06366	0.0000

R-squared	0.938604	Mean dependent var	1032.657
Adjusted R-squared	0.938315	S.D. dependent var	2468.602
S.E. of regression	613.1115	Akaike info criterion	15.68423
Sum squared resid	80067921	Schwarz criterion	15.71558
Log likelihood	-1684.055	Hannan-Quinn criter.	15.69690
F-statistic	3256.262	Durbin-Watson stat	1.663588
Prob(F-statistic)	0.000000		

Dependent Variable: INFTEC
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Failure to improve likelihood (non-zero gradients) after 162 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*OILPRI

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.000828	0.137533	-0.006017	0.9952
INFTEC(-1)	1.014708	0.000401	2529.712	0.0000
Variance Equation				
C(3)	-0.081894	0.041234	-1.986055	0.0470
C(4)	0.030662	0.033910	0.904221	0.3659
C(5)	0.174259	0.033939	5.134416	0.0000
C(6)	1.037766	0.001346	771.1118	0.0000
C(7)	0.000296	0.000229	1.294709	0.1954

R-squared	0.986673	Mean dependent var	47.69060
Adjusted R-squared	0.986611	S.D. dependent var	33.55699
S.E. of regression	3.882925	Akaike info criterion	4.725903
Sum squared resid	3211.424	Schwarz criterion	4.835645
Log likelihood	-501.0346	Hannan-Quinn criter.	4.770244
Durbin-Watson stat	1.903195		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	0.029	0.029	0.1799	0.671
.|. |	.|. |	2	-0.040	-0.041	0.5358	0.765
.|. |	.|. |	3	0.051	0.054	1.1094	0.775
.|. |	.|. |	4	-0.030	-0.035	1.3095	0.860
.|* |	.|* |	5	0.112	0.119	4.0914	0.536
*|. |	*|. |	6	-0.080	-0.095	5.5048	0.481
*|. |	*|. |	7	-0.146	-0.127	10.257	0.174
.|. |	.|. |	8	0.054	0.045	10.916	0.207
.|. |	.|* |	9	0.073	0.079	12.134	0.206
.|. |	.|. |	10	0.054	0.051	12.805	0.235
.|. |	.|. |	11	-0.052	-0.050	13.427	0.266
.|. |	.|* |	12	0.060	0.090	14.248	0.285
.|. |	.|. |	13	0.004	-0.042	14.252	0.356
.|. |	.|. |	14	-0.034	-0.049	14.528	0.411
.|. |	.|. |	15	0.019	0.024	14.609	0.480
*|. |	.|. |	16	-0.090	-0.052	16.527	0.417
.|. |	.|. |	17	-0.027	-0.036	16.704	0.475
.|. |	.|. |	18	0.022	0.006	16.821	0.535
*|. |	*|. |	19	-0.121	-0.094	20.308	0.376
.|. |	.|. |	20	-0.029	-0.045	20.509	0.426
.|. |	.|. |	21	0.026	0.026	20.676	0.479
.|. |	.|. |	22	0.048	0.061	21.233	0.506
.|. |	.|. |	23	0.053	0.032	21.906	0.526
*|. |	*|. |	24	-0.078	-0.071	23.405	0.496
.|. |	.|. |	25	-0.026	-0.019	23.575	0.544
.|. |	.|. |	26	-0.027	-0.059	23.751	0.590
.|. |	.|. |	27	0.040	0.042	24.158	0.622
.|. |	.|. |	28	-0.054	-0.035	24.892	0.634
*|. |	*|. |	29	-0.162	-0.109	31.446	0.345
.|. |	.|. |	30	0.070	0.059	32.687	0.336

.|. |	.|. |	31	-0.005	-0.028	32.692	0.384
.|. |	.|. |	32	0.012	0.004	32.728	0.431
.|. |	.|. |	33	0.025	0.006	32.885	0.473
.|. |	.|* |	34	0.014	0.078	32.932	0.520
.|. |	.|. |	35	0.021	-0.051	33.049	0.563
.|. |	.|. |	36	-0.001	-0.024	33.050	0.610

*Probabilities may not be valid for this equation specification.

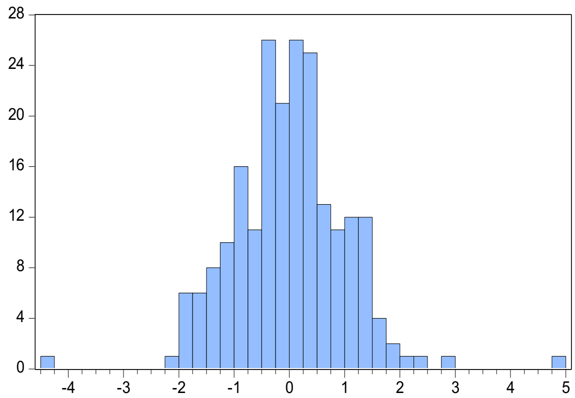
Heteroskedasticity Test: ARCH

F-statistic	0.015901	Prob. F(1,212)	0.8998
Obs*R-squared	0.016050	Prob. Chi-Square(1)	0.8992

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.038072	0.174454	5.950405	0.0000
WGT_RESID^2(-1)	0.008664	0.068707	0.126101	0.8998

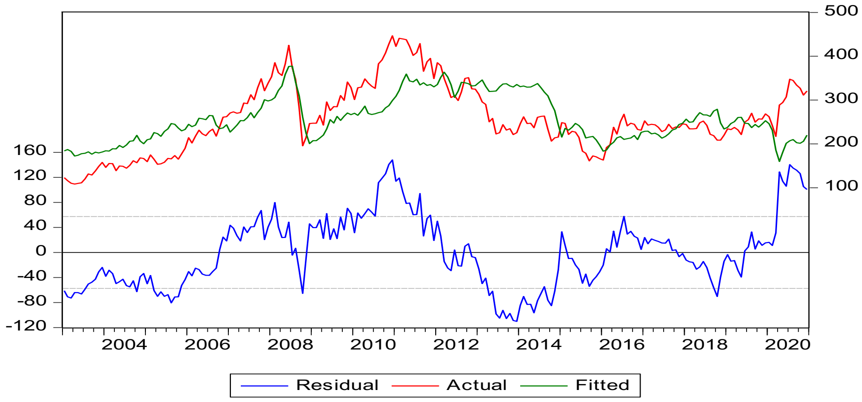
R-squared	0.000075	Mean dependent var	1.047175
Adjusted R-squared	-0.004642	S.D. dependent var	2.317967
S.E. of regression	2.323340	Akaike info criterion	4.533191
Sum squared resid	1144.357	Schwarz criterion	4.564648
Log likelihood	-483.0514	Hannan-Quinn criter.	4.545902
F-statistic	0.015901	Durbin-Watson stat	1.998761
Prob(F-statistic)	0.899772		



Series: Standardized Residuals
Sample 2003M02 2020M12
Observations 215

Mean	-0.002577
Median	0.009749
Maximum	4.893913
Minimum	-4.362881
Std. Dev.	1.025012
Skewness	0.189203
Kurtosis	5.869589
Jarque-Bera	75.05051
Probability	0.000000

Materials Sector



Heteroskedasticity Test: ARCH

F-statistic	573.3532	Prob. F(1,213)	0.0000
Obs*R-squared	156.7628	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	486.0820	192.0654	2.530816	0.0121
RESID^2(-1)	0.858999	0.035874	23.94479	0.0000

R-squared	0.729129	Mean dependent var	3266.793
Adjusted R-squared	0.727858	S.D. dependent var	4299.877
S.E. of regression	2243.128	Akaike info criterion	18.27839
Sum squared resid	1.07E+09	Schwarz criterion	18.30974
Log likelihood	-1962.927	Hannan-Quinn criter.	18.29106
F-statistic	573.3532	Durbin-Watson stat	2.251212
Prob(F-statistic)	0.000000		

Dependent Variable: MATERI
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Convergence achieved after 48 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*OILPRI

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	3.969582	3.197768	1.241360	0.2145
MATERI(-1)	0.989554	0.013852	71.43558	0.0000
		Variance Equation		
C(3)	0.027498	0.190862	0.144075	0.8854
C(4)	0.286055	0.088296	3.239720	0.0012
C(5)	-0.022661	0.055682	-0.406976	0.6840
C(6)	0.938621	0.037066	25.32288	0.0000
C(7)	0.001525	0.001039	1.468735	0.1419

R-squared	0.934857	Mean dependent var	258.1873
Adjusted R-squared	0.934551	S.D. dependent var	77.25456
S.E. of regression	19.76406	Akaike info criterion	8.597136
Sum squared resid	83201.61	Schwarz criterion	8.706878
Log likelihood	-917.1921	Hannan-Quinn criter.	8.641477
Durbin-Watson stat	2.073397		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob*

*|. |	*|. |	1	-0.082	-0.082	1.4579	0.227
.|. |	.|. |	2	-0.009	-0.016	1.4766	0.478
.|. |	.|. |	3	0.047	0.045	1.9661	0.579
.|. |	.|. |	4	-0.012	-0.004	1.9961	0.736
.|. |	.|. |	5	-0.059	-0.059	2.7592	0.737
.|* |	.|* |	6	0.089	0.078	4.5214	0.606
*|. |	*|. |	7	-0.082	-0.070	6.0159	0.538
*|. |	*|. |	8	-0.091	-0.098	7.8892	0.444
.|. |	.|. |	9	0.043	0.020	8.3136	0.503
.|. |	.|. |	10	-0.029	-0.021	8.5057	0.580
.|* |	.|* |	11	0.118	0.133	11.665	0.389
*|. |	*|. |	12	-0.082	-0.087	13.223	0.353
.|. |	.|. |	13	-0.003	-0.009	13.225	0.431
.|. |	.|. |	14	-0.016	-0.017	13.285	0.504
.|* |	.|. |	15	0.074	0.061	14.561	0.483
.|. |	.|. |	16	-0.000	0.024	14.561	0.557
.|. |	.|. |	17	0.031	0.007	14.793	0.610
.|. |	.|* |	18	0.061	0.091	15.686	0.614
*|. |	.|. |	19	-0.074	-0.058	16.973	0.592
.|. |	.|. |	20	-0.017	-0.043	17.043	0.650
.|. |	*|. |	21	-0.054	-0.075	17.743	0.665
.|. |	.|. |	22	-0.001	-0.012	17.744	0.721
.|. |	.|. |	23	0.001	0.048	17.744	0.771
.|. |	.|. |	24	-0.009	-0.030	17.765	0.814
.|. |	.|. |	25	0.004	0.033	17.768	0.852
.|* |	.|. |	26	0.089	0.073	19.722	0.805
.|. |	.|. |	27	-0.010	0.001	19.747	0.841
*|. |	*|. |	28	-0.087	-0.109	21.653	0.797
.|. |	.|. |	29	0.065	0.015	22.710	0.790
.|. |	.|. |	30	-0.020	0.027	22.815	0.823
.|. |	.|. |	31	-0.019	-0.008	22.906	0.853
.|. |	.|. |	32	0.019	0.004	23.002	0.878
.|. |	*|. |	33	-0.051	-0.071	23.662	0.884
*|. |	*|. |	34	-0.101	-0.079	26.274	0.825
.|* |	.|* |	35	0.103	0.077	29.011	0.752
.|. |	.|. |	36	0.000	0.004	29.011	0.789

*Probabilities may not be valid for this equation specification.

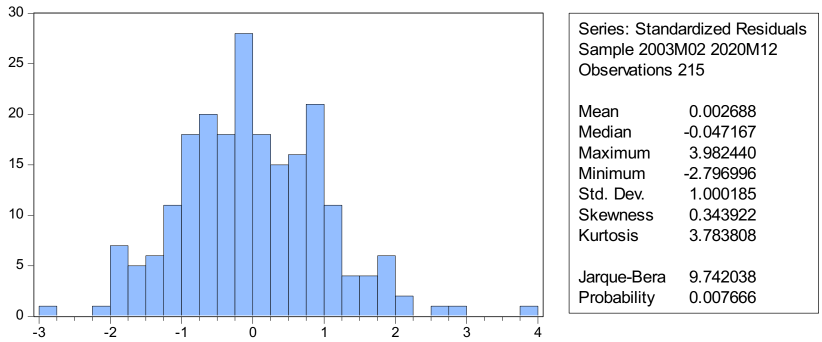
Heteroskedasticity Test: ARCH

F-statistic	0.014255	Prob. F(1,212)	0.9051
Obs*R-squared	0.014388	Prob. Chi-Square(1)	0.9045

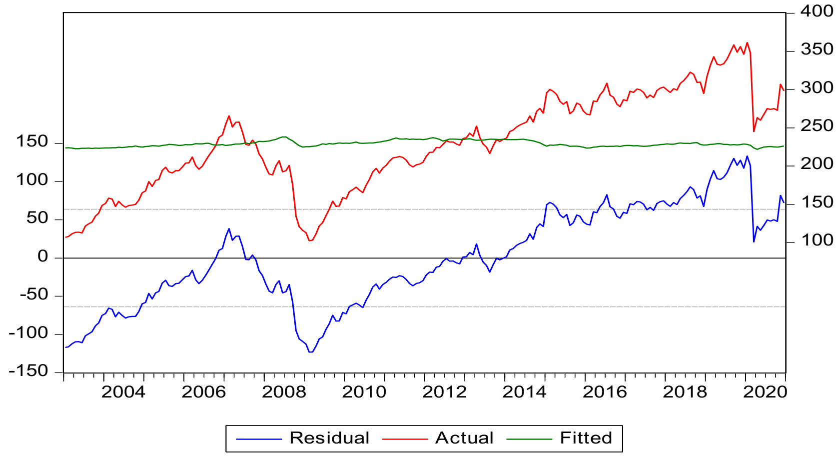
Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.001719	0.133437	7.507069	0.0000
WGT_RESID^2(-1)	-0.008202	0.068700	-0.119393	0.9051

R-squared	0.000067	Mean dependent var	0.993522
Adjusted R-squared	-0.004649	S.D. dependent var	1.669917
S.E. of regression	1.673794	Akaike info criterion	3.877365
Sum squared resid	593.9366	Schwarz criterion	3.908823
Log likelihood	-412.8781	Hannan-Quinn criter.	3.890077
F-statistic	0.014255	Durbin-Watson stat	1.998705
Prob(F-statistic)	0.905077		



Real Estate Sector



Heteroskedasticity Test: ARCH

F-statistic	1594.777	Prob. F(1,213)	0.0000
Obs*R-squared	189.6678	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	251.6603	136.2887	1.846523	0.0662
RESID^2(-1)	0.927996	0.023238	39.93466	0.0000

R-squared	0.882176	Mean dependent var	4004.901
Adjusted R-squared	0.881623	S.D. dependent var	4206.281
S.E. of regression	1447.214	Akaike info criterion	17.40193
Sum squared resid	4.46E+08	Schwarz criterion	17.43328
Log likelihood	-1868.707	Hannan-Quinn criter.	17.41460
F-statistic	1594.777	Durbin-Watson stat	1.801236
Prob(F-statistic)	0.000000		

Dependent Variable: REAEST
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Convergence achieved after 29 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)

*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*OILPRI

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.884193	1.778470	1.621727	0.1049
REAEST(-1)	0.994720	0.006539	152.1234	0.0000
		Variance Equation		
C(3)	6.291561	0.706701	8.902720	0.0000
C(4)	0.628877	0.159466	3.943636	0.0001
C(5)	-0.359971	0.068504	-5.254733	0.0000
C(6)	-0.371075	0.098349	-3.773029	0.0002
C(7)	-0.014354	0.004628	-3.101688	0.0019

R-squared	0.969614	Mean dependent var	229.7195
Adjusted R-squared	0.969472	S.D. dependent var	63.50261
S.E. of regression	11.09539	Akaike info criterion	7.124531
Sum squared resid	26221.95	Schwarz criterion	7.234273
Log likelihood	-758.8871	Hannan-Quinn criter.	7.168872
Durbin-Watson stat	1.902333		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	0.016	0.016	0.0535	0.817
.|. |	.|. |	2	0.008	0.007	0.0666	0.967
.|. |	.|. |	3	0.044	0.044	0.4963	0.920
.|. |	.|. |	4	-0.050	-0.052	1.0512	0.902
.|. |	.|. |	5	-0.008	-0.007	1.0653	0.957
*|. |	*|. |	6	-0.067	-0.069	2.0769	0.912
.|. |	.|. |	7	-0.030	-0.023	2.2724	0.943
.|. |	.|. |	8	0.049	0.049	2.8090	0.946
*|. |	*|. |	9	-0.084	-0.080	4.3898	0.884
.|. |	.|. |	10	-0.025	-0.027	4.5277	0.920
.|. |	.|. |	11	-0.013	-0.019	4.5643	0.950
.|. |	.|. |	12	-0.036	-0.028	4.8568	0.963
*|. |	*|. |	13	-0.082	-0.091	6.4131	0.930
.|. |	.|. |	14	0.035	0.043	6.7017	0.946
.|* |	.|* |	15	0.096	0.090	8.8445	0.886
.|* |	.|* |	16	0.103	0.096	11.318	0.789
.|. |	.|. |	17	-0.018	-0.031	11.399	0.835
.|. |	.|. |	18	-0.038	-0.056	11.732	0.861
.|. |	*|. |	19	-0.059	-0.076	12.554	0.861
.|. |	.|. |	20	-0.062	-0.049	13.465	0.857
.|. |	.|. |	21	-0.002	0.023	13.466	0.891
*|. |	*|. |	22	-0.069	-0.069	14.609	0.878
.|. |	.|. |	23	-0.014	-0.021	14.659	0.906
.|. |	.|. |	24	-0.030	-0.043	14.885	0.924
.|. |	.|. |	25	-0.006	0.009	14.893	0.944
.|. |	.|. |	26	-0.020	-0.036	14.994	0.957
*|. |	.|. |	27	-0.069	-0.060	16.175	0.950
.|. |	.|. |	28	-0.058	-0.060	17.023	0.948
.|. |	.|. |	29	-0.015	-0.024	17.079	0.961
.|. |	.|. |	30	-0.013	-0.035	17.120	0.971
.|. |	.|. |	31	0.027	-0.018	17.302	0.977
.|. |	.|. |	32	-0.001	-0.033	17.303	0.984
.|. |	.|. |	33	0.019	0.006	17.392	0.988
.|. |	.|. |	34	0.021	0.031	17.511	0.991

.|. |	.|. |	35	-0.011	-0.011	17.542	0.994
.|. |	.|. |	36	-0.014	-0.029	17.595	0.996

*Probabilities may not be valid for this equation specification.

