OIL PRICES AND STOCK MARKETS: AN EMPIRICAL ANALYSIS FROM RUSSIA, CANADA, U.S. AND JAPAN HASAN KURTAR 2017

ANKARA YILDIRIM BEYAZIT UNIVERSITY
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HASAN KURTAR

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Approval of the Institute of Social Sciences

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Plagiarism

I hereby declare that all information in this thesis has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work; otherwise I accept all legal responsibility.

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ABSTRACT

OIL PRICES AND STOCK MARKETS: AN EMPIRICAL ANALYSIS FROM RUSSIA, CANADA, U.S. AND JAPAN

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This study tries to widen understanding of the relationship between oil prices and stock markets at the aggregate and sector level in countries which have different characteristics. Reaction of stock markets and sectoral stock indices to oil price changes in Russia, Canada, Japan and United States have been observed. Russia and Canada are net oil exporters while United States and Japan are net oil importer countries. The study has been realized in the period between 2002:1–2016:12 (Some sectors' indices were formed after 01:01:2002, so their analyses has begun from formation date of that indices) and Johansen cointegration analysis and Granger causality tests have been applied. At the end of the study, empirical evidence has proved that there are significant and mostly positive relationships between Russian MOEX stock market indices and crude oil prices. Since Russia is an oil exporter, this result is compatible with the financial and economic theory. However; significant Johansen cointegration between Brent Crude Oil prices and most of the Canadian, U.S. and Japanese stock market aggregate and sectoral indices could not be figured out.

Keywords: Oil Price, Stock Market, Sector Indices, Exporting, Importing

ÖZET

PETROL FİYATLARI VE BORSA: RUSYA, KANADA, A.B.D VE JAPONYA'DAN AMPİRİK ANALİZ

Kurtar, Hasan

Yüksek Lisans, Bankacılık ve Finans Bölümü

Tez Yöneticisi: Doç. Dr. Ayhan KAPUSUZOĞLU

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Bu çalışmanın amacı, petrol fiyatları ile farklı karakterlere sahip borsalar ve borsa endeksleri arasındaki ilişkiyi irdelemektir. İki tanesi net petrol ihracatçısı (Rusya, Kanada), iki tanesi ise net petrol ithalatçısı (A.B.D, Japonya) olan ülkelerdeki birleşik ve sektör endekslerinin petrol fiyatlarındaki değişimlere verdiği tepki bu analizde incelendi. Çalışma 2002 ile 2016 yılları arasında gözlemlenen veriler ile gerçekleştirildi ve Johansen Eşbütünleşme testleri ile Granger nedensellik analiz yöntemleri kullanıldı. Çalışmanın sonucundaki ampirik bulgular, MOEX Rusya endeksleri ile petrol fiyatı arasında uzun dönemli ve güçlü bir ilişki var olduğunu ortaya koydu. Ek olarak; Rus birleşik ve sektör endekslerinin çoğunluğu ile petrol fiyatları arasında pozitif bir ilişki olduğu ortaya koyuldu. Rusya'nın net petrol ihracatçısı olduğunu düşündüğümüzde, ampirik bulgular ile ekonomik ve finansal teorinin örtüştüğünü görmekteyiz. Ancak; Kanada, A.B.D ve Japonya birleşik ve sektör endekslerinin büyük çoğunluğu ile petrol fiyatları arasında, uzun vadeli ve güçlü eşbütünleşme bulunamadı.

Anahtar Kelimeler: Petrol Fiyatı, Borsa, Sektör Endeksleri, İhracat, İthalat

Dedication

To My Wife

Acknowledgments

I wish to express my deepest gratitude to my supervisor Assoc. Prof. Dr. Ayhan KAPUSUZOĞLU for his guidance, advice, criticism, encouragements and insight throughout the research

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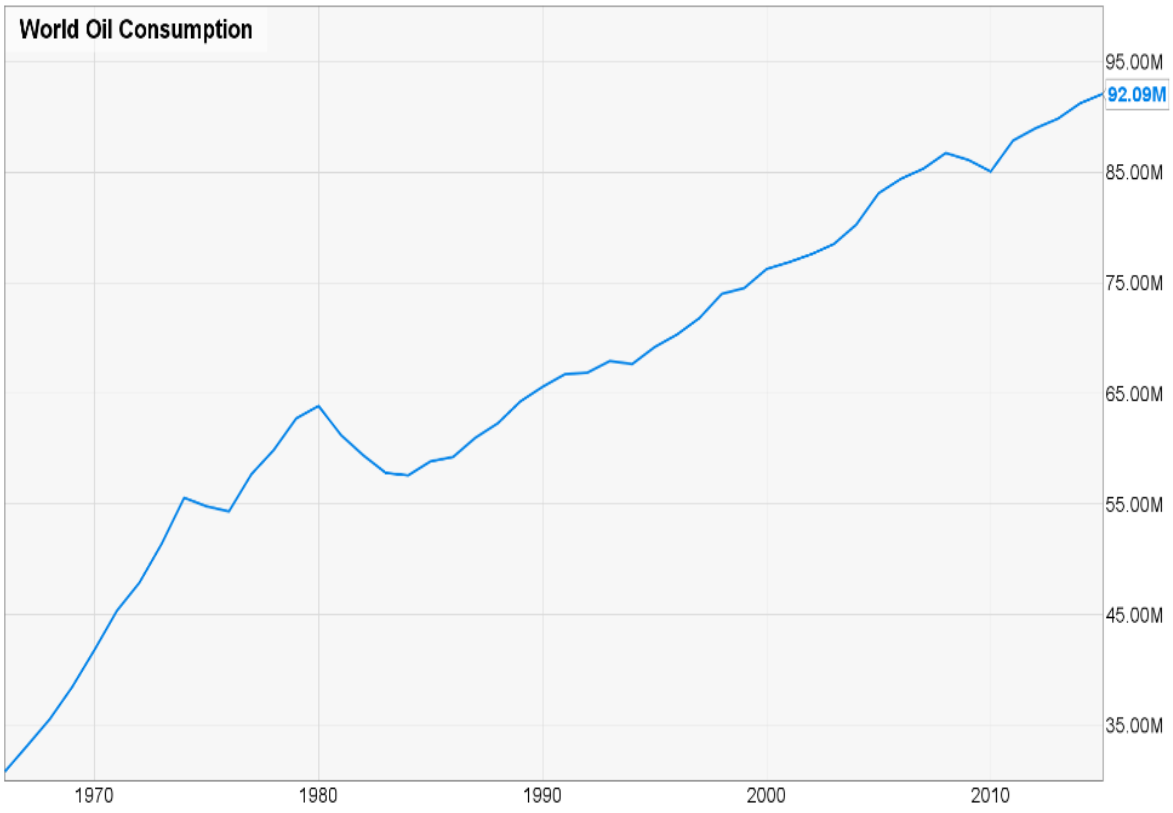
1. INTRODUCTION

Crude oil is an underground treasure which caused many disputes, fights and wars among humankind for many years. It is called black gold because it makes run our cars, airplanes and other machineries; it heats and lightens our homes and it plays vital role in production of many every day essentials. Since it is lifeblood of industrialized world, its impact range is very broad from politics to economics and finance. Oil consumption of the world economy is increasing year by year for a long time parallel to world energy requirement. The graph below shows how oil consumption is increasing historically.

BP Statistical Review of World Energy



Source: BP

Since oil is important for economies, its price changes also matter. In last decades, oil price fluctuated a lot as it can be seen below in the graph.

Influence of volatility in oil prices on macroeconomic factors are largely dealt with in literature by different researchers. To illustrate; Hamilton (1983), Gilbert and Mork (1984), Gisser & Goodwin (1986), Mork, (1989), Mork, Olsen and Mysen (1994), Hooker (1996), Uri and Boyd (1997), Hamilton, (2003) analyze relationship between oil prices and macroeconomic indicators.

Oil price impacts are varying across countries since some of them are oil producer while others are oil consumer. Some countries are net oil exporter while some are net oil importers. Oil prices influence stock markets as well as macroeconomic indicators because it means income or cash inflow for some countries while it is cost or cash outflow for others. Since oil is cost or income for economies, it means change in cash flow of the economies. Alterations in cash flow directly or indirectly will have some impacts on stock markets or equity values in stock markets as suggested by financial theory (Lardic & Mignon, 2005).

In this study; reaction of stock markets and sectoral stock indices to oil price changes in Russia, Canada, Japan and U.S. will be observed. These countries and their sectors will be studied separately in details. Those four countries have been selected for this analysis since they have different characteristics with respect to having energy sources and foreign energy dependencies. Russia and Canada are net oil exporter countries while Russian economy is more dependent to oil. On the other hand; Japan and U.S. are net oil importer countries while Japan economy has high dependency on foreign oil energy.

Producers	Mt	% of world total
Saudi Arabia	572	13.2
United States	567	13.1
Russian Federation	533	12.3
Canada	221	5.1
People's Rep. of China	215	5.0
Iraq	175	4.0
Islamic Rep. of Iran	168	3.9
United Arab Emirates	160	3.7
Kuwait	160	3.7
Venezuela	144	3.3
Rest of the world	1 416	32.7
World	**4 331**	**100.0**

2015 provisional data

Net exporters	Mt
Saudi Arabia	354
Russian Federation	222
United Arab Emirates	125
Iraq	124
Nigeria	111
Canada	104
Kuwait	101
Venezuela	91
Angola	81
Kazakhstan	64
Others	515
Total	**1 892**

2014 data

Net importers	Mt
United States	344
People's Rep. of China	308
India	189
Japan	165
Korea	126
Germany	89
Spain	61
Italy	59
France	54
Netherlands	54
Others	509
Total	**1 958**

2014 data

1. Includes production of crude oil, NGL, feedstocks, additives and other hydrocarbons. Excludes liquids from other fuel sources (renewable, coal and natural gas).