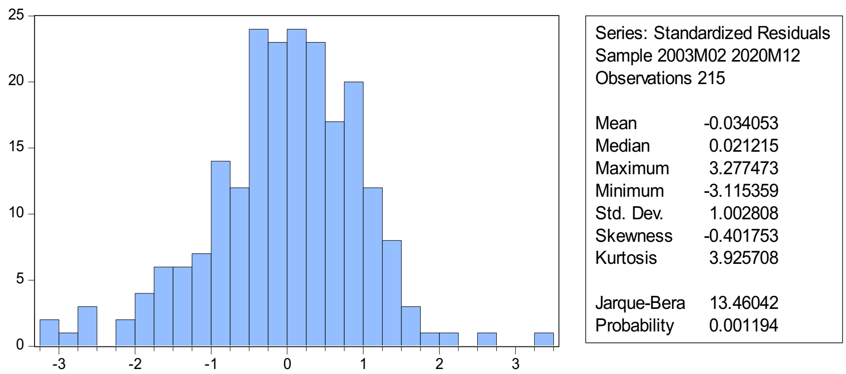
Heteroskedasticity Test: ARCH

F-statistic	0.306014	Prob. F(1,212)	0.5807
Obs*R-squared	0.308456	Prob. Chi-Square(1)	0.5786

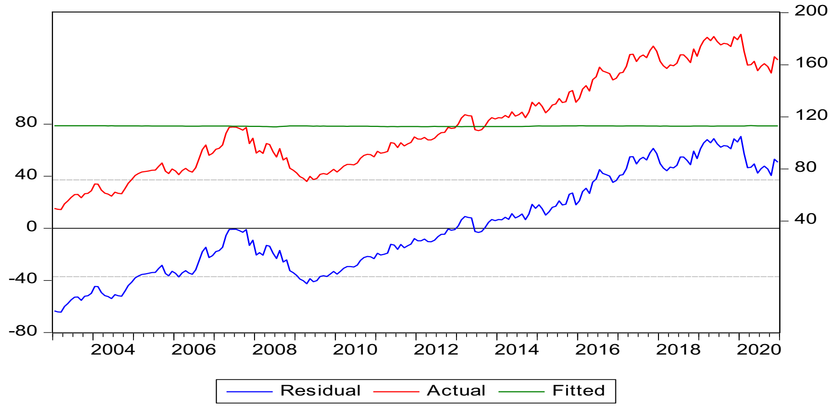
Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.968730	0.137329	7.054095	0.0000
WGT_RESID^2(-1)	0.037936	0.068578	0.553185	0.5807

R-squared	0.001441	Mean dependent var	1.006770
Adjusted R-squared	-0.003269	S.D. dependent var	1.736111
S.E. of regression	1.738946	Akaike info criterion	3.953737
Sum squared resid	641.0737	Schwarz criterion	3.985195
Log likelihood	-421.0499	Hannan-Quinn criter.	3.966449
F-statistic	0.306014	Durbin-Watson stat	2.016085
Prob(F-statistic)	0.580719		



Telecommunications Sector



Heteroskedasticity Test: ARCH

F-statistic	3505.512	Prob. F(1,213)	0.0000
Obs*R-squared	202.6846	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	43.19929	30.61374	1.411108	0.1597
RESID^2(-1)	0.963325	0.016270	59.20736	0.0000

R-squared	0.942719	Mean dependent var	1355.863
Adjusted R-squared	0.942450	S.D. dependent var	1290.331
S.E. of regression	309.5447	Akaike info criterion	14.31734
Sum squared resid	20409211	Schwarz criterion	14.34870
Log likelihood	-1537.114	Hannan-Quinn criter.	14.33001
F-statistic	3505.512	Durbin-Watson stat	2.031545
Prob(F-statistic)	0.000000		

Dependent Variable: TELCOM
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Failure to improve likelihood (non-zero gradients) after 70 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*OILPRI

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.715316	0.169090	4.230384	0.0000
TELCOM(-1)	1.003189	2.26E-07	4435741.	0.0000
		Variance Equation		
C(3)	0.030296	0.051757	0.585349	0.5583
C(4)	-0.023274	0.061632	-0.377631	0.7057
C(5)	0.192667	0.048741	3.952903	0.0001
C(6)	1.005723	0.001989	505.6353	0.0000
C(7)	-2.84E-06	0.000155	-0.018373	0.9853

R-squared	0.987896	Mean dependent var	113.1721
Adjusted R-squared	0.987839	S.D. dependent var	36.90981
S.E. of regression	4.070222	Akaike info criterion	5.461659
Sum squared resid	3528.708	Schwarz criterion	5.571401
Log likelihood	-580.1284	Hannan-Quinn criter.	5.506000
Durbin-Watson stat	2.085557		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	-0.045	-0.045	0.4392	0.507
*|. |	*|. |	2	-0.074	-0.076	1.6265	0.443
.|. |	.|. |	3	0.025	0.018	1.7641	0.623

.|. |	.|. |	4	0.021	0.018	1.8648	0.761
*|. |	*|. |	5	-0.161	-0.157	7.6235	0.178
.|. |	.|. |	6	0.068	0.058	8.6647	0.193
.|. |	.|. |	7	0.070	0.053	9.7513	0.203
.|. |	.|. |	8	-0.013	0.006	9.7875	0.280
.|. |	.|. |	9	0.041	0.054	10.160	0.338
.|. |	.|. |	10	-0.021	-0.048	10.263	0.418
*|. |	*|. |	11	-0.143	-0.128	14.969	0.184
.|. |	.|. |	12	0.068	0.072	16.041	0.189
.|. |	.|. |	13	-0.029	-0.054	16.238	0.237
.|. |	.|* |	14	0.054	0.080	16.908	0.261
.|. |	.|. |	15	0.051	0.043	17.503	0.290
*|. |	*|. |	16	-0.094	-0.141	19.563	0.241
.|. |	.|. |	17	-0.053	-0.010	20.225	0.263
.|. |	.|. |	18	0.025	0.000	20.377	0.312
.|. |	.|. |	19	-0.040	-0.032	20.757	0.350
.|. |	.|* |	20	0.051	0.099	21.378	0.375
.|* |	.|. |	21	0.089	0.025	23.291	0.329
.|. |	.|. |	22	-0.029	-0.041	23.491	0.374
*|. |	*|. |	23	-0.125	-0.088	27.316	0.243
.|* |	.|. |	24	0.100	0.060	29.736	0.194
*|. |	.|. |	25	-0.083	-0.038	31.438	0.175
.|. |	.|. |	26	-0.057	-0.029	32.250	0.185
.|. |	*|. |	27	-0.008	-0.082	32.267	0.222
.|. |	*|. |	28	-0.037	-0.091	32.604	0.251
.|. |	.|* |	29	0.067	0.106	33.733	0.249
.|. |	*|. |	30	-0.061	-0.086	34.672	0.255
.|. |	.|. |	31	-0.028	0.007	34.869	0.289
.|. |	.|. |	32	0.007	0.013	34.883	0.333
.|. |	.|. |	33	0.032	-0.031	35.146	0.367
.|. |	.|. |	34	-0.064	-0.035	36.189	0.367
*|. |	*|. |	35	-0.078	-0.095	37.781	0.343
.|. |	.|. |	36	0.072	0.030	39.123	0.331

*Probabilities may not be valid for this equation specification.

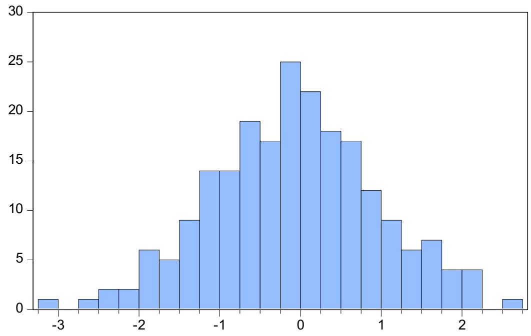
Heteroskedasticity Test: ARCH

F-statistic	1.316750	Prob. F(1,212)	0.2525
Obs*R-squared	1.320968	Prob. Chi-Square(1)	0.2504

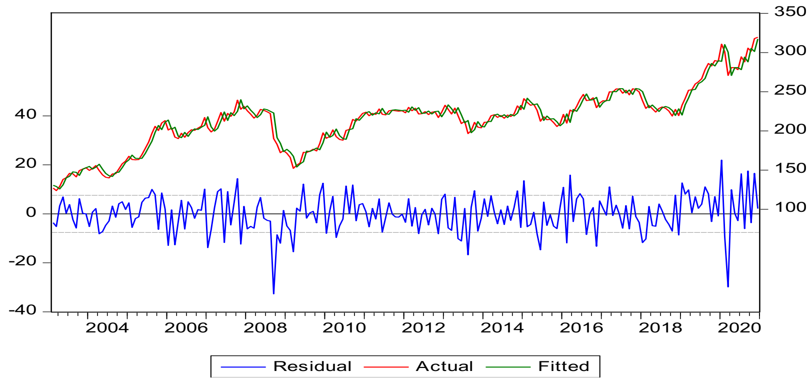
Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.120456	0.122909	9.116126	0.0000
WGT_RESID^2(-1)	-0.078590	0.068488	-1.147497	0.2525

R-squared	0.006173	Mean dependent var	1.038735
Adjusted R-squared	0.001485	S.D. dependent var	1.466512
S.E. of regression	1.465422	Akaike info criterion	3.611466
Sum squared resid	455.2621	Schwarz criterion	3.642924
Log likelihood	-384.4268	Hannan-Quinn criter.	3.624178
F-statistic	1.316750	Durbin-Watson stat	1.977770
Prob(F-statistic)	0.252469		



Utilities Sector



Heteroskedasticity Test: ARCH

F-statistic	2196.736	Prob. F(1,213)	0.0000
Obs*R-squared	195.9958	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24.69908	54.06210	0.456865	0.6482
RESID^2(-1)	1.005724	0.021458	46.86935	0.0000

R-squared	0.911609	Mean dependent var	1394.865
Adjusted R-squared	0.911194	S.D. dependent var	2237.602
S.E. of regression	666.8145	Akaike info criterion	15.85216
Sum squared resid	94708647	Schwarz criterion	15.88351
Log likelihood	-1702.107	Hannan-Quinn criter.	15.86483
F-statistic	2196.736	Durbin-Watson stat	2.457919
Prob(F-statistic)	0.000000		

Dependent Variable: UTILIT
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Failure to improve likelihood (singular hessian) after 39 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*OILPRI

Variable	Coefficient	Std. Error	z-Statistic	Prob.

C	6.616330	3.064518	2.159012	0.0308
UTILIT(-1)	0.972232	0.013520	71.90843	0.0000

Variance Equation

C(3)	8.338394	0.661580	12.60375	0.0000
C(4)	-0.215417	0.106159	-2.029198	0.0424
C(5)	-0.071185	0.069629	-1.022344	0.3066
C(6)	-0.881948	0.118220	-7.460226	0.0000
C(7)	-0.010077	0.006924	-1.455347	0.1456

R-squared	0.960662	Mean dependent var	214.1114
Adjusted R-squared	0.960477	S.D. dependent var	38.18099
S.E. of regression	7.590516	Akaike info criterion	6.875898
Sum squared resid	12272.19	Schwarz criterion	6.985640
Log likelihood	-732.1590	Hannan-Quinn criter.	6.920239
Durbin-Watson stat	2.136535		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
*|. |	*|. |	1	-0.082	-0.082	1.4779	0.224
.|. |	.|. |	2	0.053	0.047	2.0990	0.350
.|* |	.|* |	3	0.162	0.172	7.8968	0.048
*|. |	*|. |	4	-0.098	-0.076	10.037	0.040
.|* |	.|. |	5	0.093	0.063	11.974	0.035
.|. |	.|. |	6	0.052	0.049	12.573	0.050
.|. |	.|. |	7	-0.059	-0.034	13.343	0.064
.|. |	.|. |	8	0.043	-0.001	13.763	0.088
*|. |	.|. |	9	-0.067	-0.064	14.777	0.097
.|* |	.|* |	10	0.095	0.105	16.826	0.078
*|. |	*|. |	11	-0.102	-0.110	19.205	0.058
.|. |	.|. |	12	0.030	0.036	19.412	0.079
.|. |	.|. |	13	-0.034	-0.061	19.677	0.104
.|. |	.|. |	14	-0.014	0.035	19.722	0.139
.|. |	.|. |	15	0.026	-0.003	19.883	0.176
*|. |	*|. |	16	-0.120	-0.110	23.234	0.108
.|. |	.|. |	17	0.023	0.025	23.361	0.138
.|. |	*|. |	18	-0.066	-0.080	24.378	0.143
.|. |	.|. |	19	-0.018	0.042	24.452	0.179
.|. |	.|. |	20	0.050	-0.004	25.047	0.200
.|. |	.|. |	21	-0.018	0.060	25.126	0.242
.|. |	.|. |	22	-0.031	-0.065	25.365	0.280
.|. |	.|. |	23	0.019	0.019	25.453	0.327
.|. |	.|. |	24	-0.044	-0.036	25.929	0.357
.|* |	.|* |	25	0.092	0.085	27.995	0.308
.|. |	.|. |	26	0.039	0.070	28.376	0.340
.|. |	.|. |	27	-0.006	-0.032	28.384	0.391
.|. |	.|. |	28	0.007	0.007	28.397	0.444
.|. |	.|. |	29	-0.019	-0.062	28.491	0.492
.|. |	.|. |	30	0.006	0.033	28.500	0.544
.|. |	.|. |	31	0.001	-0.043	28.501	0.595
.|. |	.|. |	32	0.024	0.058	28.643	0.637
.|. |	.|. |	33	0.055	0.043	29.428	0.646
.|. |	.|. |	34	-0.049	-0.040	30.054	0.662
.|. |	.|. |	35	-0.012	-0.049	30.089	0.704
.|. |	.|. |	36	0.001	-0.012	30.089	0.745

*Probabilities may not be valid for this equation specification.

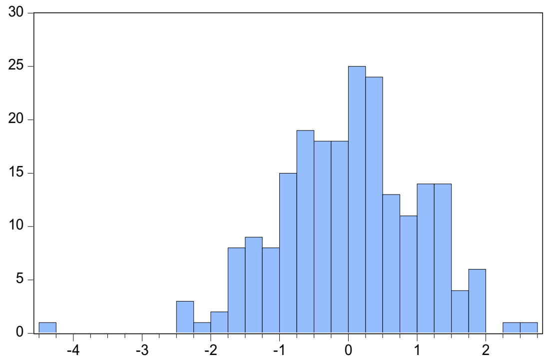
Heteroskedasticity Test: ARCH

F-statistic	1.809704	Prob. F(1,212)	0.1800
Obs*R-squared	1.811315	Prob. Chi-Square(1)	0.1784

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.918748	0.136424	6.734515	0.0000
WGT_RESID^2(-1)	0.091950	0.068351	1.345252	0.1800

R-squared	0.008464	Mean dependent var	1.011496
Adjusted R-squared	0.003787	S.D. dependent var	1.725368
S.E. of regression	1.722098	Akaike info criterion	3.934265
Sum squared resid	628.7115	Schwarz criterion	3.965723
Log likelihood	-418.9664	Hannan-Quinn criter.	3.946977
F-statistic	1.809704	Durbin-Watson stat	2.004048
Prob(F-statistic)	0.179981		



Series: Standardized Residuals	
Sample 2003M02 2020M12	
Observations 215	
Mean	0.013481
Median	0.043834
Maximum	2.519031
Minimum	-4.376006
Std. Dev.	1.005937
Skewness	-0.362938
Kurtosis	3.929512
Jarque-Bera	12.46004
Probability	0.001969

B.2 Business Cycle, Stock Market and Oil Prices

Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L sequentially determined breaks
Sample: 1990Q1 2020Q4
Included observations: 123
Breaking variables: EXRATE GDP INFLAT INTRAT M_2 OILPRI C
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks: 2

Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	104.1958	104.1958	21.87
1 vs. 2 *	88.59002	88.59002	24.17
2 vs. 3	24.82708	24.82708	25.13

* Significant at the 0.05 level.
** Bai-Perron critical values.

Break dates:

	Sequential	Repartition
1	1998Q1	1998Q1
2	2008Q1	2008Q1

Dependent Variable: STINDEX
Method: Markov Switching Regression (BFGS / Marquardt steps)
Sample (adjusted): 1990Q1 2020Q4
Included observations: 123 after adjustments
Number of states: 2
Initial probabilities obtained from ergodic solution
Standard errors & covariance computed using observed Hessian
Random search: 25 starting values with 10 iterations using 1 standard deviation (rng=kn, seed=1995349881)
Convergence achieved after 89 iterations

Variable	Coefficient	Std. Error	z-Statistic	Prob.
		Regime 1		
EXRATE	4129.124	2424.182	1.703306	0.0885
GDP	12.11024	4.226224	2.865499	0.0042
INFLAT	-176.3820	130.0237	-1.356537	0.1749
INTRAT	782.9511	86.25532	9.077135	0.0000
M_2	5.699947	1.111448	5.128396	0.0000
OILPRI	22.10427	11.66706	1.894587	0.0581
C	-4673.000	1825.484	-2.559870	0.0105
LOG(SIGMA)	6.453983	0.094012	68.65056	0.0000
		Regime 2		
EXRATE	-7724.634	1799.566	-4.292498	0.0000
GDP	6.845367	2.994524	2.285962	0.0223
INFLAT	122.9315	58.95970	2.085009	0.0371
INTRAT	-46.00101	37.87624	-1.214508	0.2246
M_2	5.236488	0.608941	8.599335	0.0000
OILPRI	44.75666	8.204699	5.455004	0.0000
C	5849.187	1545.756	3.784030	0.0002
LOG(SIGMA)	5.842692	0.115548	50.56516	0.0000

Transition Matrix Parameters

P11-C	2.964657	0.587019	5.050360	0.0000
P21-C	-2.892047	0.687996	-4.203581	0.0000

Mean dependent var	9762.708	S.D. dependent var	4259.507
S.E. of regression	799.1522	Sum squared resid	68334933
Durbin-Watson stat	1.011784	Log likelihood	-958.4812
Akaike info criterion	15.87774	Schwarz criterion	16.28928
Hannan-Quinn criter.	16.04491		

Transition summary: Constant Markov transition probabilities and expected durations
Sample (adjusted): 1990Q1 2020Q4
Included observations: 123 after adjustments

Constant transition probabilities:
P(i, k) = P(s(t) = k | s(t-1) = i)
(row = i / column = j)

	1	2
1	0.950952	0.049048
2	0.052548	0.947452

Constant expected durations:

	1	2
	20.38805	19.03018

Break period - 1990Q1 - 2008Q4.