Source of table: (International Energy Agency, 2016)

Our study tries to widen understanding of the relationship between oil prices and stock markets at the aggregate and sector level in countries which have different characteristics. First of all; any analysis in aggregate level can veil certain association between oil prices and any one sector. In addition; analysis made by overall indices can hide sector sensitivities to alterations in the price of oil. To illustrate; some sectors is influenced by change in oil prices in different degrees and it is not possible to see distinct affection level of those sectors which can be attributed to competition level in the sector, degree of transferring oil price changes to its consumers, diversification of the stock market in an aggregate analysis. Therefore; it is important to make analysis in aggregate and sector level simultaneously as it is made in this analysis.

This study focuses on comparing oil importing (U.S., Japan) and oil exporting (Russian Federation, Canada) countries with respect to relationship between oil prices and stock markets. Looking at the past studies made on this issue, it is seen that there are many studies researching association between oil prices and stock markets at the aggregate level. For example; Hammoudeh and Eleisa (2004), Gjerde and Saettem (1999), Arouri and Rault (2011), Bashar (2006), Arouri, Lahiani and Nguyen (2011), Zarour (2006), Arouri, Lahiani and Bellalah (2010), Bjørnland (2008), Ravichandran and Alkhathlan (2010), Onour (2007), Naifar and Al Dohaiman (2013), Cunado and Gracia (2014), Al-Fayoumi (2009), Maghyereh and Al-Kandari (2007) and Arouri and Fouquau (2009) made their studies in order to observe relationship between oil prices and stock markets in aggregate level and in different countries. Those authors researched the relationship between these two variables by only focusing on a country/group of country/only oil importing countries/only oil exporting countries. In other words; they did not compare oil importing and exporting countries with respect to aggregate relationship between oil prices and stock markets in studies mentioned above. However; there are many studies researching relationship between oil prices and stock markets in aggregate level by comparing oil importing and oil exporting countries. For example; Park and Ratti (2008) investigated relationship between oil price fluctuations and stock markets for 13 European countries and United States. Some of countries such as Norway are oil exporters while others are oil importing countries in the study. O'Neill, Penm and Terrell (2008), Imarhiagbe (2010), Degiannakis, Filis and Floros (2011) made their analyses in the same manner which is comparing oil importing and oil exporting countries with respect to association between oil prices and stock markets in overall level. However; studies in the literature which are mentioned above did not make their analyses by descending to the sectoral level. They have only observed their country sets in overall level. On the other hand; some researchers such as Scholtens and Yurtsever (2012), Arouri (2011), Arouri and Nguyen (2010), Khamis and Hamdan (2016) made their analyses by descending to the sectoral level in a country or in a group of country such as Eurozone countries. Yet; these studies which are making their analysis on sectoral level in oil exporting countries or Eurozone countries or a singular country did not compare and contrast oil importing and oil exporting countries with respect to association between oil prices and stock markets.

To summarize; in the literature there are many studies which are only concentrating on relationship between oil prices and stock markets at the aggregate level. In addition; some studies compare oil importing and oil exporting countries at the aggregate level with respect to interaction between oil prices and stock markets. Furthermore; there are some studies concentrate only on oil exporting countries or Eurozone countries or a singular country in sectoral level analyses. However; to my best knowledge, there is no study comparing oil importing and oil exporting countries with respect to interaction between oil prices and stock markets in aggregate and sectoral level at the same time. Therefore; this study (it may be the first study) will contribute to the literature by comparing and contrasting oil importing countries and exporting countries with respect to association between oil prices and stock markets both in aggregate level and sectoral level simultaneously. In addition; country set in this study demonstrates distinct features with respect to oil/foreign oil dependency. Russian economy is less diversified than Canadian and U.S. economies. Japan economy displays high dependency on foreign oil. Therefore; it will be very interesting to see in this study that how affection level of those countries' aggregate and sectoral indices differ from oil price changes. Now, it is unclear that whether countries (Russia and Japan) which shows high dependency or oil/foreign oil will be influenced more than Canada and U.S. (which are more diversified economies) or not. At the end of the study; it will have been most probably known that how oil importing and oil exporting countries are influenced from oil price changes in aggregate and sectoral level. In addition; it will have probably been clear that whether countries' different characteristics take role or not with respect to affection level from oil price changes.

The study will be realized in the period between 2002:1–2016:12 (Some sectors' indices were formed after 01:01:2002, so their analyses will begin from formation date of that indices) and cointegration analysis and Granger causality tests will be applied. The study will show that whether characteristics of a country will be significant or not when a country's financial markets is being affected from rise or fall of oil prices. It is expected that highly oil dependent economies (Russia, Japan) will be influenced significantly from changes in oil prices and number of sectoral stock indices affected from oil price changes will be a lot and vice-versa.

Rest of the research is organized as following. First section will include history of oil and important events changing fate of oil significantly. In the following part, it will be

scrutinized that oil shocks and their impacts on the world briefly. Later on; per country's economic characteristic will be analyzed. Then, literature review with theoretical background on stock markets and oil prices relation will take place. Data and methodology will be following. Empirical analysis and results will be at the last section of the study.

2. OIL HISTORY

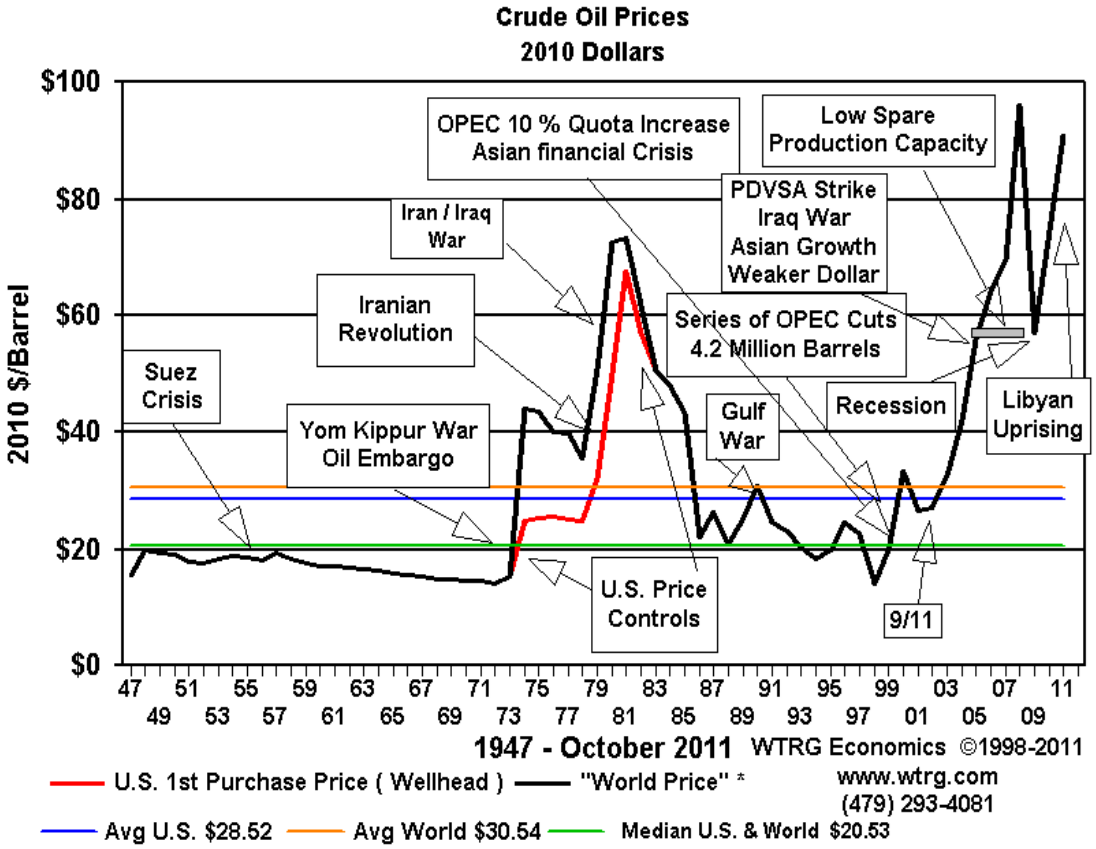
As it is stated above, oil is very crucial source of energy in today world but how did it become such an important material? Ancient people of Middle East used oil for different purposes. The Babylonians – modern day Iraqis – used oil to waterproof their boats and as mortar in building construction while Egyptians were using oil in the preparation of mummies (Black, 2015). Although it was used by many people for different purposes, until the late 19th century, interest for oil in the world is small. After the invention of kerosene lamp, interest for crude oil increased significantly and first large scale demand for petroleum had been seen (Kerosene first was made from coal, but by the late 1880s most was derived from crude oil.). Later on; commercial oil wells were created with a new technique which allows deeper drilling. The success of the oil well and production of kerosene triggered an oil rush and a new major industry emerged (Black, 2015). Second crucial step in the rise of oil was invention of motor car by German engineer Karl Benz in 1885. This first practical and commercially available vehicle mechanized transportation via an internal combustion engine. Fuel for this vehicle was gasoline which is derived from crude oil. (MacRae, 2012). Demand for crude oil increased again significantly with the invention of first motor car. Dramatic increase in demand for crude oil came after creation of car called Ford Model T in 1908 by Henry Ford. Energy source for this Ford Model T car was gasoline. The car established a mass market for automobiles and more than 15.000.000 Ford Model T's were built and sold. This affordable transportation vehicle increased importance of crude oil immensely (Ford Motor Company, 2012). Another turning and critical point for petroleum was World War 1 (WW1). Countries which have navies started to convert their warships from coal burning into oil burning. Especially, United Kingdom converted all of its coal burning warships into oil burning warships in the leadership of Winston Churchill who was Navy Minister of United Kingdom in the World War 1 despite harsh criticisms (Yergin, 2016). This leaded to navies to move faster and stay longer in the sea. This was a great advantage in the fights made in seas. United Kingdom (U.K.) took this advantage and benefited from it in the Great War which helped a lot to U.K. in the road of victory in WW1. In addition, horseless army vehicles such as cars, tanks and trucks which were running by oil proved their usefulness in the transportation of war materials and troops in the Great War. According to the Daniel Yergin who is the Founder of IHS Cambridge Energy Research