Dependent Variable: STINDEX
Method: Markov Switching Regression (BFGS / Marquardt steps)
Date: 09/29/22 Time: 23:01
Sample: 1990Q1 2008Q4
Included observations: 74
Number of states: 2
Initial probabilities obtained from ergodic solution
Standard errors & covariance computed using observed Hessian
Random search: 25 starting values with 10 iterations using 1 standard deviation (rng=kn, seed=2008164267)
Convergence achieved after 101 iterations

Variable	Coefficient	Std. Error	z-Statistic	Prob.
		Regime 1		
EXRATE	-1.114256	0.419121	-2.658553	0.0078
GDP	0.974549	0.313782	3.105812	0.0019
INFLAT	0.043491	0.023620	1.841254	0.0656
INTRAT	-0.144103	0.074590	-1.931948	0.0534
M_2	-0.643396	0.424245	-1.516565	0.1294
OILPRI	-0.098243	0.103020	-0.953630	0.3403
C	3.171555	0.925513	3.426807	0.0006
		Regime 2		
EXRATE	-0.367312	0.339215	-1.082830	0.2789
GDP	0.087821	0.376856	0.233035	0.8157
INFLAT	-0.144291	0.056637	-2.547655	0.0108
INTRAT	0.321955	0.046441	6.932579	0.0000
M_2	0.106365	0.371043	0.286666	0.7744
OILPRI	0.463756	0.099451	4.663155	0.0000
C	2.540855	0.464444	5.470751	0.0000
		Common		
LOG(SIGMA)	-3.637956	0.102068	-35.64236	0.0000
		Transition Matrix Parameters		
P11-C	3.064031	0.945634	3.240185	0.0012
P21-C	-3.259722	0.940787	-3.464888	0.0005

Mean dependent var	3.821715	S.D. dependent var	0.194853
S.E. of regression	0.041136	Sum squared resid	0.099839
Durbin-Watson stat	1.072828	Log likelihood	154.2609
Akaike info criterion	-3.709753	Schwarz criterion	-3.180441
Hannan-Quinn criter.	-3.498604		

Transition summary: Constant Markov transition
probabilities and expected durations
Sample (adjusted): 1990Q1 2008Q4
Included observations: 74

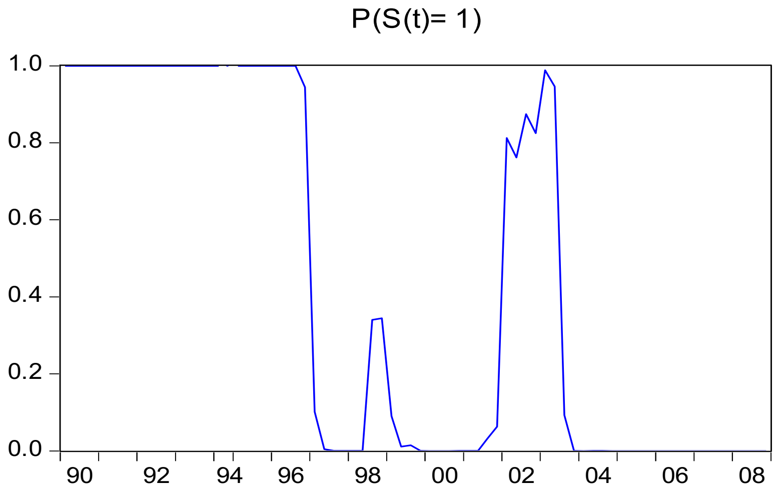
Constant transition probabilities:
P(i, k) = P(s(t) = k | s(t-1) = i)
(row = i / column = j)

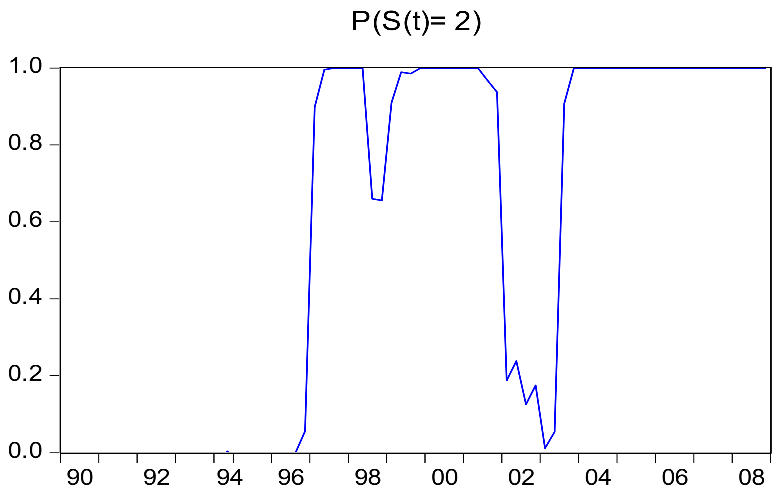
	1	2
1	0.955384	0.044616
2	0.036979	0.963021

Constant expected durations:

	1	2
	22.41370	27.04230

Filtered Regime Probabilities





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Break period - 2009Q1 - 2020Q4.

Dependent Variable: STINDEX
Method: Markov Switching Regression (BFGS / Marquardt steps)
Date: 09/29/22 Time: 23:32
Sample: 2009Q1 2020Q4
Included observations: 47
Number of states: 2
Initial probabilities obtained from ergodic solution
Standard errors & covariance computed using observed Hessian
Random search: 25 starting values with 10 iterations using 1 standard deviation (rng=kn, seed=508718887)
Convergence achieved after 80 iterations

Variable	Coefficient	Std. Error	z-Statistic	Prob.
		Regime 1		
EXRATE	0.325403	0.268866	1.210279	0.2262
GDP	0.022885	0.021650	1.057014	0.2905
INFLAT	0.026319	0.015358	1.713629	0.0366
INTRAT	-0.065345	0.034739	-1.881012	0.0500
M_2	0.698607	0.118168	5.912001	0.0000
OILPRI	0.111925	0.061747	1.812634	0.0699
C	1.731402	0.354570	4.883101	0.0000
		Regime 2		
EXRATE	0.420685	0.385564	1.091091	0.0452
GDP	0.003196	0.008352	0.382714	0.7019
INFLAT	0.002134	0.011846	0.180174	0.8570
INTRAT	-0.129345	0.036004	-3.592540	0.0003
M_2	0.738731	0.059564	12.40221	0.0000
OILPRI	0.160013	0.109914	1.455801	0.0454
C	1.512597	0.205712	7.352987	0.0000
		Common		
LOG(SIGMA)	-4.414296	0.132385	-33.34451	0.0000
		Transition Matrix Parameters		
P11-C	2.386909	0.795547	3.000339	0.0027
P21-C	-2.264844	1.024705	-2.210241	0.0271

Mean dependent var	4.141516	S.D. dependent var	0.062608
S.E. of regression	0.022772	Sum squared resid	0.016593
Durbin-Watson stat	1.233143	Log likelihood	127.4456
Akaike info criterion	-4.699812	Schwarz criterion	-4.030609
Hannan-Quinn criter.	-4.447986		

Transition summary: Constant Markov transition
probabilities and expected durations
Sample: 2009Q1 2020Q4
Included observations: 47

Constant transition probabilities:
P(i, k) = P(s(t) = k | s(t-1) = i)
(row = i / column = j)

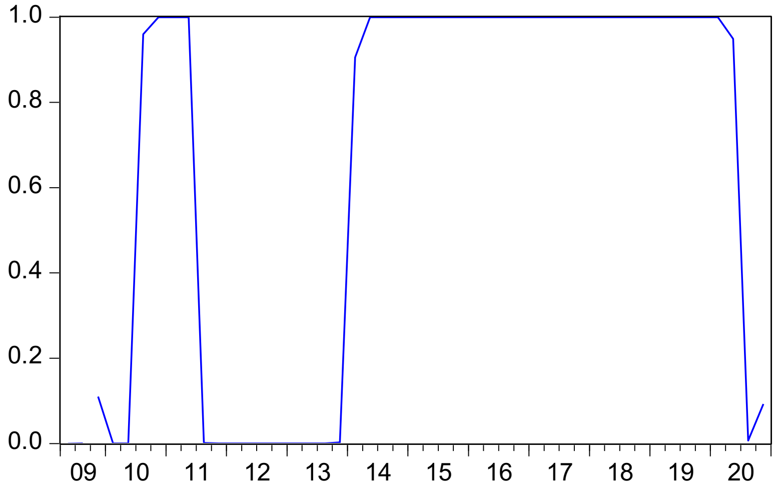
	1	2
1	0.915824	0.084176
2	0.094077	0.905923

Constant expected durations:

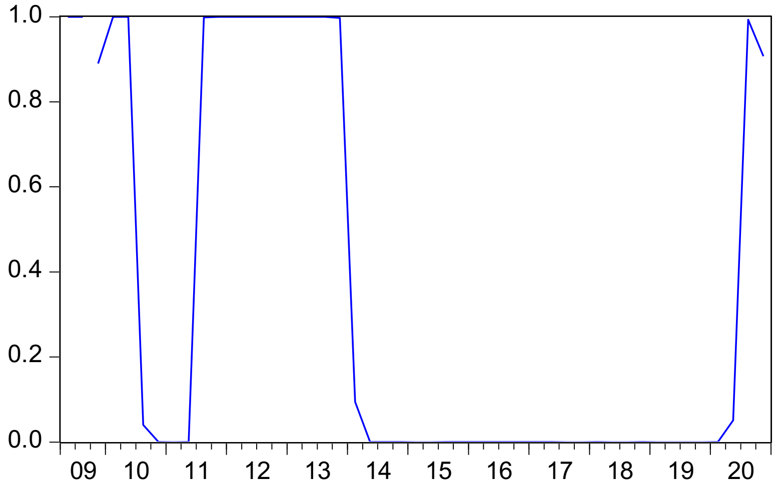
	1	2
	11.87982	10.62962

Filtered Regime Probabilities

P(S(t)= 1)



P(S(t)= 2)



B.3 Oil Price and Stock Markets (Net Oil-Importing and Exporting Countries)

NET OIL EXPORTING COUNTRIES

Unit Root Tests

Panel unit root test: Summary
Series: EXRATE
Date: 09/29/22 Time: 15:54
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.25430	0.3996	3	633
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.29195	0.3852	3	633
ADF - Fisher Chi-square	5.69034	0.4588	3	633
PP - Fisher Chi-square	7.27434	0.2962	3	645

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(EXRATE)
Date: 09/29/22 Time: 15:55
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-4.60330	0.0000	3	630
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-9.74846	0.0000	3	630
ADF - Fisher Chi-square	103.557	0.0000	3	630
PP - Fisher Chi-square	269.985	0.0000	3	642

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: INFLAT
Date: 09/29/22 Time: 15:58
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.38250	0.3510	5	1055
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.35866	0.0092	5	1055
ADF - Fisher Chi-square	19.8689	0.0305	5	1055
PP - Fisher Chi-square	16.4847	0.0866	5	1075

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(INFLAT)
Date: 09/29/22 Time: 15:58
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-10.5540	0.0000	5	1050
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-11.0091	0.0000	5	1050
ADF - Fisher Chi-square	139.646	0.0000	5	1050
PP - Fisher Chi-square	471.862	0.0000	5	1070

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: INTRATE
Date: 09/29/22 Time: 16:12
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.35215	0.3624	5	1055
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.73704	0.2306	5	1055
ADF - Fisher Chi-square	9.47896	0.4873	5	1055
PP - Fisher Chi-square	7.80084	0.6483	5	1075

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(INTRATE)
Date: 09/29/22 Time: 16:14
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-9.82408	0.0000	5	1050
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-8.98776	0.0000	5	1050
ADF - Fisher Chi-square	103.751	0.0000	5	1050
PP - Fisher Chi-square	325.708	0.0000	5	1070

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: M2
Date: 09/29/22 Time: 16:36
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	1.69502	0.9550	5	1055
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	4.61827	1.0000	5	1055
ADF - Fisher Chi-square	0.21422	1.0000	5	1055
PP - Fisher Chi-square	0.14070	1.0000	5	1075

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(M2)
Date: 09/29/22 Time: 16:37
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.44016	0.0073	5	1050
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-9.40595	0.0000	5	1050
ADF - Fisher Chi-square	110.874	0.0000	5	1050
PP - Fisher Chi-square	594.004	0.0000	5	1070

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: OILPRICE
Date: 09/29/22 Time: 16:37
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.99265	0.0231	5	1055
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.35274	0.0093	5	1055
ADF - Fisher Chi-square	19.8230	0.0310	5	1055
PP - Fisher Chi-square	14.9679	0.1332	5	1075

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: STINDEX
Date: 09/29/22 Time: 16:39
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

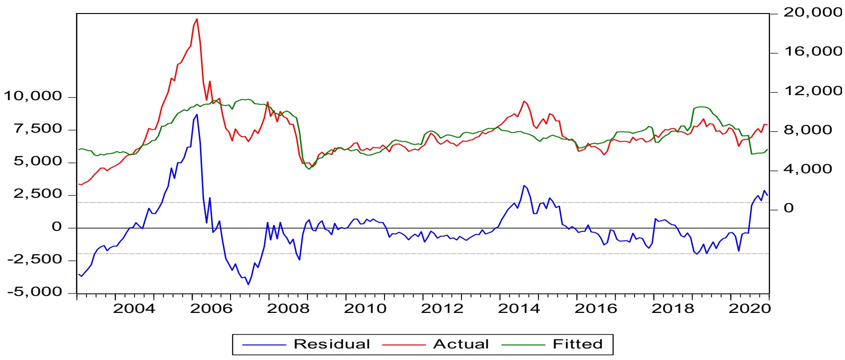
Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.62128	0.0525	5	1055
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.95360	0.0000	5	1055
ADF - Fisher Chi-square	34.3416	0.0002	5	1055
PP - Fisher Chi-square	28.6137	0.0014	5	1075

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Saudi Arabia

Descriptive Statistics

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	0.266662	2.574861	2.676620	1084.644	69.71644	7797.428
Median	0.266667	2.255000	2.000000	1072.202	64.03000	7404.130
Maximum	0.266700	11.10000	5.500000	1962.840	132.7200	19502.65
Minimum	0.266100	-3.240000	1.500000	314.3040	18.38000	2569.800
Std. Dev.	5.16E-05	2.785065	1.247051	511.0164	27.51306	2578.464
Skewness	-7.958109	0.839654	1.496446	-0.047180	0.404962	1.626292
Kurtosis	78.21971	4.075959	3.558757	1.544034	2.115133	7.617873
Jarque-Bera	53201.98	35.79986	83.42646	19.15867	12.95071	287.1364
Probability	0.000000	0.000000	0.000000	0.000069	0.001541	0.000000
Sum	57.59896	556.1700	578.1500	234283.1	15058.75	1684244.
Sum Sq. Dev.	5.72E-07	1667.666	334.3544	56144614	162748.3	1.43E+09
Observations	216	216	216	216	216	216



Heteroskedasticity Test: ARCH

F-statistic	716.4633	Prob. F(1,213)	0.0000
Obs*R-squared	165.7296	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	431410.3	324637.5	1.328898	0.1853
RESID^2(-1)	0.876321	0.032739	26.76683	0.0000

R-squared	0.770835	Mean dependent var	3691492.
Adjusted R-squared	0.769760	S.D. dependent var	9195715.
S.E. of regression	4412414.	Akaike info criterion	33.44700
Sum squared resid	4.15E+15	Schwarz criterion	33.47836
Log likelihood	-3593.553	Hannan-Quinn criter.	33.45967
F-statistic	716.4633	Durbin-Watson stat	1.322044
Prob(F-statistic)	0.000000		

Dependent Variable: STINDEX
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Failure to improve likelihood (non-zero gradients) after 105 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*EXRATE + C(8)*INFLAT + C(9)*INTRATE + C(10)* M_2
+ C(11)*OILPRICE

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	527.7419	28.43978	18.55647	0.0000
STINDEX(-1)	0.941498	0.001003	938.8708	0.0000
		Variance Equation		
C(3)	6.799628	0.000232	29307.42	0.0000
C(4)	-0.070962	0.052818	-1.343521	0.1791
C(5)	0.290531	0.044086	6.590081	0.0000
C(6)	0.977488	1.32E-06	739672.0	0.0000
C(7)	-23.94443	0.002043	-11719.91	0.0000
C(8)	0.006398	0.006246	1.024378	0.3057
C(9)	-0.010994	0.008513	-1.291405	0.1966
C(10)	-8.15E-07	1.81E-05	-0.045138	0.9640
C(11)	-0.000504	0.000665	-0.757268	0.4489

R-squared	0.928694	Mean dependent var	7821.397
Adjusted R-squared	0.928360	S.D. dependent var	2560.247
S.E. of regression	685.2690	Akaike info criterion	15.21337
Sum squared resid	1.00E+08	Schwarz criterion	15.38582
Log likelihood	-1624.437	Hannan-Quinn criter.	15.28304
Durbin-Watson stat	1.588758		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|* |	.|* |	1	0.173	0.173	6.4951	0.011
.|. |	.|. |	2	0.020	-0.010	6.5846	0.037
.|. |	.|. |	3	0.018	0.017	6.6580	0.084
.|. |	.|. |	4	0.068	0.064	7.6683	0.105
.|* |	.|* |	5	0.099	0.079	9.8350	0.080

.|. |	.|. |	6	0.053	0.023	10.451	0.107
.|* |	.|* |	7	0.088	0.077	12.202	0.094
.|. |	.|. |	8	0.051	0.020	12.791	0.119
.|. |	.|. |	9	0.041	0.020	13.166	0.155
.|. |	.|. |	10	-0.003	-0.025	13.168	0.214
*|. |	*|. |	11	-0.068	-0.082	14.240	0.220
.|. |	.|. |	12	-0.008	-0.003	14.256	0.285
*|. |	*|. |	13	-0.095	-0.113	16.328	0.232
.|. |	.|. |	14	0.004	0.027	16.332	0.294
.|. |	.|. |	15	0.012	0.009	16.366	0.358
.|. |	.|. |	16	-0.043	-0.040	16.800	0.399
*|. |	*|. |	17	-0.116	-0.092	19.973	0.276
*|. |	.|. |	18	-0.082	-0.023	21.562	0.252
.|. |	.|. |	19	-0.011	0.015	21.589	0.305
*|. |	*|. |	20	-0.083	-0.067	23.253	0.277
.|. |	.|. |	21	-0.011	0.037	23.280	0.329
.|. |	.|. |	22	-0.019	-0.001	23.363	0.381
.|. |	.|. |	23	-0.001	0.022	23.364	0.440
.|. |	.|. |	24	-0.060	-0.055	24.238	0.448
*|. |	.|. |	25	-0.067	-0.018	25.344	0.443
.|. |	.|. |	26	-0.028	-0.012	25.533	0.489
.|. |	.|. |	27	-0.012	0.003	25.568	0.543
.|. |	.|. |	28	0.024	0.022	25.712	0.589
.|. |	.|. |	29	0.028	0.027	25.912	0.630
.|. |	.|. |	30	0.009	-0.007	25.931	0.679
.|. |	.|. |	31	0.006	0.002	25.941	0.724
.|. |	.|. |	32	-0.058	-0.046	26.813	0.727
.|. |	.|. |	33	-0.023	-0.028	26.954	0.762
.|. |	.|. |	34	0.056	0.059	27.757	0.766
.|. |	.|. |	35	0.073	0.037	29.122	0.747
.|. |	*|. |	36	-0.050	-0.081	29.781	0.758

*Probabilities may not be valid for this equation specification.

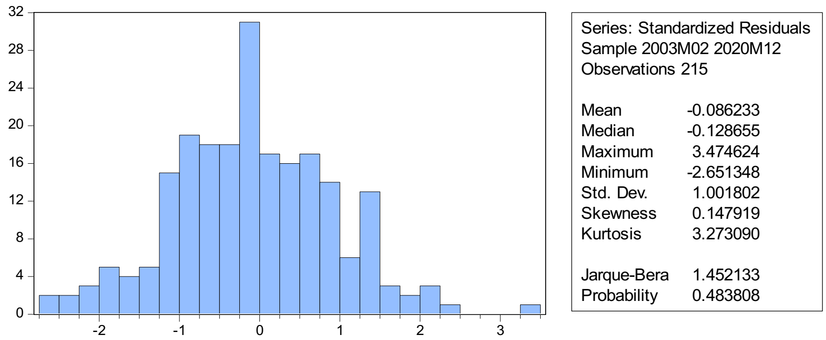
Heteroskedasticity Test: ARCH

F-statistic	0.488955	Prob. F(1,212)	0.4852
Obs*R-squared	0.492432	Prob. Chi-Square(1)	0.4828

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.951881	0.124061	7.672660	0.0000
WGT_RESID^2(-1)	0.047936	0.068553	0.699253	0.4852

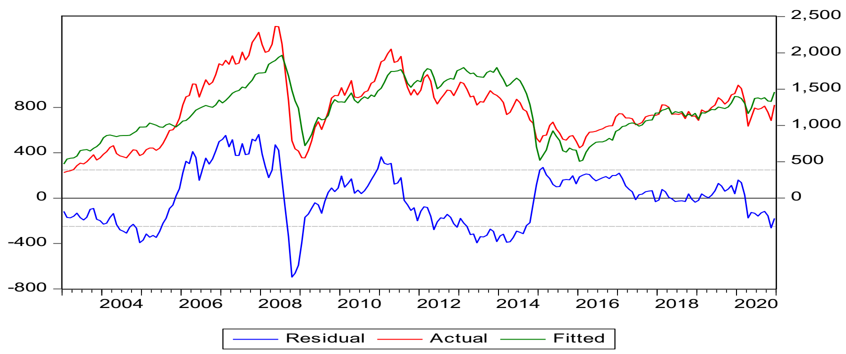
R-squared	0.002301	Mean dependent var	1.000346
Adjusted R-squared	-0.002405	S.D. dependent var	1.503426
S.E. of regression	1.505233	Akaike info criterion	3.665074
Sum squared resid	480.3337	Schwarz criterion	3.696531
Log likelihood	-390.1629	Hannan-Quinn criter.	3.677785
F-statistic	0.488955	Durbin-Watson stat	1.994065
Prob(F-statistic)	0.485160		



Russia

Descriptive Statistics

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	0.027886	8.557593	9.934028	23873.68	69.71644	1225.937
Median	0.031946	8.025000	9.875000	23704.35	64.03000	1222.767
Maximum	0.042820	16.93000	21.00000	58651.10	132.7200	2363.938
Minimum	0.012575	2.200000	4.250000	2033.300	18.38000	351.8200
Std. Dev.	0.009257	3.933177	3.034777	15677.73	27.51306	441.4723
Skewness	-0.399972	0.228828	0.686216	0.315078	0.404962	0.229630
Kurtosis	1.593767	1.978595	3.537504	1.955331	2.115133	2.623420
Jarque-Bera	23.55662	11.27446	19.55230	13.39587	12.95071	3.174599
Probability	0.000008	0.003563	0.000057	0.001233	0.001541	0.204477
Sum	6.023461	1848.440	2145.750	5156715.	15058.75	264802.3
Sum Sq. Dev.	0.018425	3326.024	1980.122	5.28E+10	162748.3	41903016
Observations	216	216	216	216	216	216



Heteroskedasticity Test: ARCH

F-statistic	417.0946	Prob. F(1,213)	0.0000
Obs*R-squared	142.3204	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11359.81	3908.725	2.906270	0.0040
RESID^2(-1)	0.813167	0.039816	20.42289	0.0000

R-squared	0.661956	Mean dependent var	60428.42
Adjusted R-squared	0.660368	S.D. dependent var	77571.63
S.E. of regression	45207.13	Akaike info criterion	24.28516

Sum squared resid	4.35E+11	Schwarz criterion	24.31651
Log likelihood	-2608.654	Hannan-Quinn criter.	24.29782
F-statistic	417.0946	Durbin-Watson stat	1.640277
Prob(F-statistic)	0.000000		

Dependent Variable: STINDEX
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Failure to improve likelihood (non-zero gradients) after 72 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*EXRATE + C(8)*INFLAT + C(9)*INTRATE + C(10)* M_2
+ C(11)*OILPRICE

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	30.49495	12.57816	2.424436	0.0153
STINDEX(-1)	0.979985	0.012368	79.23774	0.0000
		Variance Equation		
C(3)	1.311454	1.365155	0.960663	0.3367
C(4)	0.169211	0.133845	1.264230	0.2061
C(5)	0.037323	0.078836	0.473424	0.6359
C(6)	0.865017	0.077268	11.19505	0.0000
C(7)	5.856983	16.19937	0.361556	0.7177
C(8)	0.025790	0.021704	1.188236	0.2347
C(9)	-0.056253	0.050391	-1.116324	0.2643
C(10)	1.9E-100	1.14E-05	1.71E-95	1.0000
C(11)	-0.000648	0.002096	-0.309209	0.7572

R-squared	0.942079	Mean dependent var	1230.002
Adjusted R-squared	0.941807	S.D. dependent var	438.4306
S.E. of regression	105.7638	Akaike info criterion	11.88842
Sum squared resid	2382615.	Schwarz criterion	12.06087
Log likelihood	-1267.005	Hannan-Quinn criter.	11.95810
Durbin-Watson stat	1.281988		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|** |	.|** |	1	0.218	0.218	10.358	0.001
.|. |	*|. |	2	-0.043	-0.095	10.762	0.005
*|. |	.|. |	3	-0.072	-0.043	11.894	0.008
.|. |	.|. |	4	-0.021	0.002	11.993	0.017
.|. |	.|. |	5	-0.033	-0.038	12.229	0.032
.|. |	.|. |	6	0.024	0.038	12.359	0.054
.|. |	.|. |	7	0.053	0.037	12.992	0.072
.|. |	*|. |	8	-0.041	-0.066	13.369	0.100
.|. |	.|. |	9	-0.053	-0.021	14.012	0.122
.|. |	.|. |	10	0.001	0.018	14.012	0.172
.|. |	.|. |	11	0.039	0.027	14.359	0.214
.|. |	.|. |	12	0.000	-0.017	14.359	0.278
.|. |	.|. |	13	-0.043	-0.043	14.782	0.321
*|. |	*|. |	14	-0.091	-0.076	16.696	0.273
.|. |	.|. |	15	-0.008	0.034	16.712	0.336

<table>
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<tr><td>.|. |</td><td>*|. |</td><td>16</td><td>-0.051</td><td>-0.072</td><td>17.318</td><td>0.365</td></tr>
<tr><td>.|* |</td><td>.|* |</td><td>17</td><td>0.096</td><td>0.117</td><td>19.505</td><td>0.300</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>18</td><td>0.045</td><td>-0.017</td><td>19.991</td><td>0.333</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>19</td><td>0.017</td><td>0.016</td><td>20.061</td><td>0.391</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>20</td><td>-0.042</td><td>-0.028</td><td>20.486</td><td>0.428</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>21</td><td>0.005</td><td>0.026</td><td>20.491</td><td>0.490</td></tr>
<tr><td>.|* |</td><td>.|* |</td><td>22</td><td>0.162</td><td>0.163</td><td>26.813</td><td>0.218</td></tr>
<tr><td>.|. |</td><td>*|. |</td><td>23</td><td>-0.014</td><td>-0.104</td><td>26.863</td><td>0.262</td></tr>
<tr><td>*|. |</td><td>*|. |</td><td>24</td><td>-0.157</td><td>-0.139</td><td>32.881</td><td>0.107</td></tr>
<tr><td>*|. |</td><td>.|. |</td><td>25</td><td>-0.123</td><td>-0.043</td><td>36.577</td><td>0.063</td></tr>
<tr><td>*|. |</td><td>*|. |</td><td>26</td><td>-0.130</td><td>-0.121</td><td>40.717</td><td>0.033</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>27</td><td>0.007</td><td>0.069</td><td>40.731</td><td>0.044</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>28</td><td>0.060</td><td>-0.002</td><td>41.622</td><td>0.047</td></tr>
<tr><td>.|. |</td><td>*|. |</td><td>29</td><td>-0.040</td><td>-0.114</td><td>42.024</td><td>0.056</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>30</td><td>-0.025</td><td>0.038</td><td>42.184</td><td>0.069</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>31</td><td>-0.037</td><td>-0.006</td><td>42.529</td><td>0.081</td></tr>
<tr><td>.|. |</td><td>*|. |</td><td>32</td><td>-0.061</td><td>-0.075</td><td>43.468</td><td>0.085</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>33</td><td>-0.021</td><td>0.025</td><td>43.579</td><td>0.103</td></tr>
<tr><td>.|* |</td><td>.|. |</td><td>34</td><td>0.089</td><td>0.047</td><td>45.642</td><td>0.088</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>35</td><td>-0.012</td><td>-0.052</td><td>45.677</td><td>0.107</td></tr>
<tr><td>.|. |</td><td>.|. |</td><td>36</td><td>-0.031</td><td>0.025</td><td>45.932</td><td>0.124</td></tr>
</table>

*Probabilities may not be valid for this equation specification.

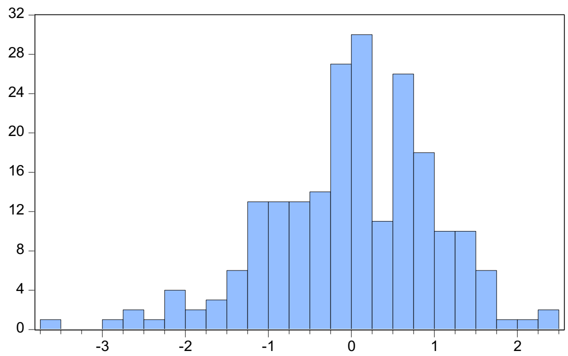
Heteroskedasticity Test: ARCH

F-statistic	1.266654	Prob. F(1,212)	0.2617
Obs*R-squared	1.271010	Prob. Chi-Square(1)	0.2596

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.921145	0.129003	7.140483	0.0000
WGT_RESID^2(-1)	0.077172	0.068570	1.125457	0.2617

R-squared	0.005939	Mean dependent var	0.997276
Adjusted R-squared	0.001250	S.D. dependent var	1.607904
S.E. of regression	1.606898	Akaike info criterion	3.795790
Sum squared resid	547.4097	Schwarz criterion	3.827248
Log likelihood	-404.1496	Hannan-Quinn criter.	3.808502
F-statistic	1.266654	Durbin-Watson stat	1.995362
Prob(F-statistic)	0.261668		



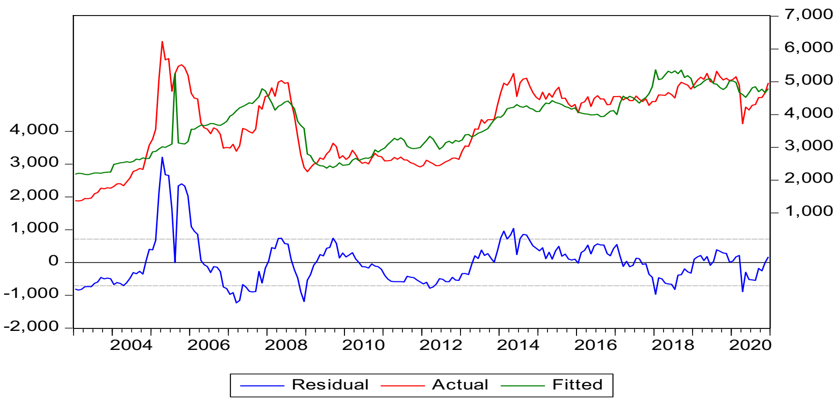
Series: Standardized Residuals
Sample 2003M02 2020M12
Observations 215

Mean	0.013893
Median	0.110882
Maximum	2.468276
Minimum	-3.581040
Std. Dev.	0.998929
Skewness	-0.520284
Kurtosis	3.627876
Jarque-Bera	13.23157
Probability	0.001339

UAE

Descriptive Statistics

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	0.281576	3.401435	2.243056	843.0480	69.71644	3721.284
Median	0.272300	2.205000	1.500000	835.3380	64.03000	4005.545
Maximum	2.279000	12.30000	4.750000	1513.510	132.7200	6229.040
Minimum	0.271000	-2.790000	1.000000	174.7360	18.38000	1366.470
Std. Dev.	0.136540	4.019080	1.489287	403.0929	27.51306	1139.212
Skewness	14.59465	0.826145	0.704171	-0.190599	0.404962	-0.262546
Kurtosis	214.0040	2.841211	1.724704	1.773622	2.115133	1.881534
Jarque-Bera	408372.4	24.79746	32.48825	14.84383	12.95071	13.74020
Probability	0.000000	0.000004	0.000000	0.000598	0.001541	0.001038
Sum	60.82040	734.7100	484.5000	182098.4	15058.75	803797.3
Sum Sq. Dev.	4.008265	3472.895	476.8646	34934039	162748.3	2.79E+08
Observations	216	216	216	216	216	216



Heteroskedasticity Test: ARCH

F-statistic	343.6630	Prob. F(1,213)	0.0000
Obs*R-squared	132.7330	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	102794.7	55999.37	1.835640	0.0678
RESID^2(-1)	0.785954	0.042397	18.53815	0.0000

R-squared	0.617363	Mean dependent var	490880.0
Adjusted R-squared	0.615566	S.D. dependent var	1228298.
S.E. of regression	761578.0	Akaike info criterion	29.93343
Sum squared resid	1.24E+14	Schwarz criterion	29.96479
Log likelihood	-3215.844	Hannan-Quinn criter.	29.94610
F-statistic	343.6630	Durbin-Watson stat	1.696940
Prob(F-statistic)	0.000000		

Dependent Variable: STINDEX
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Failure to improve likelihood (singular hessian) after 59 iterations
Coefficient covariance computed using outer product of gradients

Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*EXRATE + C(8)*INFLAT + C(9)*INTRATE + C(10)* M_2
+ C(11)*OILPRICE

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	37.78397	27.82201	1.358060	0.1744
STINDEX(-1)	0.997686	0.006821	146.2773	0.0000
		Variance Equation		
C(3)	0.816237	0.848850	0.961580	0.3363
C(4)	0.957152	0.090919	10.52748	0.0000
C(5)	-0.022142	0.090732	-0.244035	0.8072
C(6)	0.816637	0.065886	12.39463	0.0000
C(7)	-0.758987	1.874320	-0.404940	0.6855
C(8)	0.036774	0.021710	1.693848	0.0903
C(9)	0.093594	0.070824	1.321507	0.1863
C(10)	0.000176	0.000228	0.773321	0.4393
C(11)	0.002986	0.002343	1.274382	0.2025

R-squared	0.944123	Mean dependent var	3732.189
Adjusted R-squared	0.943861	S.D. dependent var	1130.515
S.E. of regression	267.8601	Akaike info criterion	13.66790
Sum squared resid	15282540	Schwarz criterion	13.84036
Log likelihood	-1458.300	Hannan-Quinn criter.	13.73758
Durbin-Watson stat	1.737694		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	0.046	0.046	0.4658	0.495
.|. |	.|. |	2	0.026	0.024	0.6116	0.737
.|. |	.|. |	3	0.072	0.069	1.7371	0.629
.|. |	.|. |	4	0.008	0.001	1.7519	0.781
.|* |	.|* |	5	0.099	0.097	3.9501	0.557
.|. |	.|. |	6	0.044	0.031	4.3815	0.625
.|. |	.|. |	7	0.038	0.031	4.6980	0.697
*|. |	*|. |	8	-0.110	-0.130	7.4386	0.490
.|. |	.|. |	9	0.025	0.030	7.5830	0.577
.|. |	.|. |	10	-0.004	-0.018	7.5863	0.669
*|. |	*|. |	11	-0.130	-0.124	11.435	0.408
.|. |	.|. |	12	0.030	0.031	11.647	0.474
*|. |	*|. |	13	-0.135	-0.117	15.846	0.258
.|. |	.|. |	14	0.021	0.055	15.946	0.317
.|. |	.|. |	15	-0.016	-0.015	16.009	0.381
.|. |	.|. |	16	0.008	0.039	16.025	0.451
.|. |	.|. |	17	-0.052	-0.051	16.668	0.477
*|. |	.|. |	18	-0.067	-0.033	17.739	0.473
.|. |	.|. |	19	0.030	0.007	17.954	0.525
*|. |	*|. |	20	-0.129	-0.111	21.956	0.343
.|. |	.|. |	21	-0.034	-0.053	22.234	0.386
.|. |	.|. |	22	-0.018	-0.011	22.316	0.441
.|. |	.|. |	23	0.020	0.058	22.413	0.495
*|. |	*|. |	24	-0.085	-0.117	24.181	0.451
.|. |	.|. |	25	-0.031	0.015	24.420	0.495
.|. |	.|. |	26	0.008	-0.009	24.437	0.551
.|. |	.|. |	27	-0.054	-0.005	25.161	0.565

.|. |	.|. |	28	-0.003	-0.051	25.163	0.619
.|. |	.|. |	29	0.020	0.035	25.266	0.664
.|. |	.|. |	30	-0.046	-0.047	25.795	0.686
.|* |	.|. |	31	0.080	0.068	27.423	0.651
.|. |	.|. |	32	0.010	-0.013	27.447	0.696
.|. |	.|. |	33	-0.033	-0.056	27.723	0.727
.|. |	.|. |	34	0.013	0.021	27.765	0.766
.|* |	.|* |	35	0.138	0.113	32.685	0.580
.|. |	.|. |	36	-0.050	-0.060	33.335	0.596

*Probabilities may not be valid for this equation specification.

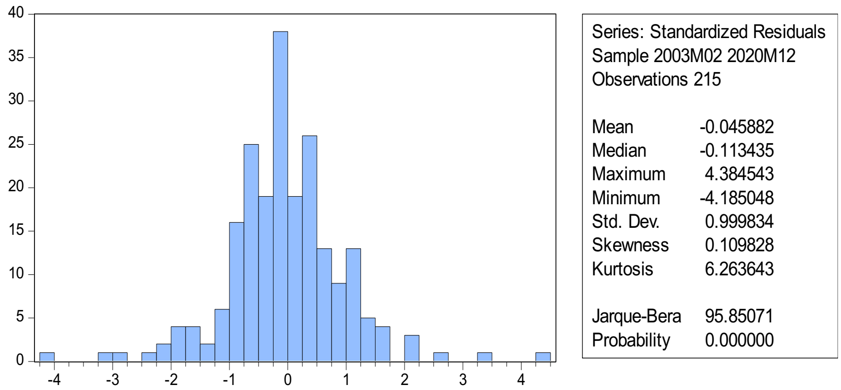
Heteroskedasticity Test: ARCH

F-statistic	0.378218	Prob. F(1,212)	0.5392
Obs*R-squared	0.381106	Prob. Chi-Square(1)	0.5370

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.957729	0.170814	5.606847	0.0000
WGT_RESID^2(-1)	0.042380	0.068912	0.614994	0.5392

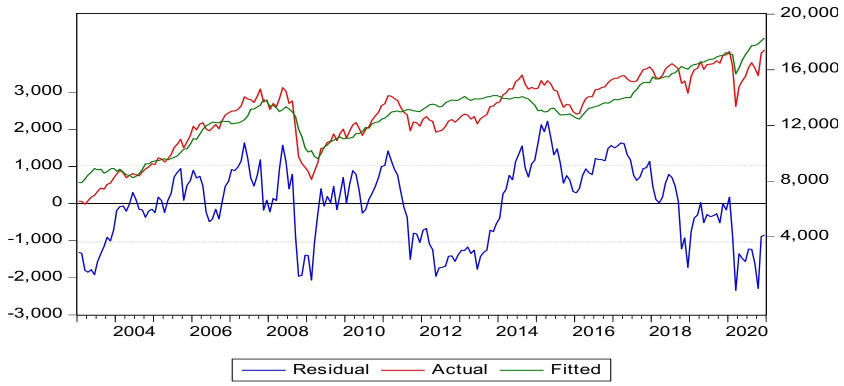
R-squared	0.001781	Mean dependent var	0.999372
Adjusted R-squared	-0.002928	S.D. dependent var	2.290726
S.E. of regression	2.294077	Akaike info criterion	4.507840
Sum squared resid	1115.711	Schwarz criterion	4.539298
Log likelihood	-480.3389	Hannan-Quinn criter.	4.520552
F-statistic	0.378218	Durbin-Watson stat	1.983431
Prob(F-statistic)	0.539218		