Associates; taxi-cabs which run by oil played vital role in the fate of Paris / France in WW1 (Yergin, 2016). French armies were resisting against German troops near Paris but if reinforcement did not come to French soldiers, they would not be able to withstand German pressures any more. Only way to carry soldier coming as support to French troops was rail lines in Paris. However, it was destroyed by Germans and rail lines could not be used any more. If French forces coming for reinforcement walked to front line, they would be too late and Paris would fall into hands of Germans. Paris Military Governor General Joseph Gallieni found a solution to carry reinforcement troops. He decided to use taxi-cabs for transportation of soldiers to front line for fighting. Thousands of soldiers carried by taxi-cabs to front lines and German troops were repelled. This moment was crucial point for the Great War. Second turning point in WW1 was invention of "Tank" which was necessary for breaking through the German resistance line. Tank which is running by oil seemed only way to gain victory against Germans. Those two developments caused importance of internal combustion engine and oil to be understood completely. In 1914 August, U.K. army was holding 827 motor cars in their hands and 747 out of 827 were not belonging to U.K. army. When it came to the end of the war, U.K. army had 56.000 tanks, 23.000 motor cars and 34.000 motorbikes. United States manufactured 50.000 motor cars and brought them to France in order to be used in WW1. In addition; internal combustion engine which is running by oil triggered to use airplanes in the war. England, France, Italy, Germany and United States (U.S.) manufactured 55.000, 68.000, 20.000, 48.000 and 15.000 airplanes respectively. As it is stated above, oil was very important to gain something from the war. In order to fulfill oil need of German armies, Germans invaded Romania but U.K. reacted earlier and they made sabotages to oil refineries and oil depots. When Germans took control of the oil areas, there was no oil ready to use. When calendars show October 1918, Germans have very little oil in their stocks and they wanted ceasefire after a month. Lord Curzon who was Minister of Foreign Affairs of U.K. was saying that "Allied Forces walked to victory on the waves of oil" (Yergin, 2016). To summarize, vehicles which are running by oil played vital role in the Great War and made crude oil very important asset for superpowers' armies. Moreover; "it is understood that oil would assume a rapidly-growing importance in the civilian economy, making it a vital element in national and imperial economic strength and a source of untold wealth to those who controlled it. Already in the United States, John D. Rockefeller, founder of Standard Oil Company, was the world's richest person" (Paul, 2002). Ultimately; these developments created a huge demand globally for crude oil. When it came

to today, it is seen that usage area of petroleum products is very broad. Petrochemical industry uses crude oil as a critical input in order to produce many chemical products such as plastics, polyurethane, solvents, and hundreds of other intermediate and end-user goods. Transportation industry is heavily depending on oil products by using oil main energy source. Oil is also used in construction sector for production of various materials (U.S. Energy Information Administration, 2016). In short; it is in the heart of production chain for most products in modern world. Therefore; any changes in crude oil price or supply - demand condition of crude oil has serious effects on economics and finance as well as political environment. Let us remind you past oil crisis which have significant impacts in different aspects on the whole world.

2.1 The First Oil Shock: 1862-1864

Civil war in United States (U.S.) caused demand for oil to increase. At the same time; tax on alcohol which was substitute of oil increased from 20 cent per gallon in 1862 to $2 per gallon by 1865. Therefore; consumers preferred to use petroleum instead of expensive alcohol as a source of illuminant. Meanwhile; new method of drilling and new source of oils caused oil to be produced in excess amounts and excess supply of oil were seen 1860-1861 and price had fallen 10 cents per barrel by the end of 1861. Therefore; many drilling operations stopped their activities. This resulted oil production to decrease after 1862. To summarize; due to the civil war and tax on alcohol demand for oil had risen while supply of oil to decline. As a result; price of oil increased significantly as the rise during 1970s during the U.S. Civil War (Hamilton, Historical Oil Shocks, 2011).



2.2 Oil Shock: 1865-1899

This shock was similar with the first oil shock. Finding new crude oil sources in U.S. and in other countries such as Russia leaded to oil price fall down to 56 cent per barrel by 1892. However; depletion of oil resources which could be easily drilled and cholera epidemic in Baku caused oil price hike (Hamilton, Historical Oil Shocks, 2011).

2.3 Great Depression

New sources of oil were discovered in United States at the beginning of the 1920s. Since there was no regulation in U.S. in 1920s, “rule of capture” was in operation. Rule of capture was meaning that owner of source can extract as much as oil it wishes. Producers of oil were in race to extract the oil from well on adjacent properties (Hamilton, Historical Oil Shocks, 2011). In short; new oil resources and no control on oil production resulted in excess supply of oil. This leaded to price of oil to decline around % 40 between 1920 and 1926. In twentieth century, oil’s importance increased since it was used for heating, transportation and power. Usage of oil was seriously depending on the economic / business cycle. With Great Depression, economic recessions were seen nearly in all sectors and in many areas of

the world. Subsequently; demand for oil declined significantly. To summarize; supply of oil was increasing while demand for oil was declining between 1920 and 1931. "By 1931, the price of oil had dropped an additional % 66 from its value in 1926" (Hamilton, Historical Oil Shocks, 2011).

2.4 Postwar Era Price Fluctuations

After World War II, demand for petroleum products increased significantly. In addition; Iran Prime Minister Mohammad Mossadegh nationalized Iran's oil industry in the summer of 1951. In response; boycott of Iran emerged in the world. This caused 19 million barrels of monthly Iranian oil production to be eradicated from world market. Excess demand and shortage of supply of oil in the world resulted in spike in oil price (Hamilton, Historical Oil Shocks, 2011).

2.5 Suez Crisis

In 1875, Egypt ruler Khedive had difficulties in payments of liabilities. Therefore; he decided to sell shares of Suez Canal Corporation which he owned. United Kingdom (U.K.) Prime Minister Benjamin Disraeli quickly bought % 44 shares of the Canal Corporation from Khedive since he thought the canal was strategic path to India which was U.K. colony. After the sale of the shares, U.K. and France remained as only powers controlling Suez Canal (Yergin, 2016).

In 1948, after Indians gained their independence from U.K., Suez Canal was not a strategic path anymore; it started to lose its importance. Meantime; the Canal acquired a new role as main road of oil. In 1955, two third of traffic volume in the canal were being created by oil transportation. Furthermore; two third of European oil was being carried through Suez Canal (Yergin, 2016). It was playing key role for fast and cheap transportation of oil from Persian Gulf to Europe. It was estimated that it costs probably $600 million more per year to carry the same cargo around the Cape of Good Hope to Western Europe and North America with existing facilities (Economic Weekly, 1957). As time passes by, Dependency of Europe on Middle East Oil and importance of Suez Canal was rising. However, for Egypt, Suez Canal was economic loss. Income generated by canal toll (passing fee) was flowing to shareholders of Suez Canal Corporation which were U.K. and France. Populist Arab nationalist Gamal Abdel Nasser who was Egypt President was feeling uncomfortable due to

transfer of the income from Middle East to Europe. U.K. and United States (U.S.) decided to decrease tensions of Nasser by providing loan for industrialization of Egypt through World Bank. After a while, due to various reasons, World Bank loan agreement had been cancelled. This angered Nasser and he decided to nationalize Suez Canal Corporation. He thought income generated from canal toll could be used for construction of Assuan Dam which was very critical for industrialization of Egypt (Yergin, 2016).

Nationalization of the Canal Corporation astonished European Powers. However, they had no intention to give up controlling of the canal. It was bridge for transportation of European oil. It was vital for sustainability and continuity of oil supply of Europe. Through the canal, 1- 1.5 million barrels of oil per day were being transported. In 1956s, Anthony Eden, Prime Minister of U.K., was saying that "I will be clear, we fight for oil if necessary, we cannot live without oil and we have no intention to die without it". Balance of payment of U.K. was in the urge of deterioration. Dollar and gold reserves were just enough to cover of three month imports. One of the main sources of foreign income for U.K. was Middle East Oil Corporations. If those corporations do not keep on bringing income, U.K. economy would be affected adversely and significantly (Yergin, 2016).