Canada

Descriptive Statistics

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	0.854530	1.785278	1.902778	1136.764	69.71644	12854.75
Median	0.828723	1.860000	1.250000	1102.717	64.03000	13160.30
Maximum	1.045957	4.680000	4.750000	2121.400	132.7200	17433.40
Minimum	0.641430	-0.950000	0.500000	566.5420	18.38000	6343.290
Std. Dev.	0.103647	0.883601	1.255144	405.2861	27.51306	2616.571
Skewness	0.193348	-0.046377	0.887867	0.424224	0.404962	-0.560349
Kurtosis	1.692385	4.083796	2.621494	2.278555	2.115133	2.599346
Jarque-Bera	16.73451	10.64896	29.66847	11.16310	12.95071	12.74837
Probability	0.000232	0.004871	0.000000	0.003767	0.001541	0.001705
Sum	184.5785	385.6200	411.0000	245541.1	15058.75	2776626.
Sum Sq. Dev.	2.309671	167.8614	338.7083	35315218	162748.3	1.47E+09
Observations	216	216	216	216	216	216



Heteroskedasticity Test: ARCH

F-statistic	190.2216	Prob. F(1,213)	0.0000
Obs*R-squared	101.4272	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	322189.4	77046.81	4.181736	0.0000
RESID^2(-1)	0.686380	0.049766	13.79208	0.0000

R-squared	0.471754	Mean dependent var	1037773.
Adjusted R-squared	0.469274	S.D. dependent var	1146423.
S.E. of regression	835179.4	Akaike info criterion	30.11794
Sum squared resid	1.49E+14	Schwarz criterion	30.14929
Log likelihood	-3235.678	Hannan-Quinn criter.	30.13061
F-statistic	190.2216	Durbin-Watson stat	2.097691
Prob(F-statistic)	0.000000		

Dependent Variable: STINDEX
Method: ML ARCH - Normal distribution (BHHH / EViews legacy)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Convergence achieved after 42 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*EXRATE + C(8)*INFLAT + C(9)*INTRATE + C(10)* M_2
+ C(11)*OILPRICE

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	220.1676	109.2736	1.768377	0.1309
STINDEX(-1)	0.988751	0.008847	112.0261	0.0000
		Variance Equation		
C(3)	-0.070390	0.255639	-0.275350	0.7830
C(4)	-0.083640	0.080608	-1.037612	0.2995
C(5)	0.007212	0.058882	0.122485	0.9025
C(6)	0.990249	0.000896	1104.609	0.0000
C(7)	-0.074001	0.352374	-0.210006	0.8337
C(8)	0.049517	0.028507	1.737036	0.0824
C(9)	0.037932	0.010561	3.591620	0.0003
C(10)	0.000107	4.25E-05	2.510914	0.0120
C(11)	0.000660	0.001271	0.519323	0.6035

R-squared	0.963655	Mean dependent var	12883.98
Adjusted R-squared	0.963485	S.D. dependent var	2587.079
S.E. of regression	494.3657	Akaike info criterion	14.86309
Sum squared resid	52056655	Schwarz criterion	15.03554
Log likelihood	-1586.782	Hannan-Quinn criter.	14.93277
Durbin-Watson stat	1.810659		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	0.054	0.054	0.6269	0.428
.|. |	.|. |	2	0.045	0.042	1.0608	0.588
*|. |	*|. |	3	-0.079	-0.084	2.4354	0.487
.|. |	.|. |	4	-0.057	-0.050	3.1420	0.534
*|. |	.|. |	5	-0.068	-0.056	4.1654	0.526
.|. |	.|. |	6	-0.063	-0.060	5.0647	0.536
.|. |	.|. |	7	0.037	0.041	5.3758	0.614
.|. |	*|. |	8	-0.057	-0.069	6.0961	0.636
.|. |	*|. |	9	-0.055	-0.070	6.7786	0.660
.|. |	.|. |	10	-0.052	-0.046	7.3996	0.687
.|. |	.|. |	11	-0.042	-0.048	7.7977	0.731
*|. |	*|. |	12	-0.081	-0.092	9.2939	0.678
.|. |	.|. |	13	-0.043	-0.054	9.7271	0.716
.|. |	*|. |	14	-0.059	-0.085	10.531	0.722
.|. |	.|. |	15	0.035	0.012	10.823	0.765
.|. |	.|. |	16	0.065	0.039	11.827	0.756
.|. |	.|. |	17	0.033	-0.014	12.090	0.795
.|. |	.|. |	18	0.028	-0.006	12.276	0.833
.|. |	.|. |	19	0.024	0.013	12.417	0.867
*|. |	*|. |	20	-0.093	-0.116	14.502	0.804
.|. |	.|. |	21	-0.032	-0.031	14.743	0.836
*|. |	*|. |	22	-0.082	-0.095	16.360	0.798
.|. |	.|. |	23	0.009	-0.024	16.379	0.839
.|. |	.|. |	24	-0.026	-0.048	16.539	0.868
.|. |	.|. |	25	0.017	-0.020	16.609	0.895

.|. |	.|. |	26	0.034	-0.003	16.903	0.912
*|. |	*|. |	27	-0.108	-0.131	19.796	0.839
.|. |	*|. |	28	-0.058	-0.087	20.639	0.840
.|. |	.|. |	29	-0.009	-0.013	20.662	0.871
.|. |	*|. |	30	-0.051	-0.108	21.319	0.878
.|. |	.|. |	31	0.072	0.024	22.633	0.862
.|. |	.|. |	32	0.024	-0.048	22.778	0.885
.|. |	.|. |	33	0.056	-0.029	23.573	0.887
.|. |	.|. |	34	0.048	0.001	24.176	0.894
.|. |	*|. |	35	-0.027	-0.082	24.372	0.911
.|. |	*|. |	36	-0.047	-0.105	24.946	0.917

*Probabilities may not be valid for this equation specification.

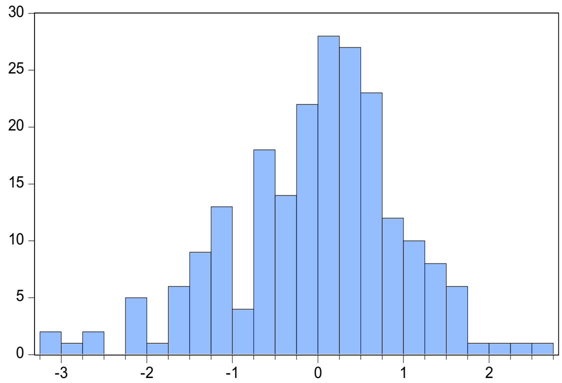
Heteroskedasticity Test: ARCH

F-statistic	0.208317	Prob. F(1,212)	0.6486
Obs*R-squared	0.210076	Prob. Chi-Square(1)	0.6467

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.970399	0.130353	7.444381	0.0000
WGT_RESID^2(-1)	0.031347	0.068679	0.456417	0.6486

R-squared	0.000982	Mean dependent var	1.001857
Adjusted R-squared	-0.003731	S.D. dependent var	1.615535
S.E. of regression	1.618546	Akaike info criterion	3.810235
Sum squared resid	555.3742	Schwarz criterion	3.841693
Log likelihood	-405.6951	Hannan-Quinn criter.	3.822947
F-statistic	0.208317	Durbin-Watson stat	1.989705
Prob(F-statistic)	0.648557		



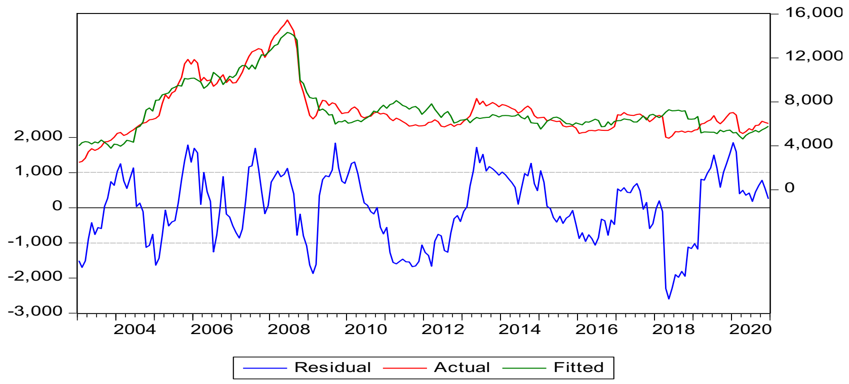
Series: Standardized Residuals
Sample 2003M02 2020M12
Observations 215

Mean	-0.024688
Median	0.116850
Maximum	2.681831
Minimum	-3.214092
Std. Dev.	1.001670
Skewness	-0.504571
Kurtosis	3.541656
Jarque-Bera	11.75119
Probability	0.002807

Kuwait

Descriptive Statistics

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	3.434311	3.181435	3.218750	26690.24	69.71644	7248.598
Median	3.424212	2.825000	2.625000	27675.95	64.03000	6617.435
Maximum	3.769133	11.64000	6.250000	40508.60	132.7200	15456.20
Minimum	3.215434	0.000000	1.500000	9606.200	18.38000	2498.100
Std. Dev.	0.128794	2.384438	1.525903	9754.991	27.51306	2455.309
Skewness	0.530878	1.668909	0.964709	-0.353435	0.404962	1.348711
Kurtosis	2.530089	6.203557	2.523946	1.742699	2.115133	4.673924
Jarque-Bera	12.13328	192.6343	35.54351	18.72423	12.95071	90.70296
Probability	0.002319	0.000000	0.000000	0.000086	0.001541	0.000000
Sum	741.8112	687.1900	695.2500	5765092.	15058.75	1565697.
Sum Sq. Dev.	3.566389	1222.392	500.6016	2.05E+10	162748.3	1.30E+09
Observations	216	216	216	216	216	216



Heteroskedasticity Test: ARCH

F-statistic	212.6449	Prob. F(1,213)	0.0000
Obs*R-squared	107.4103	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	280867.6	71297.57	3.939371	0.0001
RESID^2(-1)	0.705651	0.048391	14.58235	0.0000

R-squared	0.499583	Mean dependent var	978924.1
Adjusted R-squared	0.497233	S.D. dependent var	1092645.
S.E. of regression	774751.0	Akaike info criterion	29.96773
Sum squared resid	1.28E+14	Schwarz criterion	29.99908
Log likelihood	-3219.531	Hannan-Quinn criter.	29.98040
F-statistic	212.6449	Durbin-Watson stat	1.795404
Prob(F-statistic)	0.000000		

Dependent Variable: STINDEX
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Failure to improve likelihood (non-zero gradients) after 78 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*EXRATE + C(8)*INFLAT + C(9)*INTRATE + C(10)* M_2
+ C(11)*OILPRICE

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	374.6759	90.20555	4.153579	0.0000
STINDEX(-1)	0.954594	0.013097	72.88728	0.0000
		Variance Equation		
C(3)	16.18571	11.25065	1.438647	0.1503
C(4)	0.527006	0.164191	3.209720	0.0013
C(5)	0.104505	0.090057	1.160441	0.2459
C(6)	0.726532	0.090665	-8.013349	0.0000
C(7)	0.703847	3.223145	0.218373	0.8271
C(8)	0.474747	0.105347	4.506517	0.0000
C(9)	0.247906	0.178903	1.385703	0.1658
C(10)	3.71E-05	4.34E-05	0.854275	0.3930
C(11)	-0.027575	0.014106	-1.954804	0.0506

R-squared	0.963344	Mean dependent var	7270.693
Adjusted R-squared	0.963172	S.D. dependent var	2439.420
S.E. of regression	468.1375	Akaike info criterion	14.73688
Sum squared resid	46679526	Schwarz criterion	14.90933
Log likelihood	-1573.214	Hannan-Quinn criter.	14.80655
Durbin-Watson stat	1.151742		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|** |	.|** |	1	0.234	0.234	11.914	0.001
.|. |	.|. |	2	0.053	-0.002	12.530	0.002
.|. |	*|. |	3	-0.054	-0.069	13.160	0.004
.|. |	.|* |	4	0.057	0.090	13.875	0.008
.|. |	.|. |	5	-0.002	-0.034	13.876	0.016
.|* |	.|* |	6	0.086	0.090	15.523	0.017
.|. |	.|. |	7	-0.021	-0.055	15.623	0.029
.|. |	.|. |	8	0.041	0.049	15.998	0.042
.|. |	.|. |	9	-0.002	-0.006	15.999	0.067
.|* |	.|* |	10	0.118	0.108	19.174	0.038
.|. |	.|. |	11	0.005	-0.037	19.180	0.058
.|. |	*|. |	12	-0.047	-0.068	19.693	0.073
.|. |	.|. |	13	-0.048	0.007	20.230	0.090
.|. |	.|. |	14	-0.002	-0.016	20.231	0.123
.|. |	.|. |	15	-0.038	-0.030	20.561	0.151
.|. |	.|. |	16	0.003	0.000	20.563	0.196
.|. |	.|. |	17	0.010	0.026	20.588	0.245
.|. |	.|. |	18	0.006	-0.010	20.596	0.300
.|. |	.|. |	19	-0.022	-0.015	20.715	0.353
.|. |	.|. |	20	-0.014	-0.015	20.760	0.411
.|. |	.|. |	21	0.001	0.016	20.760	0.474
.|. |	.|. |	22	-0.032	-0.030	21.005	0.520
.|* |	.|* |	23	0.145	0.182	26.101	0.296
.|* |	.|. |	24	0.100	0.022	28.556	0.237
.|. |	.|. |	25	-0.008	-0.053	28.571	0.282

.|. |	.|. |	26	-0.040	-0.003	28.972	0.312
.|. |	.|. |	27	-0.016	-0.027	29.033	0.359
.|. |	.|* |	28	0.072	0.096	30.319	0.348
.|* |	.|. |	29	0.112	0.059	33.472	0.259
.|* |	.|. |	30	0.102	0.073	36.083	0.205
.|* |	.|. |	31	0.108	0.073	39.045	0.152
.|. |	.|. |	32	0.064	0.032	40.090	0.154
.|. |	.|. |	33	0.062	0.012	41.091	0.157
.|. |	.|. |	34	0.070	0.024	42.339	0.154
.|. |	.|. |	35	0.021	0.014	42.454	0.181
.|. |	.|. |	36	-0.022	-0.017	42.579	0.209

*Probabilities may not be valid for this equation specification.

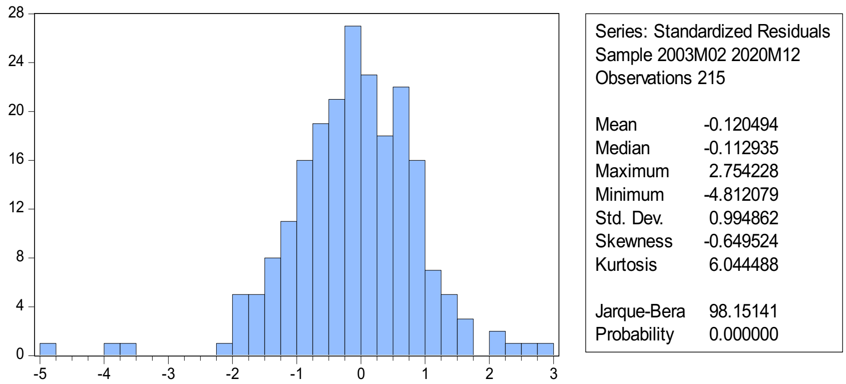
Heteroskedasticity Test: ARCH

F-statistic	0.006691	Prob. F(1,212)	0.9349
Obs*R-squared	0.006754	Prob. Chi-Square(1)	0.9345

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.009040	0.172196	5.859825	0.0000
WGT_RESID^2(-1)	-0.005618	0.068674	-0.081800	0.9349

R-squared	0.000032	Mean dependent var	1.003406
Adjusted R-squared	-0.004685	S.D. dependent var	2.303351
S.E. of regression	2.308741	Akaike info criterion	4.520583
Sum squared resid	1130.020	Schwarz criterion	4.552041
Log likelihood	-481.7024	Hannan-Quinn criter.	4.533295
F-statistic	0.006691	Durbin-Watson stat	2.000473
Prob(F-statistic)	0.934883		



NET OIL IMPORTING COUNTRIES

Unit Root Test

Panel unit root test: Summary
Series: EXRATE
Date: 09/29/22 Time: 12:00
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.81795	0.2067	3	633
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.44399	0.0744	3	633
ADF - Fisher Chi-square	10.1349	0.1191	3	633
PP - Fisher Chi-square	10.4038	0.1086	3	645

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(EXRATE)
Date: 09/29/22 Time: 15:09
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.72735	0.0001	3	630
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-9.94713	0.0000	3	630
ADF - Fisher Chi-square	105.650	0.0000	3	630
PP - Fisher Chi-square	284.051	0.0000	3	642

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: INFLAT
Date: 09/29/22 Time: 15:15
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	0.04766	0.5190	5	1055
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-5.64521	0.0000	5	1055
ADF - Fisher Chi-square	53.9099	0.0000	5	1055
PP - Fisher Chi-square	25.4886	0.0045	5	1075

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(INFLAT)
Date: 09/29/22 Time: 15:16
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-16.0768	0.0000	5	1050
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-13.6763	0.0000	5	1050
ADF - Fisher Chi-square	191.573	0.0000	5	1050
PP - Fisher Chi-square	284.601	0.0000	5	1070

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: INTRATE
Date: 09/29/22 Time: 15:16
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.39284	0.3472	5	1055
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.45642	0.3240	5	1055
ADF - Fisher Chi-square	8.14410	0.6148	5	1055
PP - Fisher Chi-square	5.64197	0.8444	5	1075

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(INTRATE)
Date: 09/29/22 Time: 15:17
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-4.43490	0.0000	5	1050
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-5.21376	0.0000	5	1050
ADF - Fisher Chi-square	48.5275	0.0000	5	1050
PP - Fisher Chi-square	196.898	0.0000	5	1070

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: M2
Date: 09/29/22 Time: 15:18
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	11.4643	1.0000	5	1055
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	12.0931	1.0000	5	1055
ADF - Fisher Chi-square	4.6E-06	1.0000	5	1055
PP - Fisher Chi-square	1.4E-08	1.0000	5	1075

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(M2)
Date: 09/29/22 Time: 15:18
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.08958	0.0000	5	1050
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-5.73888	0.0000	5	1050
ADF - Fisher Chi-square	55.1043	0.0000	5	1050
PP - Fisher Chi-square	181.205	0.0000	5	1070

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: OILPRICE
Date: 09/29/22 Time: 15:19
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.99265	0.0231	5	1055
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.35274	0.0093	5	1055
ADF - Fisher Chi-square	19.8230	0.0310	5	1055
PP - Fisher Chi-square	14.9679	0.1332	5	1075

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: STINDEX
Date: 09/29/22 Time: 15:19
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	7.78540	1.0000	5	1055
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	8.41346	1.0000	5	1055
ADF - Fisher Chi-square	0.00236	1.0000	5	1055
PP - Fisher Chi-square	0.00341	1.0000	5	1075

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(STINDEX)
Date: 09/29/22 Time: 15:19
Sample: 2003M01 2020M12
Exogenous variables: Individual effects
User-specified lags: 4
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

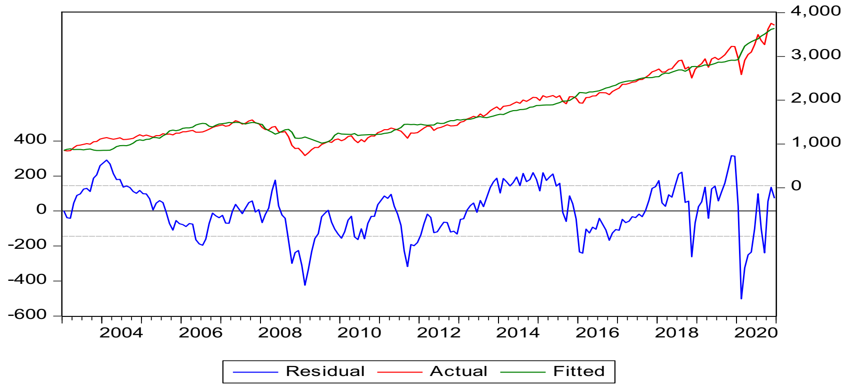
Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-12.1843	0.0000	5	1050
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-13.8831	0.0000	5	1050
ADF - Fisher Chi-square	195.758	0.0000	5	1050
PP - Fisher Chi-square	551.203	0.0000	5	1070

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

USA

Descriptive Statistics

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	0.000000	2.050417	1.348287	10256.59	69.71644	1736.385
Median	0.000000	2.040000	0.650000	9691.050	64.03000	1423.525
Maximum	0.000000	5.600000	5.260000	19412.10	132.7200	3756.070
Minimum	0.000000	-2.100000	0.050000	5790.400	18.38000	735.0900
Std. Dev.	0.000000	1.276317	1.602008	3371.865	27.51306	708.4014
Skewness	NA	-0.190742	1.295508	0.634420	0.404962	0.875001
Kurtosis	NA	3.673850	3.516783	2.630400	2.115133	2.756111
Jarque-Bera	NA	5.396429	62.82383	15.71902	12.95071	28.09793
Probability	NA	0.067326	0.000000	0.000386	0.001541	0.000001
Sum	0.000000	442.8900	291.2300	2215422.	15058.75	375059.2
Sum Sq. Dev.	0.000000	350.2317	551.7827	2.44E+09	162748.3	1.08E+08
Observations	216	216	216	216	216	216



Heteroskedasticity Test: ARCH

F-statistic	94.40470	Prob. F(1,213)	0.0000
Obs*R-squared	66.02700	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9148.823	2074.058	4.411074	0.0000
RESID^2(-1)	0.553898	0.057008	9.716208	0.0000

R-squared	0.307102	Mean dependent var	20477.59
Adjusted R-squared	0.303849	S.D. dependent var	30144.40
S.E. of regression	25151.17	Akaike info criterion	23.11246
Sum squared resid	1.35E+11	Schwarz criterion	23.14381
Log likelihood	-2482.589	Hannan-Quinn criter.	23.12512
F-statistic	94.40470	Durbin-Watson stat	2.176839
Prob(F-statistic)	0.000000		

Dependent Variable: STINDEX
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Failure to improve likelihood (non-zero gradients) after 0 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*INFLAT + C(8)*INTRATE + C(9)* M_2+ C(10)*OILPRICE

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-1.890776	19.95216	-0.094765	0.9245
STINDEX(-1)	1.008793	0.008095	124.6254	0.0000
Variance Equation				
C(3)	8.718440	9.674047	0.901219	0.3675
C(4)	0.380130	0.082473	4.609164	0.0000
C(5)	0.055717	0.064631	0.862089	0.3886
C(6)	0.993145	0.021146	46.96704	0.0000
C(7)	-4.370904	3.444935	-1.268791	0.2045
C(8)	6.143224	2.509195	2.448285	0.0144
C(9)	0.018898	0.006283	3.007828	0.0026

C(10)	-0.396137	0.160989	-2.460641	0.0139

R-squared	0.987727	Mean dependent var	1740.481
Adjusted R-squared	0.987669	S.D. dependent var	707.4859
S.E. of regression	78.56237	Akaike info criterion	11.65382
Sum squared resid	1314646.	Schwarz criterion	11.81060
Log likelihood	-1242.786	Hannan-Quinn criter.	11.71717
Durbin-Watson stat	2.010699		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	-0.009	-0.009	0.0173	0.896
*|. |	*|. |	2	-0.178	-0.179	6.9908	0.030
.|. |	.|. |	3	-0.008	-0.012	7.0051	0.072
.|. |	.|. |	4	-0.016	-0.049	7.0600	0.133
.|. |	.|. |	5	-0.039	-0.045	7.4052	0.192
.|. |	*|. |	6	-0.056	-0.072	8.1068	0.230
.|* |	.|* |	7	0.206	0.195	17.604	0.014
.|. |	.|. |	8	-0.013	-0.037	17.645	0.024
*|. |	.|. |	9	-0.116	-0.051	20.696	0.014
.|. |	.|. |	10	0.028	0.020	20.880	0.022
.|. |	.|. |	11	-0.040	-0.063	21.237	0.031
.|. |	.|. |	12	-0.046	-0.038	21.719	0.041
.|. |	.|. |	13	-0.016	-0.018	21.779	0.059
.|. |	.|. |	14	0.021	-0.041	21.885	0.081
.|* |	.|* |	15	0.082	0.077	23.467	0.075
.|. |	.|* |	16	0.051	0.085	24.065	0.088
.|* |	.|* |	17	0.099	0.115	26.391	0.068
*|. |	*|. |	18	-0.137	-0.114	30.844	0.030
.|. |	.|. |	19	-0.029	0.033	31.044	0.040
*|. |	*|. |	20	-0.066	-0.123	32.090	0.042
.|. |	.|. |	21	-0.026	-0.016	32.250	0.055
.|. |	*|. |	22	-0.022	-0.100	32.369	0.071
.|. |	.|. |	23	0.033	0.012	32.633	0.088
.|. |	.|. |	24	0.037	-0.033	32.971	0.105
.|. |	.|. |	25	-0.053	0.022	33.656	0.115
*|. |	*|. |	26	-0.126	-0.141	37.552	0.067
.|. |	.|. |	27	-0.003	0.016	37.554	0.085
.|. |	*|. |	28	-0.025	-0.073	37.708	0.104
.|. |	.|. |	29	0.001	0.009	37.708	0.129
.|. |	.|. |	30	0.034	-0.034	38.008	0.150
.|. |	.|. |	31	0.027	0.004	38.187	0.175
.|. |	.|. |	32	-0.000	-0.053	38.187	0.209
.|. |	.|* |	33	0.027	0.109	38.380	0.239
.|. |	.|. |	34	0.074	0.049	39.781	0.228
.|. |	.|. |	35	-0.036	0.042	40.119	0.254
.|. |	.|. |	36	-0.020	-0.012	40.225	0.289

*Probabilities may not be valid for this equation specification.

Heteroskedasticity Test: ARCH

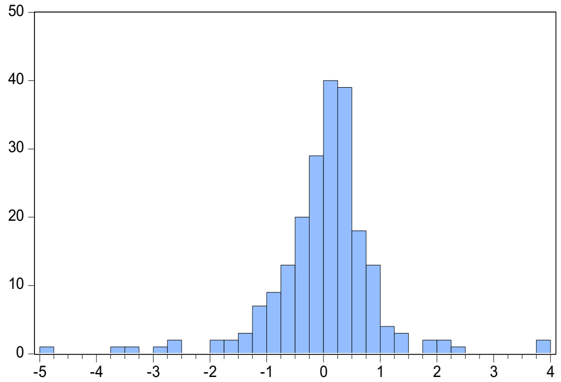
F-statistic	72.67230	Prob. F(1,212)	0.0000
Obs*R-squared	54.63079	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares

Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.454087	0.163583	2.775875	0.0060
WGT_RESID^2(-1)	0.505134	0.059255	8.524805	0.0000

R-squared	0.255284	Mean dependent var	0.914183
Adjusted R-squared	0.251771	S.D. dependent var	2.611580
S.E. of regression	2.259022	Akaike info criterion	4.477043
Sum squared resid	1081.875	Schwarz criterion	4.508501
Log likelihood	-477.0436	Hannan-Quinn criter.	4.489755
F-statistic	72.67230	Durbin-Watson stat	1.947694
Prob(F-statistic)	0.000000		

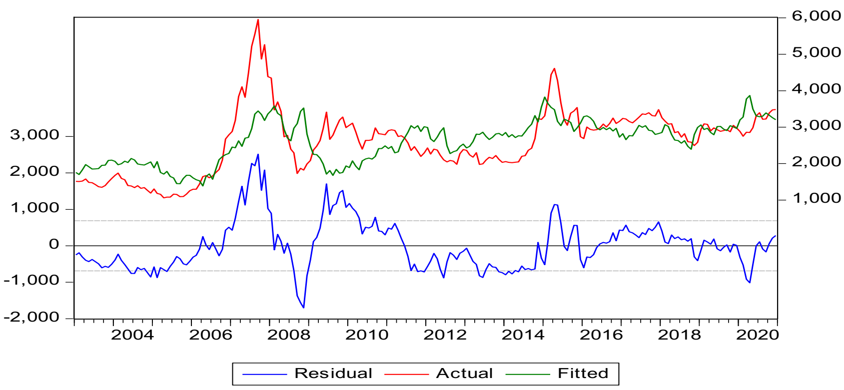


Series: Standardized Residuals	
Sample 2003M02 2020M12	
Observations 215	
Mean	-0.000411
Median	0.075839
Maximum	3.974839
Minimum	-4.818064
Std. Dev.	0.956280
Skewness	-0.635447
Kurtosis	9.158595
Jarque-Bera	354.2435
Probability	0.000000

China

Descriptive Statistics

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	0.144293	2.608796	5.416852	95937.26	69.71644	2603.999
Median	0.146475	2.200000	5.310000	85374.49	64.03000	2694.854
Maximum	0.165130	8.800000	7.470000	218680.0	132.7200	5954.765
Minimum	0.120919	-1.790000	3.850000	19010.84	18.38000	1060.738
Std. Dev.	0.014063	1.905038	0.933500	61082.23	27.51306	887.9426
Skewness	-0.474932	0.768397	0.233030	0.411857	0.404962	0.558062
Kurtosis	1.961297	4.064726	2.418240	1.854511	2.115133	3.994039
Jarque-Bera	17.83032	31.45840	5.000910	17.91586	12.95071	20.10462
Probability	0.000134	0.000000	0.082048	0.000129	0.001541	0.000043
Sum	31.16719	563.5000	1170.040	20722448	15058.75	562463.8
Sum Sq. Dev.	0.042522	780.2719	187.3557	8.02E+11	162748.3	1.70E+08
Observations	216	216	216	216	216	216



Heteroskedasticity Test: ARCH

F-statistic	309.4805	Prob. F(1,213)	0.0000
Obs*R-squared	127.3508	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	106572.8	42346.80	2.516667	0.0126
RESID^2(-1)	0.769595	0.043747	17.59206	0.0000

R-squared	0.592329	Mean dependent var	462271.7
Adjusted R-squared	0.590415	S.D. dependent var	852478.0
S.E. of regression	545575.7	Akaike info criterion	29.26633
Sum squared resid	6.34E+13	Schwarz criterion	29.29768
Log likelihood	-3144.130	Hannan-Quinn criter.	29.27900
F-statistic	309.4805	Durbin-Watson stat	2.326704
Prob(F-statistic)	0.000000		

Dependent Variable: STINDEX
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Convergence achieved after 82 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*EXRATE + C(8)*INFLAT + C(9)*INTRATE + C(10)* M_2+
C(11)*OILPRICE

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	65.49565	28.22880	2.320172	0.0203
STINDEX(-1)	0.971710	0.010763	90.28335	0.0000
		Variance Equation		
C(3)	-5.867705	2.538736	-2.311270	0.0208
C(4)	0.754924	0.177974	4.241760	0.0000
C(5)	0.476353	0.112925	4.218313	0.0000
C(6)	0.008040	0.118736	0.067710	0.9460
C(7)	76.31573	17.15631	4.448259	0.0000
C(8)	0.262717	0.091057	2.885194	0.0039
C(9)	1.259380	0.405283	3.107406	0.0019
C(10)	1.44E-06	5.39E-06	0.266524	0.7898
C(11)	-0.045420	0.009333	-4.866836	0.0000

R-squared	0.928039	Mean dependent var	2609.079
Adjusted R-squared	0.927701	S.D. dependent var	886.8639
S.E. of regression	238.4635	Akaike info criterion	13.26235
Sum squared resid	12112207	Schwarz criterion	13.43480
Log likelihood	-1414.703	Hannan-Quinn criter.	13.33203
Durbin-Watson stat	1.808289		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|* |	.|* |	1	0.082	0.082	1.4680	0.226
.|* |	.|* |	2	0.092	0.085	3.3066	0.191
.|. |	.|. |	3	-0.011	-0.026	3.3352	0.343
.|* |	.|* |	4	0.156	0.153	8.7337	0.068
.|* |	.|* |	5	0.102	0.084	11.033	0.051
.|. |	*|. |	6	-0.026	-0.069	11.182	0.083
.|. |	.|. |	7	0.062	0.064	12.035	0.099
.|. |	.|. |	8	-0.034	-0.056	12.293	0.139
.|. |	*|. |	9	-0.050	-0.090	12.870	0.169
.|. |	.|. |	10	-0.031	-0.002	13.085	0.219
.|. |	.|. |	11	-0.037	-0.040	13.403	0.268
*|. |	*|. |	12	-0.086	-0.089	15.083	0.237
*|. |	*|. |	13	-0.141	-0.093	19.661	0.104
*|. |	*|. |	14	-0.123	-0.093	23.150	0.058
.|. |	.|* |	15	0.051	0.097	23.759	0.069
.|. |	.|. |	16	-0.062	-0.029	24.659	0.076
.|. |	.|. |	17	-0.016	0.017	24.717	0.101
*|. |	.|. |	18	-0.095	-0.035	26.867	0.082
.|. |	.|. |	19	0.031	0.031	27.100	0.102
.|. |	.|. |	20	-0.016	-0.013	27.160	0.131
.|. |	.|. |	21	-0.025	-0.025	27.308	0.161
.|. |	.|. |	22	-0.026	-0.041	27.466	0.194
.|. |	.|. |	23	-0.017	-0.019	27.538	0.234
*|. |	*|. |	24	-0.075	-0.102	28.914	0.223
.|. |	.|. |	25	-0.056	-0.056	29.679	0.237
.|. |	.|. |	26	0.041	0.041	30.103	0.263
.|* |	.|* |	27	0.096	0.091	32.412	0.217
*|. |	*|. |	28	-0.072	-0.071	33.703	0.211
.|. |	.|. |	29	-0.003	0.038	33.705	0.250
.|. |	*|. |	30	-0.064	-0.087	34.742	0.252
.|. |	.|. |	31	0.040	0.011	35.157	0.278
*|. |	*|. |	32	-0.125	-0.138	39.170	0.179
.|. |	.|. |	33	-0.058	-0.050	40.039	0.186
.|* |	.|* |	34	0.143	0.163	45.280	0.094
.|* |	.|* |	35	0.089	0.092	47.332	0.080
.|. |	.|. |	36	0.015	-0.029	47.394	0.097

*Probabilities may not be valid for this equation specification.

Heteroskedasticity Test: ARCH

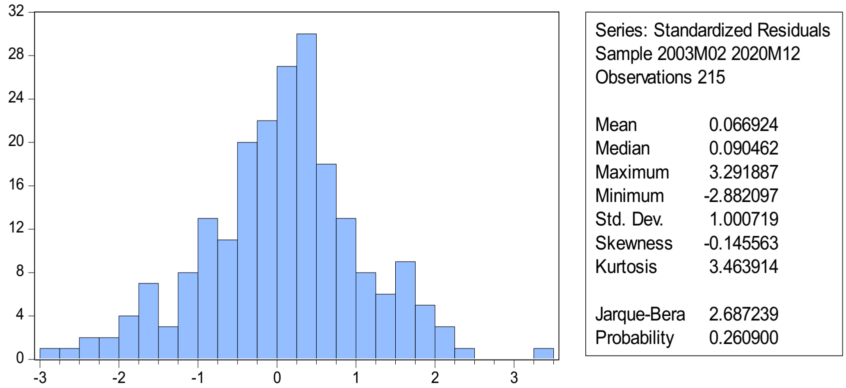
F-statistic	0.040987	Prob. F(1,212)	0.8398
Obs*R-squared	0.041366	Prob. Chi-Square(1)	0.8388

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.019663	0.127453	8.000279	0.0000
WGT_RESID^2(-1)	-0.013901	0.068662	-0.202453	0.8398

R-squared	0.000193	Mean dependent var	1.005689
Adjusted R-squared	-0.004523	S.D. dependent var	1.563874
S.E. of regression	1.567406	Akaike info criterion	3.746024

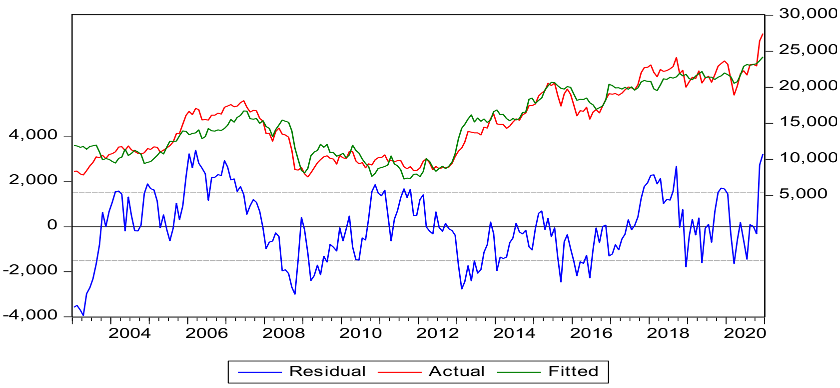
Sum squared resid	520.8338	Schwarz criterion	3.777481
Log likelihood	-398.8245	Hannan-Quinn criter.	3.758735
F-statistic	0.040987	Durbin-Watson stat	1.999053
Prob(F-statistic)	0.839757		



JAPAN

Descriptive Statistics

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	0.009706	0.248657	0.041435	835494.1	69.71644	14949.40
Median	0.009271	0.100000	0.000000	805938.7	64.03000	14856.61
Maximum	0.013046	3.740000	0.500000	1137027.	132.7200	27444.17
Minimum	0.008082	-2.520000	-0.100000	671495.2	18.38000	7568.420
Std. Dev.	0.001306	1.003958	0.171270	126544.8	27.51306	4862.305
Skewness	1.145286	0.901173	1.809570	0.533407	0.404962	0.295697
Kurtosis	3.282583	5.333758	5.296759	2.115963	2.115133	1.915422
Jarque-Bera	47.93917	78.25392	165.3595	17.27651	12.95071	13.73450
Probability	0.000000	0.000000	0.000000	0.000177	0.001541	0.001041
Sum	2.096535	53.71000	8.950000	1.80E+08	15058.75	3229071.
Sum Sq. Dev.	0.000367	216.7053	6.306655	3.44E+12	162748.3	5.08E+09
Observations	216	216	216	216	216	216



Heteroskedasticity Test: ARCH

F-statistic	272.8948	Prob. F(1,213)	0.0000
Obs*R-squared	120.7512	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	557342.9	158240.6	3.522123	0.0005
RESID^2(-1)	0.739275	0.044752	16.51953	0.0000

R-squared	0.561633	Mean dependent var	2168916.
Adjusted R-squared	0.559575	S.D. dependent var	2752776.
S.E. of regression	1826866.	Akaike info criterion	31.68336
Sum squared resid	7.11E+14	Schwarz criterion	31.71472
Log likelihood	-3403.961	Hannan-Quinn criter.	31.69603
F-statistic	272.8948	Durbin-Watson stat	2.028021
Prob(F-statistic)	0.000000		