Meanwhile, countries were seeking diplomatic solution to Suez crisis. Unfortunately diplomatic efforts failed to smooth crisis environment and Israel invaded the Sinai on October 29 (Boughton, 2001). United Kingdom and France joined this military intervention by air strikes. Egypt blocked the canal and sabotage was made to pumping station along the Iraqi oil pipeline. Oil production from Middle East declined dramatically. Reductions in oil production nearly reached %10 of total world oil production (Hamilton, Historical Oil Shocks, 2011). European countries were supposing that U.S. would supply oil instead of Persian Gulf countries during the crisis process. However, they were wrong in their idea and U.S. refused to supply oil. Influence of oil production cut off was felt strongly in Europe. New York Times (London, December 1) was informing that "Europe's oil shortage resulting from the Suez Canal crisis was being felt more fully this weekend…. Dwindling gasoline supplies brought sharp cuts in motoring, reductions in work weeks and the threat of layoffs in automobile factories. There was no heat in some buildings; radiators were only tepid in others. Hotels closed off blocks of rooms to save fuel oil. . . . [T]he Netherlands, Switzerland, and Belgium have banned [Sunday driving]. Britain, Denmark, and France have imposed rationing. Nearly all British automobile manufacturers have reduced production and put their

employees on a 4-day instead of a 5-day workweek. . . . Volvo, a leading Swedish car manufacturer, has cut production 30%. In both London and Paris, long lines have formed outside stations selling gasoline. . . . Last Sunday, the Automobile Association reported that 70% of the service stations in Britain were closed. Dutch hotel-keepers estimated that the ban on Sunday driving had cost them up to 85% of the business they normally would have expected" (Hamilton, Historical Oil Shocks, 2011).

Later on; ceasefire had been made among countries and armies started to withdraw their troops and Egypt reopened canal under its own control and pipelines from Iraq were also reopened (Boughton, 2001). Emergency oil supply program which was cooperation between oil companies and governments was operated and ultimately the crisis had ended. "The economic consequences of the crisis were subtle and temporary and would not by themselves have constituted an international crisis. For the United Kingdom, however, Suez was also a financial crisis. Throughout 1956 and 1957, the United Kingdom had a current account surplus despite the disruptions to its international trade, but the value of its currency came under speculative pressure due to deteriorations in the international trade coming from Suez Crisis (Delice, 2003). The Bank of England was forced to deplete its U.S. dollar reserves to defend the fixed value of the pound sterling against the dollar" (Boughton, 2001). However, Bank of England's U.S. Dollar Reserves were not enough to beat this speculative attack. United Kingdom (U.K.) was applying fixed exchange rate which was $ 2.80 in those times. The Directors of the U.K. Economy believed that this rate was ideal for inflation and international trade and exchange rate stability was essential for preserving both the sterling area as a preferential trade zone and sterling's broader role as a reserve currency (Boughton, 2001). Bank of England was always trying to hold minimum 2 billion U.S. dollars in its reserves. It was believed that if U.S. dollar reserves falls under 2 billion, then it means alarming for devaluation of sterling against U.S. dollar. In this crisis, with fear of devaluation of sterling against the dollar, speculation attack commenced and Reserves of Bank of England had fallen under 2 billion U.S. dollars. Later on; International Monetary Fund (IMF) appeared and its credit package helped United Kingdom to overcome this financial crisis. In nine months, IMF lent $858 million to these countries and committed itself to provide another $738 million in credits on a stand-by basis (Boughton, 2001). Meanwhile; France, Egypt and Israel did not experience any kind of financial crisis because their currencies were not convertible. In short; to hold oil trade route under control, global dispute had occurred

and safety of Suez Canal which provides two third of oil European oil had been put in danger so this resulted in a financial crisis whose effects are limited. In addition; this crisis caused global oil trade volume to decrease 10 %. Due to the crisis, Middle East supply of oil decreased but other oil producers in the world increased their oil production therefore dramatic rise in oil price did not seem, it just jumped from 2.82 to 3.07 (Fortune Turkey, 2015).

2.6 OAPEC Embargo

World energy consumption increased more than three times between years 1949 and 1972. In the same years; world oil demand risen 5.5 times. United States daily oil consumption increased from 5.8 million barrel to 16.4 million barrel when it came to 1972. At the same time, oil demand increased 15 times in Western Europe and they were consuming 14.4 million barrel per day. In Japan, unbelievable consumption increase was seen. Daily oil consumption surged from 32 thousand barrel to 4.4 million barrel between years 1949 to 1972 (Yergin, 2016).

Huge increase in oil demand was coming from fast economic growth and wage increases during golden age of capitalism (1960s). Householders increased their real income in these years. They were enjoying with their high life standards which can never be dreamt 20 years ago. They were buying houses, electrical equipments, central heating systems, air conditioners, plastic materials, automobiles etc. Number of motor vehicles went up from 45 million to 119 million between years 1949 to 1972 in U.S... Out of U.S., number of motor vehicles used surged from 18.9 million to 161 million globally in the same years. To meet this increasing demand, firms increased their production and output level. The firms were running with fuel oil. Although coal had been used in the industrial revolution in 18^{th} and 19^{th} centuries, 20^{th} century was era of oil (Yergin, 2016). Importance of oil and dependency of world on oil was clear to everyone. Meantime; U.S. lifted quota on imported oil to meet oil demand of industry since domestic oil production reached its peak in at the beginning of 1970s, this caused global oil demand to rise once more (Yergin, 2016).

Second prominent issue in those years was abandonment of Gold Exchange Standard in U.S. This was important because all international transactions including oil trade were being made with the American dollar. Leaving international gold standard system allowed floating of value of the dollar. This resulted in depreciation of dollar. In return, depreciation

meant economic loss for oil producer countries since value of their income coming from oil trade reduced and made imports expensive for those countries. Subsequently; Organization of Petroleum Exporting Countries (OPEC) changed dollar based oil trade and they linked value of a barrel of oil to gold. This caused oil price to surge (Verrastro, 2013).

As stated above; global oil demand was swelling, dollar and other currencies were depreciating. This leaded to higher crude oil price in the world. Meanwhile; new Israel – Arab conflict erupted and on Yom Kippur, holiest Jewish holiday, Syria and Egypt attacked on Israel in order to obtain lands they lost in 1967. United States helped Israel by supplying military equipments in response to Soviets backed Arab attack. Organization of Arab Petroleum Exporting Countries (OAPEC) decided to increase oil price % 70 and cut oil production % 5 to put pressure on their enemies by showing military aid of U.S. as a reason. However, U.S. President Nixon resumed helping to Israel by providing financial aid. This caused combined response of OAPEC which was putting embargo on shipments of oil to U.S. and other western nations helping Israel. Those events triggered oil shortage and oil prices increased immensely. Before Yom Kimpur War, crude oil price was about $3 but after the embargo it was $12 in 1974 (Verrastro, 2013).

Limited supply and huge increase in price of oil had driven big industrialized economies and world into recession. Unemployment surged and higher inflation rate were seen all over the world. The oil crisis exacerbated "stock market crash" started at the beginning of 1973 and resumed until the end of 1974 (Alpanda & Peralta-Alva, 2010). Impacts of the crisis were felt strongly in United States. Gasoline lines occurred. It is estimated that spent waiting in queues to purchase gasoline added % 12 to the cost of gasoline for urban residents in December 1973 and % 50 in March 1974 (Frech & Lee, 1987). "The American Automobile Association recorded that up to % 20 of the country's gas stations had no fuel one week during the crisis. In some places, drivers were forced to wait in line for two – three hours to get gas" (Frum, 2000). It is estimated that 1973 oil shock caused U.S GDP to decline approximately % 2.5 while leaving unemployment and inflation high. Country experienced serious and longer recession during the years 1973 – 1975 (Verrastro, 2013).

2.7 Iranian Revolution

During the Yom Kimpur War in 1973, Iran increased its oil production to offset the effect of 1973 oil crisis but it was not enough. In 1978 large public protests and demonstrations against Shah Mohammad Reza Pahlavi and his regime were seen in capital and other cities of Iran. The public was discontented with the Shah regime. This public movement resulted in revolution in Iran and Ruhollah Khomeini had taken control of the country instead of Mohammad Reza Pahlavi as a leader. During the revolution, strikes were seen many sectors including oil sector of Iran. Those strikes caused around % 7 reductions in production of oil in total world production. Other Arab countries tried to fill the production gap but their efforts were not enough in the revolution process. In short; Iranian revolution made shortage of oil for some time and price of oil had risen again (Hamilton, Historical Oil Shocks, 2011).

2.8 1980 – 1981 Iran-Iraq and 1990 – 1991 First Persian Gulf War

As it did become in 1973 oil crisis and Iran Revolution, instabilities in Middle East were main source of oil crisis because OPEC was responsible for two third of world oil production for a long time. Iran-Iraq war created instability in Middle East once more. After the Revolution, Iran started to increase its oil production level. However, with the attack of Iraq, oil production of Iran had been deteriorated. Total loss in oil production (Iraq plus Iran production cut) due to the war was about % 6 of total oil production. Combined effect of Iran Revolution and Iran-Iraq war was doubling of oil price between years 1978-1981 (Hamilton, Historical Oil Shocks, 2011).

Likewise, First Persian Gulf War which resulted in invasion of Kuwait by Iraq created problems and cut downs in production of oil and this decline in production caused oil price to go up for a short time. However, this price hike was not severe as it became in the past (Hamilton, Historical Oil Shocks, 2011).