Dependent Variable: STINDEX
Method: ML ARCH - Normal distribution (BHHH / EViews legacy)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Convergence achieved after 41 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*EXRATE + C(8)*INFLAT + C(9)*INTRATE + C(10)* M_2+
C(11)*OILPRICE

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	179.9882	169.9497	1.059067	0.2896
STINDEX(-1)	0.996596	0.013282	75.03386	0.0000
		Variance Equation		
C(3)	1.789584	0.358246	4.995404	0.0000
C(4)	-0.204243	0.085864	-2.378669	0.0174
C(5)	0.015346	0.079047	0.194141	0.8461
C(6)	0.876046	0.013625	64.29734	0.0000
C(7)	-73.15839	37.90474	-1.930059	0.0536
C(8)	-0.060414	0.036492	-1.655556	0.0978
C(9)	0.191387	0.180579	1.059854	0.2892
C(10)	6.66E-07	1.40E-07	4.744564	0.0000
C(11)	0.002441	0.001813	1.346460	0.1782

R-squared	0.971890	Mean dependent var	14980.14
Adjusted R-squared	0.971758	S.D. dependent var	4852.567
S.E. of regression	815.4902	Akaike info criterion	16.08023
Sum squared resid	1.42E+08	Schwarz criterion	16.25268
Log likelihood	-1717.625	Hannan-Quinn criter.	16.14991
Durbin-Watson stat	1.807747		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|* |	.|* |	1	0.094	0.094	1.9376	0.164
.|. |	.|. |	2	0.006	-0.003	1.9449	0.378
.|. |	.|. |	3	0.033	0.033	2.1826	0.535
.|. |	.|. |	4	-0.021	-0.027	2.2761	0.685
.|. |	.|. |	5	-0.025	-0.021	2.4154	0.789
.|. |	.|. |	6	-0.064	-0.061	3.3159	0.768
.|. |	.|. |	7	0.012	0.026	3.3483	0.851
.|. |	.|. |	8	-0.009	-0.012	3.3671	0.909

.|. |	.|. |	9	-0.024	-0.019	3.5008	0.941
.|. |	.|. |	10	-0.008	-0.009	3.5158	0.967
.|. |	.|. |	11	-0.046	-0.046	4.0010	0.970
.|. |	.|. |	12	-0.012	-0.006	4.0348	0.983
.|. |	.|. |	13	-0.009	-0.006	4.0519	0.991
.|. |	.|. |	14	-0.002	-0.001	4.0532	0.995
.|. |	.|. |	15	-0.020	-0.024	4.1438	0.997
*|. |	*|. |	16	-0.090	-0.089	6.0388	0.988
.|. |	.|. |	17	-0.025	-0.015	6.1827	0.992
.|. |	.|. |	18	0.044	0.050	6.6495	0.993
.|. |	.|. |	19	0.015	0.010	6.7007	0.996
.|. |	.|. |	20	0.000	-0.008	6.7007	0.998
.|. |	.|. |	21	0.031	0.021	6.9392	0.998
.|. |	.|. |	22	-0.004	-0.023	6.9434	0.999
.|. |	.|. |	23	0.032	0.037	7.1850	0.999
.|. |	.|. |	24	0.049	0.046	7.7602	0.999
.|. |	.|. |	25	0.006	-0.005	7.7692	1.000
.|. |	*|. |	26	-0.059	-0.068	8.6403	0.999
.|. |	.|. |	27	-0.013	-0.008	8.6834	1.000
.|. |	.|. |	28	-0.002	-0.002	8.6849	1.000
.|. |	.|. |	29	0.039	0.057	9.0622	1.000
.|. |	.|. |	30	0.059	0.058	9.9411	1.000
.|. |	.|. |	31	-0.014	-0.034	9.9901	1.000
.|. |	.|. |	32	0.033	0.020	10.267	1.000
*|. |	*|. |	33	-0.107	-0.119	13.181	0.999
.|. |	.|. |	34	-0.048	-0.009	13.779	0.999
.|. |	.|. |	35	-0.004	0.017	13.782	1.000
.|. |	.|. |	36	-0.055	-0.046	14.584	0.999

*Probabilities may not be valid for this equation specification.

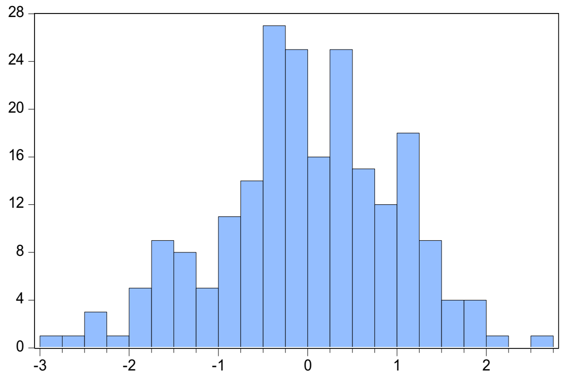
Heteroskedasticity Test: ARCH

F-statistic	0.318835	Prob. F(1,212)	0.5729
Obs*R-squared	0.321360	Prob. Chi-Square(1)	0.5708

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.954504	0.118481	8.056209	0.0000
WGT_RESID^2(-1)	0.038720	0.068573	0.564655	0.5729

R-squared	0.001502	Mean dependent var	0.992840
Adjusted R-squared	-0.003208	S.D. dependent var	1.418160
S.E. of regression	1.420433	Akaike info criterion	3.549103
Sum squared resid	427.7377	Schwarz criterion	3.580561
Log likelihood	-377.7540	Hannan-Quinn criter.	3.561815
F-statistic	0.318835	Durbin-Watson stat	1.991767
Prob(F-statistic)	0.572906		



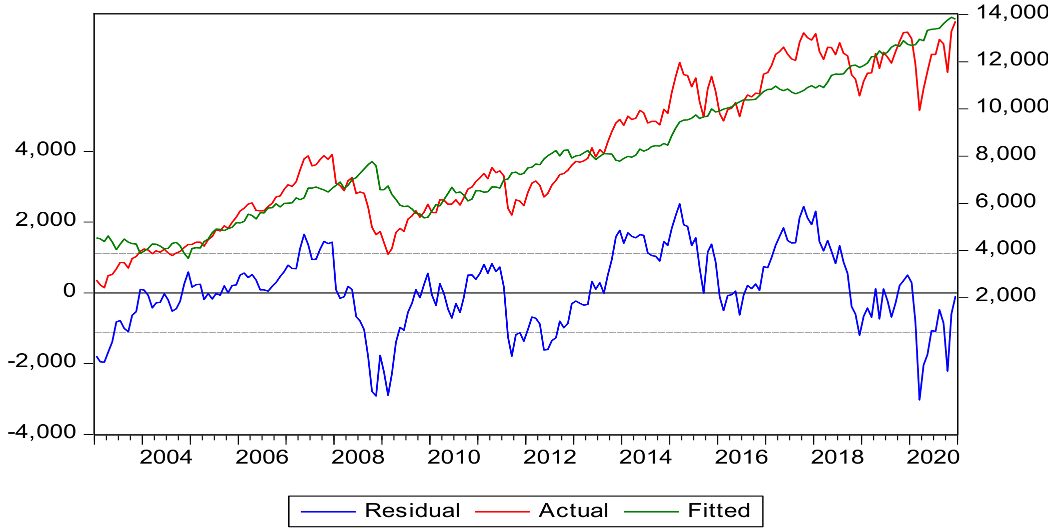
Series: Standardized Residuals
Sample 2003M02 2020M12
Observations 215

Mean	-0.021889
Median	-0.013955
Maximum	2.671860
Minimum	-2.904681
Std. Dev.	0.996414
Skewness	-0.300608
Kurtosis	3.015578
Jarque-Bera	3.240261
Probability	0.197873

Germany

Descriptive Statistics

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	1.253251	1.485417	1.215741	2173.485	69.71644	8034.924
Median	1.250798	1.530000	1.000000	2061.800	64.03000	7390.870
Maximum	1.576970	4.680000	4.250000	3433.240	132.7200	13718.78
Minimum	1.054290	-0.500000	0.000000	1333.900	18.38000	2423.870
Std. Dev.	0.122102	0.879689	1.293178	602.8308	27.51306	3062.333
Skewness	0.380202	0.274294	0.870557	0.351949	0.404962	0.169785
Kurtosis	2.433001	3.914132	2.644382	1.937590	2.115133	1.778553
Jarque-Bera	8.097328	10.22928	28.42145	14.61770	12.95071	14.46517
Probability	0.017446	0.006008	0.000001	0.000670	0.001541	0.000723
Sum	270.7022	320.8500	262.6000	469472.7	15058.75	1735544.
Sum Sq. Dev.	3.205398	166.3782	359.5465	78132081	162748.3	2.02E+09
Observations	216	216	216	216	216	216



Heteroskedasticity Test: ARCH

F-statistic	177.7811	Prob. F(1,213)	0.0000
Obs*R-squared	97.81162	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	360274.2	94305.14	3.820303	0.0002

RESID^2(-1)	0.675228	0.050642	13.33346	0.0000

R-squared	0.454938	Mean dependent var	1119126.
Adjusted R-squared	0.452379	S.D. dependent var	1489943.
S.E. of regression	1102579.	Akaike info criterion	30.67346
Sum squared resid	2.59E+14	Schwarz criterion	30.70482
Log likelihood	-3295.397	Hannan-Quinn criter.	30.68613
F-statistic	177.7811	Durbin-Watson stat	1.993065
Prob(F-statistic)	0.000000		

Dependent Variable: STINDEX
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*EXRATE + C(8)*INFLAT + C(9)*INTRATE + C(10)* M_2+
C(11)*OILPRICE

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	101.9152	47.34033	2.152820	0.0313
STINDEX(-1)	0.994002	0.006846	145.1941	0.0000
Variance Equation				
C(3)	2.854205	2.002428	1.425372	0.1540
C(4)	0.181475	0.169853	1.068423	0.2853
C(5)	-0.296335	0.106383	-2.785548	0.0053
C(6)	0.488132	0.224975	2.169713	0.0300
C(7)	0.246925	1.394385	0.177085	0.8594
C(8)	-0.168685	0.148515	-1.135810	0.2560
C(9)	0.316738	0.173918	1.821193	0.0686
C(10)	0.001114	0.000512	2.175507	0.0296
C(11)	0.002032	0.005759	0.352789	0.7242

R-squared	0.979313	Mean dependent var	8059.516
Adjusted R-squared	0.979216	S.D. dependent var	3048.028
S.E. of regression	439.4268	Akaike info criterion	14.68030
Sum squared resid	41129430	Schwarz criterion	14.85275
Log likelihood	-1567.132	Hannan-Quinn criter.	14.74998
Durbin-Watson stat	1.906956		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	0.029	0.029	0.1869	0.666
*|. |	*|. |	2	-0.073	-0.074	1.3568	0.507
*|. |	*|. |	3	-0.074	-0.070	2.5501	0.466
.|. |	.|. |	4	0.022	0.021	2.6619	0.616
.|. |	*|. |	5	-0.065	-0.077	3.5980	0.609
.|. |	.|. |	6	-0.034	-0.032	3.8492	0.697
.|. |	.|. |	7	0.022	0.017	3.9538	0.785
.|. |	.|. |	8	0.017	0.000	4.0200	0.855
.|. |	.|. |	9	0.066	0.068	5.0000	0.834
*|. |	*|. |	10	-0.085	-0.090	6.6332	0.760
*|. |	*|. |	11	-0.122	-0.114	10.025	0.528

.|. |	.|. |	12	-0.015	-0.010	10.075	0.609
.|. |	.|. |	13	-0.029	-0.062	10.271	0.672
.|. |	.|. |	14	0.053	0.051	10.915	0.693
.|. |	.|. |	15	-0.001	-0.015	10.915	0.759
.|. |	.|. |	16	0.006	-0.020	10.923	0.814
.|. |	.|. |	17	0.008	0.012	10.939	0.860
.|. |	.|. |	18	-0.049	-0.066	11.504	0.872
.|. |	.|. |	19	0.026	0.050	11.670	0.899
*|. |	*|. |	20	-0.121	-0.125	15.157	0.767
*|. |	*|. |	21	-0.086	-0.113	16.924	0.716
.|. |	.|. |	22	0.020	0.009	17.021	0.762
.|. |	.|. |	23	0.067	0.003	18.099	0.752
.|. |	.|. |	24	-0.001	-0.005	18.099	0.798
.|. |	.|. |	25	0.001	0.009	18.099	0.838
.|. |	.|. |	26	-0.006	-0.039	18.109	0.872
.|. |	.|. |	27	-0.005	0.007	18.116	0.900
*|. |	*|. |	28	-0.105	-0.128	20.858	0.831
.|. |	.|. |	29	-0.065	-0.061	21.917	0.824
.|. |	.|. |	30	0.061	0.050	22.842	0.822
.|* |	.|. |	31	0.090	0.001	24.875	0.773
.|. |	.|. |	32	-0.007	-0.021	24.886	0.811
.|. |	.|. |	33	-0.047	-0.061	25.460	0.823
.|* |	.|* |	34	0.080	0.083	27.105	0.793
.|. |	.|. |	35	-0.008	-0.004	27.122	0.827
.|. |	.|. |	36	-0.037	-0.043	27.473	0.845

*Probabilities may not be valid for this equation specification.

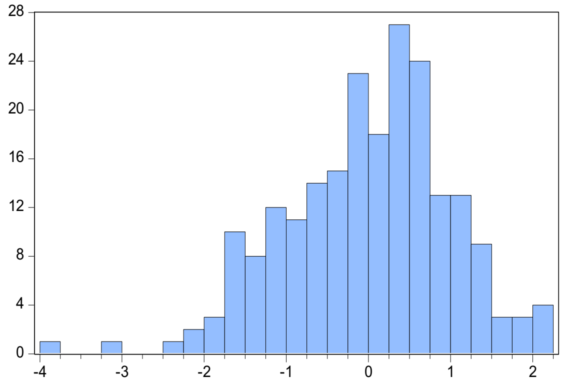
Heteroskedasticity Test: ARCH

F-statistic	0.113583	Prob. F(1,212)	0.7364
Obs*R-squared	0.114594	Prob. Chi-Square(1)	0.7350

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.019030	0.128523	7.928800	0.0000
WGT_RESID^2(-1)	-0.023101	0.068544	-0.337021	0.7364

R-squared	0.000535	Mean dependent var	0.995759
Adjusted R-squared	-0.004179	S.D. dependent var	1.582449
S.E. of regression	1.585752	Akaike info criterion	3.769297
Sum squared resid	533.0975	Schwarz criterion	3.800755
Log likelihood	-401.3148	Hannan-Quinn criter.	3.782009
F-statistic	0.113583	Durbin-Watson stat	1.998602
Prob(F-statistic)	0.736434		



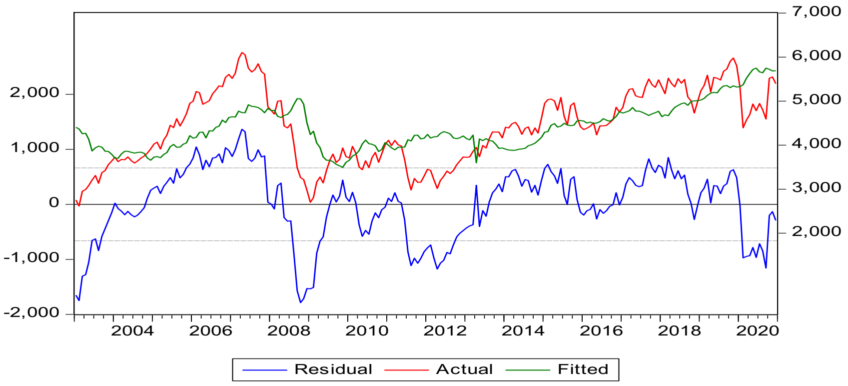
Series: Standardized Residuals
Sample 2003M02 2020M12
Observations 215

Mean	-0.007899
Median	0.103257
Maximum	2.133862
Minimum	-3.848525
Std. Dev.	1.003945
Skewness	-0.479956
Kurtosis	3.461600
Jarque-Bera	10.16328
Probability	0.006210

France

Descriptive Statistics

	EXRATE	INFLAT	INTRATE	M_2	OILPRICE	STINDEX
Mean	1.253251	1.629769	1.215741	1375.748	69.71644	4398.319
Median	1.250798	1.390000	1.000000	1353.160	64.03000	4416.630
Maximum	1.576970	68.00000	4.250000	2429.540	132.7200	6104.000
Minimum	1.054290	-0.730000	0.000000	763.9100	18.38000	2618.460
Std. Dev.	0.122102	4.619306	1.293178	421.4788	27.51306	839.8082
Skewness	0.380202	13.82048	0.870557	0.504617	0.404962	-0.000630
Kurtosis	2.433001	199.1464	2.644382	2.584743	2.115133	1.972143
Jarque-Bera	8.097328	353136.8	28.42145	10.71894	12.95071	9.508431
Probability	0.017446	0.000000	0.000001	0.004703	0.001541	0.008615
Sum	270.7022	352.0300	262.6000	297161.6	15058.75	950037.0
Sum Sq. Dev.	3.205398	4587.666	359.5465	38193550	162748.3	1.52E+08
Observations	216	216	216	216	216	216



Heteroskedasticity Test: ARCH

F-statistic	620.0444	Prob. F(1,213)	0.0000
Obs*R-squared	160.0269	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	59370.92	24332.03	2.440032	0.0155
RESID^2(-1)	0.832202	0.033421	24.90069	0.0000

R-squared	0.744311	Mean dependent var	414716.8
Adjusted R-squared	0.743111	S.D. dependent var	570145.6
S.E. of regression	288973.9	Akaike info criterion	27.99532
Sum squared resid	1.78E+13	Schwarz criterion	28.02667
Log likelihood	-3007.497	Hannan-Quinn criter.	28.00799
F-statistic	620.0444	Durbin-Watson stat	1.726674
Prob(F-statistic)	0.000000		

Dependent Variable: STINDEX
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample (adjusted): 2003M02 2020M12
Included observations: 215 after adjustments
Convergence achieved after 56 iterations
Coefficient covariance computed using outer product of gradients

Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1)) + C(7)
*EXRATE + C(8)*INFLAT + C(9)*INTRATE + C(10)* M_2 +
C(11)*OILPRICE

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	149.0572	72.25223	2.063012	0.0391
STINDEX(-1)	0.970303	0.016614	58.40302	0.0000
Variance Equation				
C(3)	4.740695	2.629446	1.802925	0.0714
C(4)	0.160018	0.188635	0.848293	0.3963
C(5)	-0.251821	0.118422	-2.126480	0.0335
C(6)	0.184905	0.331995	0.556953	0.5776
C(7)	1.007112	1.686632	0.597114	0.5504
C(8)	-0.022811	0.052741	-0.432516	0.6654
C(9)	0.354917	0.193566	1.833569	0.0667
C(10)	0.001600	0.000726	2.204551	0.0275
C(11)	-0.003189	0.007071	-0.451042	0.6520

R-squared	0.937346	Mean dependent var	4405.967
Adjusted R-squared	0.937052	S.D. dependent var	834.1950
S.E. of regression	209.2951	Akaike info criterion	13.37801
Sum squared resid	9330346.	Schwarz criterion	13.55046
Log likelihood	-1427.136	Hannan-Quinn criter.	13.44769
Durbin-Watson stat	1.858566		

Sample: 2003M01 2020M12
Included observations: 215
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	-0.005	-0.005	0.0062	0.937
*|. |	*|. |	2	-0.080	-0.080	1.3911	0.499
.|. |	.|. |	3	-0.019	-0.020	1.4728	0.689
.|. |	.|. |	4	0.064	0.058	2.3805	0.666
.|. |	.|. |	5	-0.020	-0.023	2.4702	0.781
.|. |	.|. |	6	0.053	0.063	3.1045	0.796
.|. |	.|. |	7	0.047	0.048	3.6105	0.823
.|. |	.|. |	8	-0.024	-0.020	3.7458	0.879
.|. |	.|. |	9	0.020	0.033	3.8352	0.922
.|. |	.|. |	10	-0.005	-0.014	3.8408	0.954
*|. |	*|. |	11	-0.082	-0.084	5.3614	0.912
.|. |	.|. |	12	-0.002	-0.002	5.3628	0.945
.|. |	.|. |	13	0.017	-0.006	5.4327	0.964
.|. |	.|. |	14	0.048	0.047	5.9600	0.967
.|. |	.|. |	15	-0.025	-0.014	6.1087	0.978
.|. |	.|. |	16	0.014	0.017	6.1562	0.986
.|* |	.|* |	17	0.087	0.100	7.9503	0.968
*|. |	*|. |	18	-0.074	-0.073	9.2406	0.954
.|. |	.|. |	19	0.026	0.043	9.4031	0.966
*|. |	*|. |	20	-0.080	-0.096	10.936	0.948
.|. |	.|. |	21	0.025	0.010	11.081	0.961
.|. |	.|. |	22	-0.046	-0.052	11.592	0.965
.|. |	.|. |	23	0.051	0.028	12.217	0.967
*|. |	*|. |	24	-0.072	-0.066	13.488	0.957
.|. |	.|. |	25	-0.015	0.001	13.542	0.969
.|. |	.|. |	26	0.004	-0.001	13.547	0.979

.|. |	.|* |	27	0.069	0.079	14.711	0.973
*|. |	*|. |	28	-0.092	-0.079	16.811	0.952
.|. |	.|. |	29	-0.036	-0.028	17.144	0.960
.|. |	.|. |	30	-0.010	-0.024	17.171	0.970
.|. |	.|. |	31	0.058	0.033	18.018	0.969
.|. |	.|. |	32	-0.001	0.015	18.018	0.978
.|. |	.|. |	33	0.005	-0.007	18.025	0.984
.|. |	.|. |	34	0.017	0.035	18.100	0.988
.|. |	.|. |	35	-0.021	-0.016	18.210	0.991
*|. |	*|. |	36	-0.082	-0.088	19.953	0.986

*Probabilities may not be valid for this equation specification.