2.9 1997-1998 East Asian Crises

After industrialization of new economies such as China and “Asian Tigers”, global demand for oil increased significantly. China’s demand for petroleum has grown year by year. In the summer of 1997, some of Asian economies faced with serious financial problems and stresses. Their currencies lost value against dollar immensely. Investors thought that

story of Asia rise had come to end, their industry will operate slower and those countries' demand for petroleum will decline. This caused strong decrease in oil price. Price of oil was about $12 per barrel by the end of 1998. It was lowest price since 1972 (Hamilton, Historical Oil Shocks, 2011).

2.10 Steady Increase of Oil Price

During years 2004, 2005, 2006, 2007, world had experienced a strong growth. In 2004-2005, world annual growth rate was about %4, 7. In 2006 and 2007, world real GDP increased additional % 5 per year. This faster and continuous economic growth caused global demand for oil to increase significantly. However, supply of oil was steady during this process due to various reasons. Some of oil sources reached its peak while some sources were giving out less petroleum day by day. Some geopolitical events in places like Iraq and Nigeria also prevented to increase supply of oil. To summarize; while demand for oil was increasing strongly supply of oil was stagnating. This resulted in price of oil to reach $142 in 2008 (Hamilton, Historical Oil Shocks, 2011).

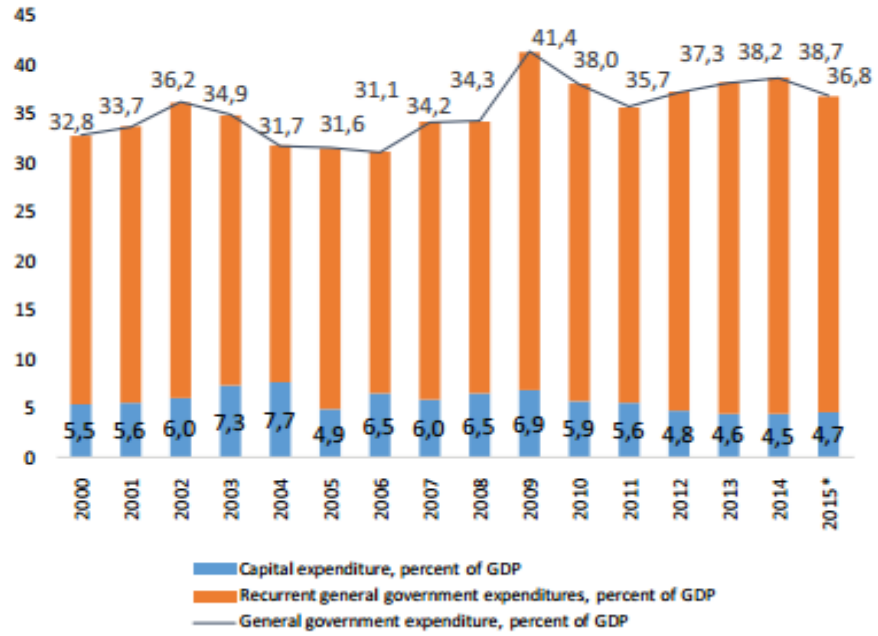
3. CHARACTERISTICS OF OBSERVED ECONOMIES

3.1 Economic Structure of Russia Federation

After collapse of Soviet Union, economic structure of Russia changed from a centrally planned economy to more or less free market economy. Although Russia moved its structure of economy towards more market based system, government still plays an important role, dominates many areas and sectors in the economy. While some industries were privatized in1990s, the sectors such as energy, transportation, banking etc. are still controlled by the government. So Russian economy can be called as "Mixed Economic System" in which government intervention in the economy and some level of economic freedom goes hand in hand. (Focus Economics, 2017).

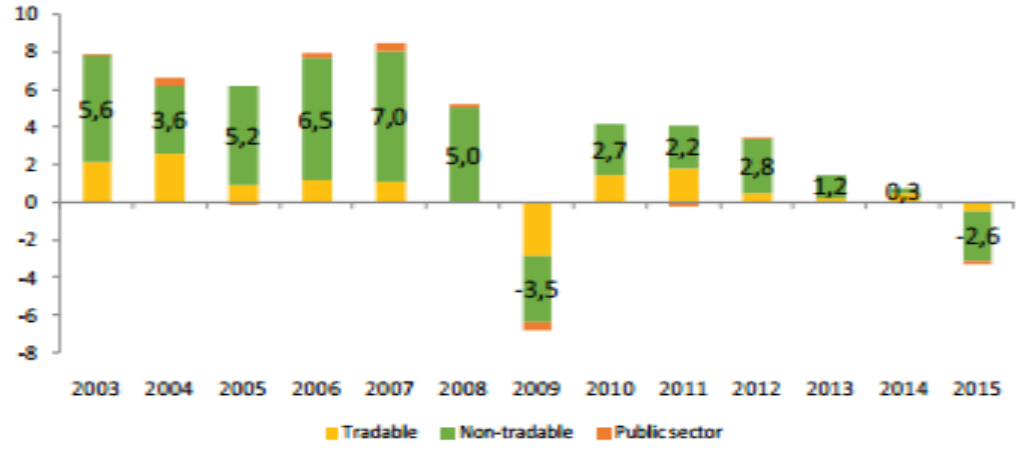
Service sector which has share around %60 consists of major part of Russian economy. Industry sector with a weight nearly %35 is coming in the second place and agriculture is in the last place with a weight around %5. Industry sector includes extractive industries generating oil, gas, coal, chemicals and metals; machinery, aircrafts and defense industries. Russia has abundant natural resources. Those natural resources play vital role in its economy. Economy is heavily relying on the revenue collected through sales of natural resources. Russia is exporting those industrial energy products like oil and natural gas. In addition; it sells out metals like steel and primary aluminum. Government budget and Russian economy is mostly depending on those exports. This makes Russian economy vulnerable against volatility in the price of exported goods. (The World Bank, 2016). To illustrate; Russia experienced with high growth rate which was on average %7 between years 1998 - 2008. In these years, oil prices increased continuously and immensely which set record at $145. This price hike in oil contributed a lot to Russian economy (Focus Economics, 2017). Oil revenues which consist of %25 of total revenues made possible to increase government spending. Total government spending had risen more than 10 times between 2000-2013. This increased spending was used for creating jobs in public instutions and for transfer payments, pensions, social security spending etc. Share of public sector in the economy increased significantly which also helped job creation (World Bank Group, 2016).

Russia Public Spending Composition, 2000-15, Percent of GDP



As it can be seen above in the figure, government spending increased as a share of GDP. Non-tradable sector was main driver of the growth as it can be seen graph in the below.

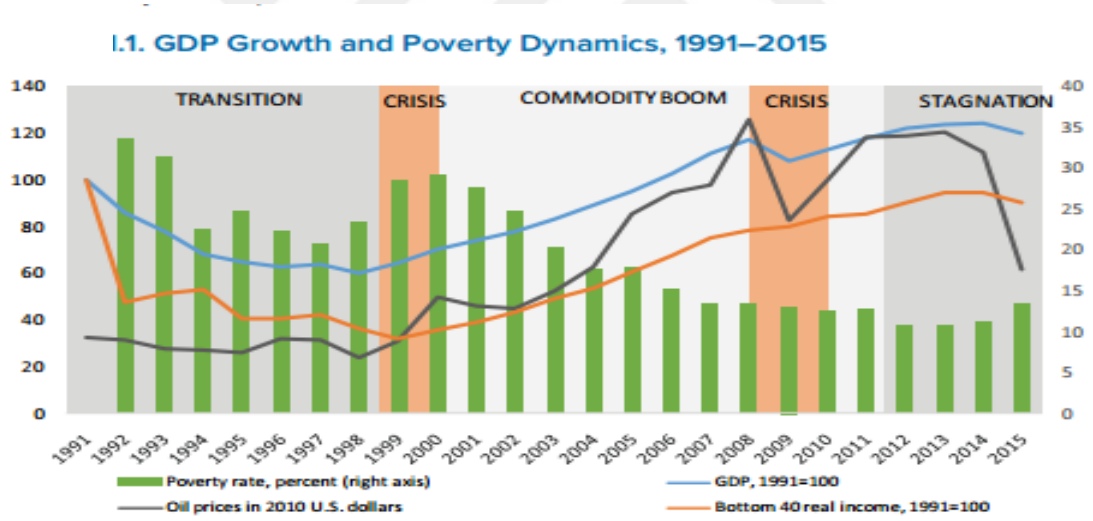
Russia GDP Growth Sector Composition 2003-15, Percent



Source: Rosstat.

This increase in public spending was provided by surging oil revenues. In 2000, share of government spending in GDP was only %2.3. When it came to 2008, it surged to %10 of GDP. This provided growth of GDP for a long time. Resource-rich Russia experienced

average real GDP per capita growth %4 which was provided by favorable terms of trade triggering mostly government spending and consumption. In other words; favorable terms of trade and well external environment (rising oil prices and valuable ruble) were main sources for the growth. Those good conditions came to a halt in global financial crisis. In this crisis, Russian economy contracted around % 8 with sharply decreasing oil prices. From 2008 to 2009, oil price came down from $145 to around $60-$70. Another shock that Russian economy faced was in 2014 and 2015. During 2011-2013, oil prices were around $105. However, it hit less than $60 at the end of 2014. In 2014, Russian economy's growth was close to zero and it recorded negative growth which was around %4 in 2015. It is expected that Russian economy will record negative growth in 2016 as well due to low oil price, international sanctions and structural limitations. The statistics above shows us that health of Russian economy closely related with external environment and oil prices (Focus Economics, 2017). Because deterioration in terms of trade and reductions in GDP go hand in hand as World Bank Report told (World Bank Group, 2016).



Source: ROSSTAT, RLMS-HSE, World Bank.

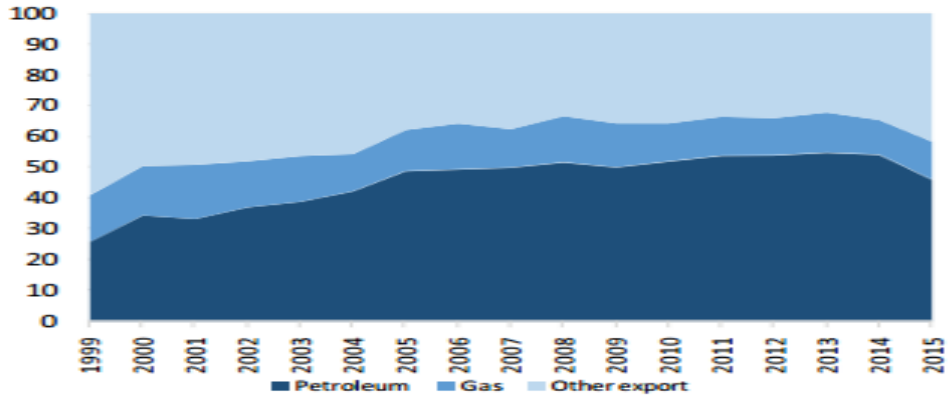
According to the World Bank Report; one of the weaknesses inherent in the current Russian economic system is its vulnerability, because the economy is concentrated in just a few sectors, and a significant degree of state involvement slows innovation and structural transformation. Market dominance and concentration in a few sectors by large and relatively old firms close to the state provide fewer incentives for productivity increases in and perpetuate economic volatility (World Bank Group, 2016). Investment in new areas and diversification of economy were not made during growth boom period. Investments did not

increase after global financial crisis because it was driven mostly by public infrastructure projects. Since government revenues declined with falling oil price, it became difficult to finance new public infrastructure projects. In short; unfavorable terms of trade (i.e. declining oil price) caused reduction in investments and growth. Still, external economic conditions and terms of trade are not favorable enough so economic growth which almost disappeared by 2014 is not seen. Main reason for this is Russian economic structure which is dominated by large corporations operating in traditional heavy industries such as oil and gas (World Bank Group, 2016). Similarly; market capitalization of the stock market is dominated by oil and gas or related stocks. This causes external oil shocks to be sent to domestic economy. Another weakness in Russian economy is dominancy of the state in the economy and in many sectors. For example; more than half of the banking sector is controlled by public banks. This lowers competition and efficiency in the financial sector. Third weakness that World Bank pointed is geographic dispersion of Russia's population and economic activity. It is asserted that there is spatial misallocation which causes geographic distortions over long distances. This prevents the economies to be clustered that intensify structural change and diversification. In other words; spatial misallocation in the economy causes main production factors such as labor and capital to be used ineffectively. This productivity problem prevents economic growth. Efficient and better allocation of production factors (land, labor, and capital) seem only solution for increasing productivity in the economy (World Bank Group, 2016). To summarize; favorable terms of trade, stable economic / external environment concealed vulnerability and shortcomings of Russian economy. Natural resource (single largest asset, oil) dependent economy provided sustainable and high growth for certain time. This prevented diversification of economy and highly reliance on oil and a few sectors made economy vulnerable to oil shocks. Therefore; low oil prices and international sanctions prevent growth of the economy, constraint government revenues which are main engine for the growth and put financial stability into risk now (World Bank Group, 2016).

Russia has current account surplus for a long time in its international trade. Current account surplus is largely created by exports of crude oil, petroleum products and natural gas. Around %60 of total exports are formed by crude oil, petroleum products and natural gas. (Focus Economics, 2017). Average current account surplus was $66.8 billion during years 2010 – 2014. It hits top at $98.8 billion in 2011. However; current account deteriorated due to the decline in oil prices and imposed sanctions after 2014. Geopolitical problems and

falling oil prices also caused capital outflow which further worsened balance of payments of Russia. In 2014, "capital and financial accounts of the Russia Federation fell from a deficit of $45.4 billion to a deficit of $146 billion (%2.2 and 57.8 of GDP respectively)" (Focus Economics, 2017).

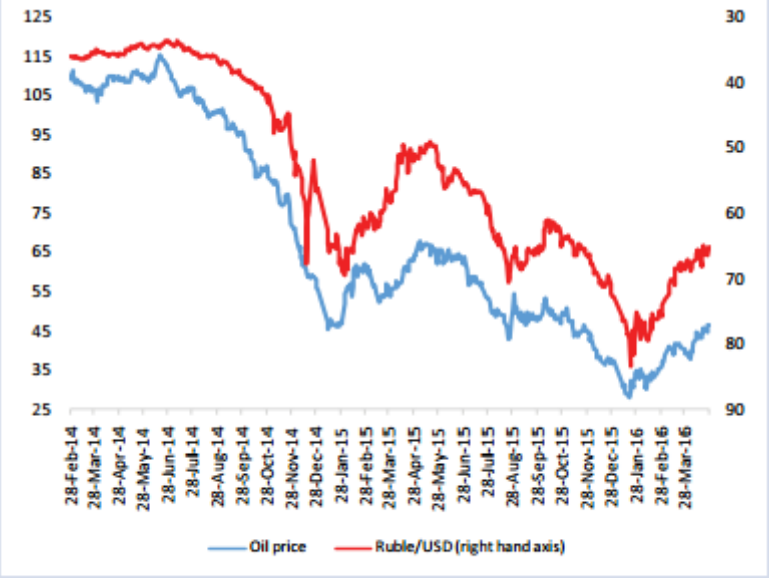
Oil and Gas Share in Total Exports, 1999-2015, Percent



Source: UN Comtrade.

Until 2014, ruble was pegged against a euro and dollar basket. By pegging the ruble, Russia was making exchange rate controls. However, after dramatic decline in oil price and international transactions, Russian Central Bank left pegging regime and they moved to free-floating exchange rate system (Focus Economics, 2017). Due to the low oil prices and international sanctions ruble nearly lost half its value in 2014 after passing to free-floating exchange rate system. Strong fluctuations and volatility in Russian currency were seen in 2015 as well. Main reason for these fluctuations and values lost in ruble was price of oil, which along with gas. Dollar exchange rate of ruble set record in January 2016 while oil prices were reaching lowest level of the last ten years (Focus Economics, 2017). However, this weaker ruble provided comparative advantage in international trade to Russian economy especially in non-oil products such as wheat. For example; country's wheat export increased %3.3 and it had risen to 23.5 million metric tons, outpacing the United States and Canada (Pant, 2016).

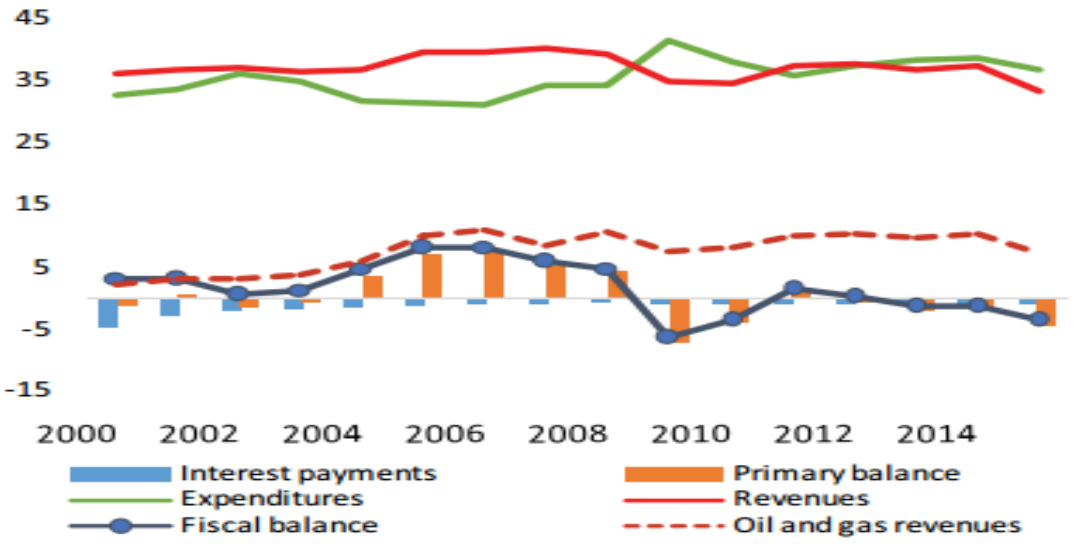
Oil Prices and Ruble Exchange Rate During the 2004 Crisis



Source: Haver database; Central Bank of Russia.

Russian government had surplus in budget between years 2001 and 2008. This budget surplus was due to tight fiscal policy and continuously increasing prices of energy commodities such as oil and natural gas since half of the government budget is created by oil and natural gas revenues. However, global financial crisis hit Russian economy hard and government budget mostly recorded deficits after 2009 with falling price of oil and natural gas (World Bank Group, 2016).

General Government Balance 2000-2015, Percent



Source: Ministry of Finance and Rosstat.