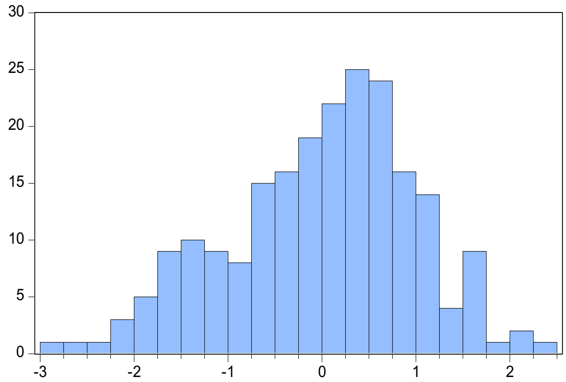
Heteroskedasticity Test: ARCH

F-statistic	0.143917	Prob. F(1,212)	0.7048
Obs*R-squared	0.145176	Prob. Chi-Square(1)	0.7032

Test Equation:
Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 2003M03 2020M12
Included observations: 214 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.021675	0.115357	8.856624	0.0000
WGT_RESID^2(-1)	-0.026033	0.068622	-0.379364	0.7048

R-squared	0.000678	Mean dependent var	0.995523
Adjusted R-squared	-0.004035	S.D. dependent var	1.350348
S.E. of regression	1.353070	Akaike info criterion	3.451931
Sum squared resid	388.1290	Schwarz criterion	3.483388
Log likelihood	-367.3566	Hannan-Quinn criter.	3.464642
F-statistic	0.143917	Durbin-Watson stat	1.998690
Prob(F-statistic)	0.704797		



Series: Standardized Residuals	
Sample 2003M02 2020M12	
Observations 215	
Mean	-0.010582
Median	0.140281
Maximum	2.261892
Minimum	-2.874496
Std. Dev.	1.002540
Skewness	-0.375659
Kurtosis	2.793990
Jarque-Bera	5.436984
Probability	0.065974

Appendix C Survey

C.1 Questionnaire

LONDON METROPOLITAN UNIVERSITY

Survey - PhD Study on Stock Market Performance

Instruction

This survey is conducted by Ms Dolapo Alao who is currently undertaking doctoral research at the Guildhall School of Business and Law, London Metropolitan University.

These questions aim to validate the results, obtained using secondary data while studying the impact of oil prices and some macroeconomic variables on stock market performance.

Your support and assistance in completing this survey questionnaire are critical to the success of the study as your opinion and answer to the questions will assist the investigation. Data of individuals and responses will be held with confidentiality within the content of academic definition. Your sincere and honest views are well acknowledged.

It takes about 10 minutes to complete this survey. Please click the box to select an answer to the question which you considered. Kindly email the completed questionnaire to LonMetSurvey@gmail.com.

Thank you for your time in participating in this investigation.

Yours sincerely,
Dolapo Alao
Doctoral Research Candidate

Question 1. Which of the classification best describe you?

1. Analyst ☐
2. Investor ☐
3. Regulator ☐
4. Other ☐

Question 2. What is your sex?

1. Male ☐
2. Female ☐
3. Prefer not to say ☐

Question 3. What age group do you belong to?

1. Less than 25 ☐
2. 25 to 34 ☐
3. 35 to 44 ☐
4. 45 to 54 ☐
5. 55 to 64 ☐
6. 65 and over ☐

Question 4. In your considered opinion, do you think that prices of oil affect stock market activities?

Question 5. Oil price increase or decrease influence stock market activities.

1. Strongly agree ☐
2. Agree ☐
3. Neither agree nor disagree ☐
4. Disagree ☐
5. Strongly disagree ☐

Question 6. Changes in macroeconomic variables like exchange rate, gross domestic products, inflation rate, interest rate, and money supply do affect stock market activities.

1. Strongly agree ☐
2. Agree ☐
3. Neither agree nor disagree ☐
4. Disagree ☐
5. Strongly disagree ☐

Question 7. Increase in oil prices affects the stock index negatively.

1. Strongly agree ☐
2. Agree ☐
3. Neither agree nor disagree ☐
4. Disagree ☐
5. Strongly disagree ☐

Question 8. Sectors of the stock market respond to oil price shocks differently.

1. Strongly agree ☐
2. Agree ☐
3. Neither agree nor disagree ☐
4. Disagree ☐
5. Strongly disagree ☐

QUESTION 9. One opinion associated with the consumer staples, consumer discretionary, energy, industrials, information technology, real estate and telecommunications sectors of the Canadian stock market is that they have positive links with oil price shocks.

1. Strongly agree ☐
2. Agree ☐
3. Neither agree nor disagree ☐
4. Disagree ☐
5. Strongly disagree ☐

QUESTION 10. How do you feel about the statement that financials, health care, materials and utilities sectors of the Canadian stock market sectors have a negative link with oil price shocks?

1. Strongly agree ☐
2. Agree ☐
3. Neither agree nor disagree ☐
4. Disagree ☐
5. Strongly disagree ☐

QUESTION 11. Does the business cycle explain the congruent interface between oil prices and the stock market?

1. Strongly agree ☐
2. Agree ☐
3. Neither agree nor disagree ☐
4. Disagree ☐
5. Strongly disagree ☐

QUESTION 12. Oil prices and other monetary policy variables are significant determinants of stock market performance in Canada when the economy is expanding.

1. Strongly agree ☐
2. Agree ☐
3. Neither agree nor disagree ☐
4. Disagree ☐
5. Strongly disagree ☐

QUESTION 13. Oil prices, interest rate, money supply and gross domestic products are significant drivers of stock market performance in Canada when the economy is on the decline.

1. Strongly agree ☐
2. Agree ☐
3. Neither agree nor disagree ☐
4. Disagree ☐
5. Strongly disagree ☐

QUESTION 14. Oil price shocks affect stock market performance in a net oil importing country differently from a net oil exporting country.

1. Strongly agree ☐
2. Agree ☐
3. Neither agree nor disagree ☐
4. Disagree ☐
5. Strongly disagree ☐

Question 15. The response of the stock market activities to a unit shock in oil price for net oil exporting countries like (Saudi Arabia, Russia, United Arab Emirates, Canada, and Kuwait) is higher than net oil importing countries such as (Unites States of America, China, Japan, Germany, and France).

1. Strongly agree ☐
2. Agree ☐
3. Neither agree nor disagree ☐
4. Disagree ☐
5. Strongly disagree ☐

C.2 Survey Response from Respondents

ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
1	3	1	3	Yes	1	1	4	2	1	3	1	1	4	2	2
2	4	1	5	Yes	2	2	4	2	3	4	2	2	4	2	3
3	2	2	3	Yes	1	1	2	2	2	3	4	2	2	3	2
4	1	1	3	Yes	1	1	3	3	1	3	2	1	3	1	1
5	1	1	3	No	3	2	4	2	3	2	3	2	4	4	3
6	3	2	3	Yes	2	1	3	2	1	3	2	2	2	2	2
7	2	1	4	Indifferent	2	1	3	2	3	2	2	2	1	2	2
8	4	1	3	Yes	2	1	4	3	2	3	2	1	1	1	3
9	2	2	3	Indifferent	2	2	4	3	2	3	2	1	1	2	2
10	4	1	2	Yes	1	1	3	2	3	3	3	2	2	2	2
11	1	1	4	Yes	1	2	1	2	2	1	1	1	1	2	1
12	1	2	2	Yes	2	2	1	2	4	1	1	4	1	2	2
13	1	1	3	Yes	1	1	4	1	3	2	2	1	1	2	1
14	2	2	3	Yes	1	1	2	2	2	3	4	2	2	3	2
15	1	1	3	Yes	1	1	3	3	1	3	2	1	3	1	1
16	2	1	4	Yes	2	2	1	4	4	4	1	4	1	1	2
17	4	1	4	Yes	2	2	4	2	3	2	2	1	2	1	1
18	2	1	6	Yes	1	1	1	1	1	1	2	1	1	2	2
19	1	1	5	Yes	1	1	4	1	2	2	2	2	2	4	4
20	4	1	3	Yes	2	1	2	2	2	4	2	2	2	2	3
21	1	1	4	Yes	1	1	1	1	3	2	2	1	2	2	4
22	1	1	4	Yes	1	1	1	2	1	5	2	2	2	1	1
23	2	1	3	Yes	1	2	1	1	3	1	1	1	1	1	1
24	1	2	5	Yes	2	2	3	2	1	2	2	2	2	2	2
25	1	2	1	Yes	1	2	5	1	1	5	4	1	1	2	4
26	3	1	5	Yes	2	1	1	2	2	2	2	2	2	2	3
27	1	2	4	Yes	2	1	4	2	3	3	3	2	2	2	3
28	1	1	4	Yes	1	1	4	2	1	4	1	1	1	3	1
29	3	1	4	Yes	2	1	4	2	1	4	2	2	1	2	4
30	3	1	4	Yes	1	1	4	2	2	3	2	2	2	1	2
31	1	2	4	No	4	2	4	2	4	4	2	2	2	2	2
32	2	1	5	No	3	1	3	2	2	3	2	1	2	1	2
33	4	2	4	No	3	1	3	3	2	2	4	2	2	2	2
34	2	1	3	Yes	1	1	5	2	2	2	2	2	2	2	2
35	1	2	4	Yes	2	1	2	1	2	2	2	2	2	2	2
36	3	2	3	Yes	1	1	2	4	1	2	2	2	2	2	2
37	1	2	5	Yes	2	2	3	2	1	2	2	2	2	2	2
38	1	2	3	Yes	2	2	2	2	3	2	2	2	3	2	2
39	3	2	3	Yes	2	2	3	1	3	3	2	1	2	1	1
40	3	1	2	Yes	2	1	3	1	3	3	4	1	3	1	3
41	1	1	5	Yes	1	1	2	1	3	2	1	2	2	2	2
42	1	2	6	Yes	1	2	4	2	2	4	2	2	2	2	2
43	1	1	3	Yes	2	2	4	1	1	2	2	2	2	2	2
44	1	1	5	Yes	1	1	4	2	3	3	2	4	2	2	1
45	3	2	1	Yes	2	2	3	2	3	3	3	2	2	2	4
46	1	2	5	Indifferent	3	1	3	1	2	4	2	2	3	1	2
47	4	2	5	Yes	2	4	2	1	3	4	3	2	3	1	3
48	1	1	1	Yes	1	1	1	2	2	4	2	2	1	4	2
49	1	1	1	Yes	2	1	4	2	2	5	3	2	2	2	3
50	1	1	4	Yes	1	1	3	2	2	2	1	1	1	1	4
51	1	2	3	Yes	1	1	3	1	3	3	3	2	2	2	3
52	1	2	2	Yes	1	1	4	2	2	4	2	1	1	1	1
53	1	1	3	Yes	2	2	3	1	1	2	2	2	2	2	2
54	3	1	4	Yes	1	1	3	2	3	3	2	2	4	2	2
55	4	1	5	Yes	2	1	2	2	2	4	3	2	2	2	3
56	1	1	2	Yes	1	2	2	2	2	2	2	2	2	2	2
57	1	1	2	Yes	1	2	2	2	2	2	2	2	2	2	2
58	1	1	2	Yes	2	2	2	2	2	2	2	2	2	2	2
59	1	1	3	Yes	1	1	1	3	3	4	2	2	5	1	3
60	1	2	1	Yes	1	1	2	2	3	2	2	3	2	2	3
61	2	2	2	Yes	2	1	2	2	4	3	4	1	2	4	1
62	1	1	4	Yes	2	1	4	3	2	3	2	1	2	2	3
63	2	1	3	Yes	1	1	2	2	1	2	2	3	2	2	2
64	2	1	3	Yes	1	1	1	1	2	4	1	1	1	1	2
65	1	1	2	Yes	1	1	4	1	3	2	2	4	4	2	2
66	1	1	2	Yes	1	1	3	1	3	4	4	2	4	3	2
67	1	2	3	Yes	1	2	2	2	3	3	2	2	1	2	2
68	1	2	3	Yes	2	2	4	2	2	2	2	2	1	1	1

C.3 Survey Response Summary						
ID						
Q1	Analyst	Investor	Regulator	Others		
	38	12	10	8		
Q2	Male	Female	Prefer not to say			
	43	25	0			
Q3	Under 25	25 - 34	35 - 44	45 - 54	55 - 64	Over 65
	5	10	24	16	11	2
Q4	Yes	No	Indifferent			
	61	4	3			
	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	
Q5	35	28	4	1	0	
Q6	44	23	0	1	0	
Q7	11	16	18	21	2	
Q8	18	41	7	2	0	
Q9	15	26	23	4	0	
Q10	4	25	21	15	3	
Q11	9	44	8	7	0	
Q12	21	41	2	4	0	
Q13	18	37	6	6	1	
Q14	18	42	4	4	0	
Q15	13	35	14	6	0	

C.4 Survey Response Summary in Percentage						
		Yes	No	Indifferent		
Q4	In your considered opinion, do you think that prices of oil affect stock market activities?	89.71%	5.88%	4.41%		
		Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Q5	Oil price increase or decrease influence stock market activities.	51.47%	41.18%	5.88%	1.47%	0.00%
Q6	Changes in macroeconomic variables like exchange rate, gross domestic products, inflation rate, interest rate, and money supply do affect stock market activities.	64.70%	33.80%	0.00%	1.50%	0.00%
Q7	Increase in oil prices affects the stock index negatively.	16.20%	23.50%	26.50%	30.90%	2.90%
Q8	Sectors of the stock market respond to oil price shocks differently.	26.50%	60.30%	10.30%	2.90%	0.00%
Q9	One opinion associated with the consumer staples, consumer discretionary, energy, industrials, information technology, real estate and telecommunications sectors of the Canadian stock market is that they have positive links with oil price shocks.	22.10%	38.20%	33.80%	5.90%	0.00%
Q10	How do you feel about the statement that financials, health care, materials and utilities sectors of the Canadian stock market sectors have a negative link with oil price shocks?	5.88%	36.76%	30.88%	22.06%	4.41%
Q11	Does the business cycle explain the congruent interface between oil prices and the stock market?	13.20%	64.70%	11.80%	10.30%	0.00%
Q12	Oil prices and other monetary policy variables are significant determinants of stock market performance in Canada when the economy is expanding.	30.90%	60.30%	2.90%	5.90%	0.00%
Q13	Oil prices, exchange rate and gross domestic products are significant drivers of stock market performance in Canada when the economy is on the decline.	26.50%	54.40%	8.80%	8.80%	1.50%
Q14	Oil price shocks affect stock market performance in a net oil-importing country differently from a net oil-exporting country.	26.47%	61.76%	5.88%	5.88%	0.00%
Q15	The response of the stock market activities to a unit shock in oil price for net oil-exporting countries is higher than net oil-importing countries.	19.10%	51.50%	20.60%	8.80%	0.00%

C.4 Survey Response Summary in Percentage						
		Yes	No	Indifferent		
Q4	In your considered opinion, do you think that prices of oil affect stock market activities?	89.71%	5.88%	4.41%		
		Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Q5	Oil price increase or decrease influence stock market activities.	51.5%	41.2%	5.9%	1.5%	0.0%
Q6	Changes in macroeconomic variables like exchange rate, gross domestic products, inflation rate, interest rate, and money supply do affect stock market activities.	64.7%	33.8%	0.0%	1.5%	0.0%
Q7	Increase in oil prices affects the stock index negatively.	16.2%	23.5%	26.5%	30.9%	2.9%
Q8	Sectors of the stock market respond to oil price shocks differently.	26.5%	60.3%	10.3%	2.9%	0.0%
Q9	One opinion associated with the consumer staples, consumer discretionary, energy, industrials, information technology, real estate and telecommunications sectors of the Canadian stock market is that they have positive links with oil price shocks.	22.1%	38.2%	33.8%	5.9%	0.0%
Q10	How do you feel about the statement that financials, health care, materials and utilities sectors of the Canadian stock market sectors have a negative link with oil price shocks?	5.9%	36.8%	30.9%	22.1%	4.4%
Q11	Does the business cycle explain the congruent interface between oil prices and the stock market?	13.2%	64.7%	11.8%	10.3%	0.0%
Q12	Oil prices and other monetary policy variables are significant determinants of stock market performance in Canada when the economy is expanding.	30.9%	60.3%	2.9%	5.9%	0.0%
Q13	Oil prices, exchange rate and gross domestic products are significant drivers of stock market performance in Canada when the economy is on the decline.	26.5%	54.4%	8.8%	8.8%	1.5%
Q14	Oil price shocks affect stock market performance in a net oil-importing country differently from a net oil-exporting country.	26.5%	61.8%	5.9%	5.9%	0.0%
Q15	The response of the stock market activities to a unit shock in oil price for net oil-exporting countries is higher than net oil-importing countries.	19.1%	51.5%	20.6%	8.8%	0.0%