3.2 Observation of Japan Economy

Before World War 1 (WW1) Japan managed to industrialize its economy by transferring technology. It transformed agriculture dependent economy into industrialized economy and it emerged as military and economic power before the Great War. However, Japan's industrial infrastructure was devastated after World War 2 (WW2). With contribution of United States, Japan economy succeeded to recover and it was reconstructed after WW2. It experienced sustainable growth with the help of international trade agreement, strong domestic demand, infrastructure investment, capital investment, adapting high-modern technology for a long time. Economic growth was about % 10, %5 and %4 in 1960s, 1970s and 1980s respectively (The Japan Institute for Labour Policy and Training, 2016). Growth reduction in 1970s was due to oil shock in these years since Japan economy was heavily relying on imported oil as energy source. The oil shocks caused even economic shrinkage around %1 in the mid of 1970s and in early 1980s. In addition to oil shocks; the economic growth was deteriorated by appreciation of Japanese currency, Yen. Due to the yen appreciation, exports became more expensive in international markets and this hampered competitiveness of Japan economy. This in turn, reduced economic growth of Japanese economy (The Japan Institute for Labour Policy and Training, 2016). To revitalize the economy, both fiscal and monetary stimulation packages had been put into action at the end of the 1980s. This in turn triggered dramatic price increase both in real estate and financial sectors. In addition to price increase; speculation in financial markets and large real estate investments created price bubbles in those markets. With a contractionary monetary policy, this bubble in the economy at the beginning of the 1990s was removed and deflationary process with a low growth started for Japanese economy. The 1997 Asian Financial crisis worsened economic situation. This financial crisis caused demand for Japanese exports in international market to fall. Along the crisis years, Japanese economy recorded negative growth (The Japan Institute for Labour Policy and Training, 2016).

Although Japan has third highest GDP after U.S and China, its problem of deflation and low rate of growth still continue today (International Energy Agency, 2016). Zero and even negative interest rate policies of Bank of Japan and increasing government spending in huge volumes did not provide sustainable solution to the problems (International Monetary Fund, 2016). The reasons behind these problems are mostly structural. Decline in labor force, solid-inflexible labor market, non-increasing productivity of labor and capital, decelerating

capital formation are some structural impediments in front of economic growth and deflation. Especially, aging population, narrowing labor force, guarantee of lifetime employment are important labor market problems preventing mobilization and right allocation of the labor. Labor market flexibility is needed for increasing productivity and mobilization of labor which can only bring economic growth. (Danninger & Steinberg, 2012). Anderson, Botman and Hunt (2014) claim that "declining labor-force participation rate, falling land prices, and currency appreciation following the repatriation of foreign savings by the elderly could all create deflationary pressures" (Anderson, Botman, & B.Hunt, 2014). It is recommended that high and sustainable economic growth could only be achieved by increasing labor force, rising woman labor force participation rate, higher productivity and dynamic labor (Danninger & Steinberg, 2012).

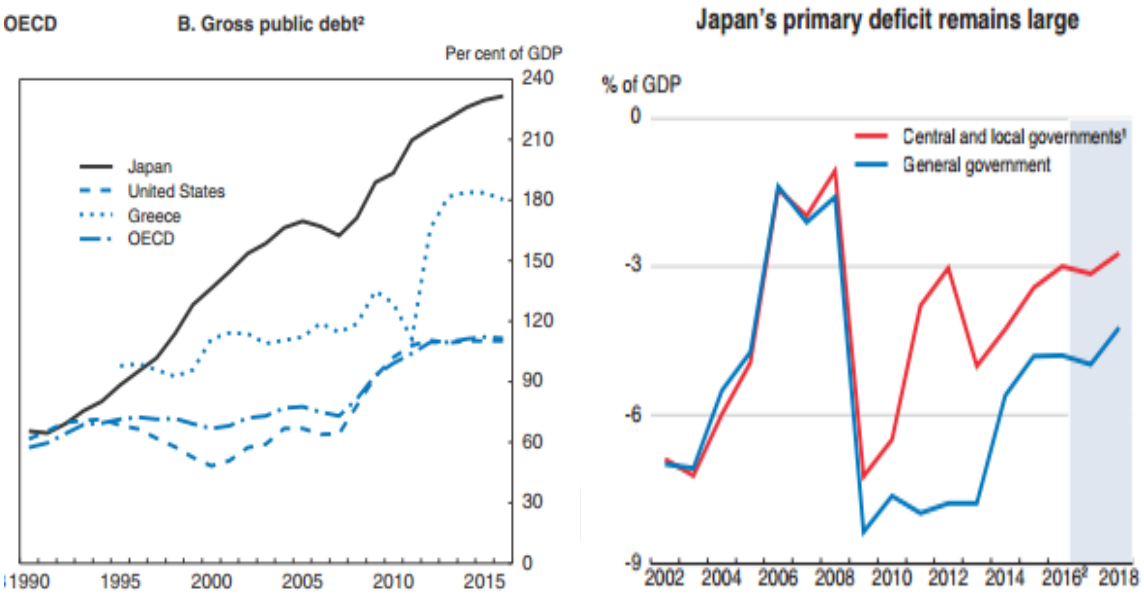
Share of service sector is higher than other sectors in Japanese economy as it occurred in other developed economies. Third four of GDP is provided by service sector. Rest of GDP is comprised by industry and agriculture which has only %1 share (International Monetary Fund, 2016).

Japan has gained from international trade for a long time by creating the trade surpluses due to lower domestic demand of aging population for imported consumer goods, strong barriers to imports and high export potential. However, it recorded deficits between 2011 and 2015. Export which is lifeblood for the economies experiencing low domestic demand and decreasing commodity prices is main contributor to Japan economy. It is one of largest exporters in the world after China, United States and Germany (International Energy Agency, 2016). Manufacturing sector which is driver of exports is capable of producing diversified and high-tech products. It can also produce light and heavy industry commodities. However; manufacturing sector is heavily relying on imported raw materials and foreign fossil fuels source especially on oil (The Japan Institute for Labour Policy and Training, 2016). This dependency on foreign oil increased after the earthquake and tsunami disaster which caused shutdown of nuclear power plants in 2011. Imported energy dependency increased from %80 to %94 when it came to 2013 after the disasters (International Energy Agency, 2016). Shutdown of nuclear plants created gap in electricity supply. This gap is fulfilled by importing fuel fossils especially liquid natural gas (LNG) and oil. Trade deficits recorded between 2011 and 2015 are due to increasing import of fossil fuel (oil + LNG) (International Energy Agency, 2016). Nearly %93 of total energy need is

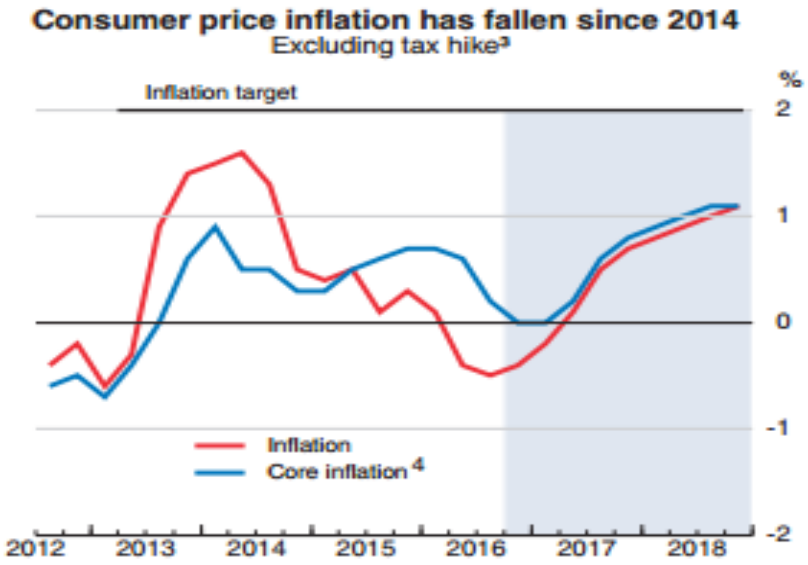
provided by foreign resources after the nuclear disaster and around half of total energy imports of the economy were provided by imports of crude oil and oil products in 2015 (International Energy Agency, 2016). The statistics above show that how Japan economy is depending outside sources of energy. This means that Japan economy is vulnerable to fluctuations in energy commodity prices.

In Japanese economy, share of private sector is bigger than public sector. There is a network among corporations called as "keiretsu". Many suppliers, producers and distributors are connected each other in this conglomerate. Keiretsu plays important role for the economy. Especially, after World War 2, its role for providing growth, developing technology and increasing productivity was fascinating. "Keiretsu" can be defined as cluster in which there are many firms managed independently and having strong ties with each other (Grabowiecki, 2006). There are two types of Keiretsu which are horizontal and vertical. In horizontal Keiretsu, clusters are managed by a body of directors while in vertical Keiretsu conglomerates are managed by one big producer (Grabowiecki, 2006). Ties among companies in Keiretsu are very strong, they exchange managers and employees and those companies hold stocks of each other. Since they are connected to each other very closely, they make their business strategy and define their common aims and targets together (Gerald, 2014). In short; it can be said that keiretsu is a systematic organization of firms running for common goal in close cooperation. As stated above; share of public sector is smaller than private sector but situation is a bit problematic with respect to fiscal position. Japanese economy has huge public debt which is amount at % 246 of its GDP in 2014 (International Monetary Fund, 2016). This amount public debt mostly was caused by public spending to revive economic growth and to avoid deflationary pressures. To cure public debt, Japanese government took decision of increasing taxes but it has been delayed due to huge fiscal and monetary stimulus program of Prime Minister Shinzo Abe (International Monetary Fund, 2016). Although public debt of Japanese economy is high, long term interest rate is still low. This is mostly due to higher demand of aging population to safe assets (International Monetary Fund, 2016). Secondly; Bank of Japan applied many monetary stimulation programs in order to increase output growth and inflation. Beginning with 2001, Bank of Japan used asset purchase programs in huge amounts to revive economic activity and it also adopted zero or even negative interest rate policy (Berkmen, 2012). Bank of Japan could be

assumed successful for rising output time to time but it couldn't reach inflation targets mostly with monetary easing programs.



Source: OECD (2016)



Source: OECD (2016)

To summarize; Japan is one of the largest economies in the world. It experienced high and sustainable growth in the past but for nearly two decades it experiences low economic output growth. Economic activity is revived with fiscal and monetary expansion

programs but deflation problem is not cured yet. Japanese economy is mostly driven by exports because domestic demand is low and not enough for sustainable economic growth. This makes it vulnerable to outside shocks and price fluctuations. Moreover; Japan is poor with respect to natural sources. Therefore; it has to buy raw materials and energy from other countries. This makes Japanese economy dependent on outside sources and foreign energy especially on oil. The last factor which is deteriorating the economy is labor force market. It is very solid-inflexible and labor force participation rate is decreasing day by day and productivity of labor could not be increased since labor force is aging and birth rate is still low.

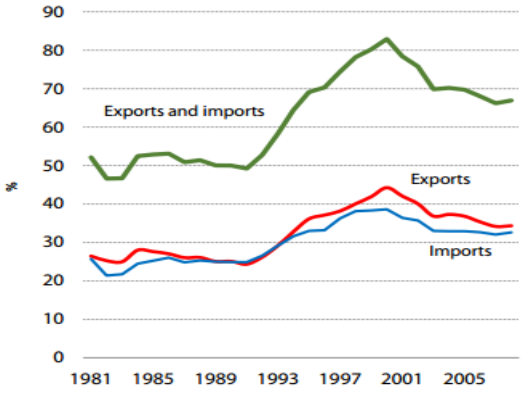
3.3 Observation of Canadian Economy

Canada is industrialized and developed country. Its economy is strong and competitive on an international level. Trade plays an important role for health of economy. Canadian economy is depending on three major industries: Services, manufacturing and natural resources. Service sector which is supplying around %75 of total employment has highest share in the economy. Service sector includes banking, health care, tourism education etc. Manufacturing industry is also significant driver of the economy. It considerably contributes to trade strength of the economy. This sector contains manufacturing of high tech products, automobiles, aerospace technology, machinery etc. in different areas. Another strong part of the Canadian economy is natural resources sectors. Those sectors which are mining, energy, agriculture, forestry, fishing etc. are historically important sectors for Canada. Sale of those natural resources products are forming of significant share of trade (Citizenship and Immigration Canada, 2016).

Canada is benefiting from trade for a long time and commerce can be counted as driver of the economy. According to the World Bank statistics; around %65 of GDP in 2015 was created by trade (World Bank, 2016). %31.5 of GDP was formed by exports in 2015. Value added exports (calculated by taking imports embedded in exports out) accounted for %22.2 of GDP in the same year. This trade roughly created 3 million jobs which forms nearly %17 of total employment. Imports were about %34 of the GDP in 2015 and nearly one fourth of imports were used in production process of exported goods (Fraser Institute, 2016). Main trading partner is U.S. According to Euler Hermes (Economic Research Organization) report; nearly %75 of Canadian exports are going to U.S. and half of total imports are coming

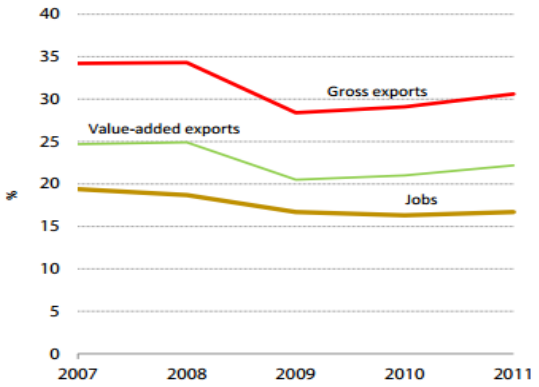
from United States (North, 2016). Exports of Canada to European Union were rising until 2008 global financial crisis. It reached nearly $ 40 billion in 2008 but it did not increase anymore because of the economic stagnation in Europe. Share of European Union in Canadian exports are still less than % 10. Main trading partners of Canada in European Union (EU) countries are United Kingdom (UK) and Germany. Half of the Canadian EU exports are going to UK and Canada buys around $15 billion goods and services annually (Fraser Institute, 2016).

International Trade as a Share of GDP



Source: Statistics Canada, 2016b, Table 380-0064, goods and services, Balance of Payment basis.

Share of Exports in GDP and Jobs



Source: Statistics Canada, 2016e, Table 381-0032.

Trade structure

By destination/origin (% of total)

Exports		Rank		Imports
United States	74%	1	50%	United States
China	4%	2	11%	China
United Kingdom	4%	3	5%	Mexico
Japan	3%	4	4%	Japan
Mexico	1%	5	4%	Germany

By product (% of total)

Exports		Rank		Imports
Crude Oil	17%	1	7%	Cars And Cycles
Cars And Cycles	11%	2	6%	Crude Oil
Refined Petroleum Products	5%	3	4%	Engines
Non-Monetary Gold	4%	4	4%	Vehicles Components
Non Ferrous Metals	4%	5	4%	Commercial Vehicles

Source: Chelem

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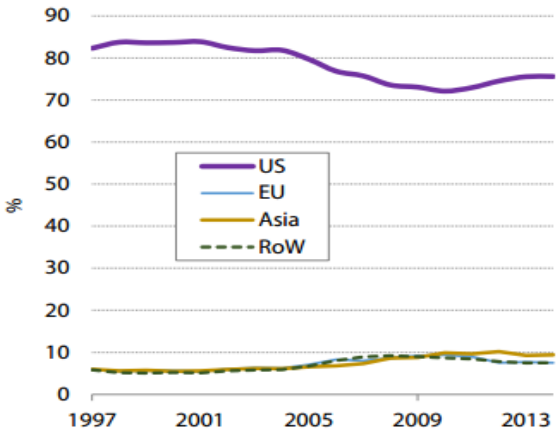
Exports by Partner as a Share of Total



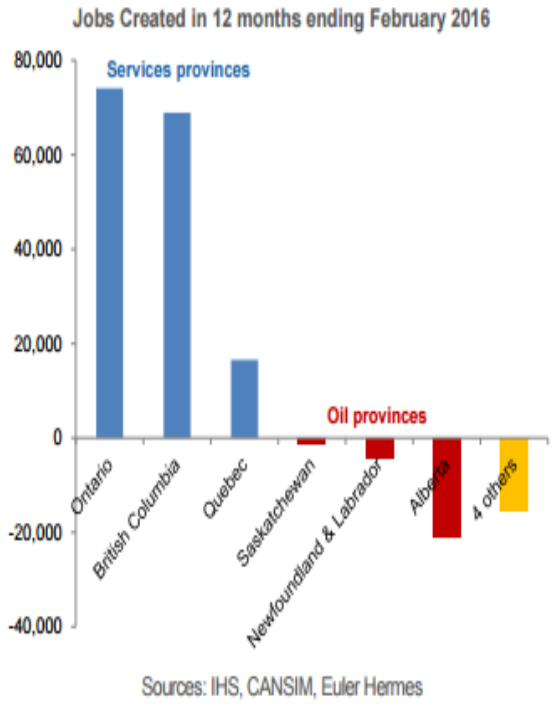
Source: Statistics Canada, 2016e, Table 381-0032.

Approximately %75 of total Canadian exports was formed by three sectors which are manufacturing, mining (including oil and gas) and agriculture in 2015. Significant share of

exports in Canadian economy is made up of crude oil. Share of crude oil in exports is %17 as it can be seen in table above (North, 2016). Around 280000 people are employed in energy sector. Approximately %30 of total exports is accounted by energy sector. Annual average contribution of energy sector to governments is around 20 to 25 million Canadian dollars (CAD) in taxes (International Energy Agency, 2016). According to the International Energy Agency; "around CAD 100 billion is invested each year in new capital goods in Canada's energy sector, representing 40% of total non-residential and machinery and equipment. Canada's energy sector attracted foreign direct investment of CAD 182 billion in 2013, up from CAD 27 billion in 1999, representing over a quarter of Canada's total foreign direct investment across all sectors" (International Energy Agency, 2016). As statistics above pointed out Canadian economy seems dependent on trade and natural resources. Especially, trade of petroleum products holds an important place in trade and economy. However; Canada is also taking the leads in most of the high technology sectors. Economic growth and prosperity in Canada for a long time could not be accounted for only trade of energy commodities. Canadian economy is well diversified and it is not fully depending on a few sectors. To illustrate; starting from 2014, energy prices declined during 2015. However; Canadian economy still recorded positive growth which is %2.5 and %1.2 in 2014 and 2015 respectively. Economic performance of energy sector decreased but rest of the economy did quite well. Due to decrease in oil prices, job losses and bankruptcies had risen in energy sector but share of energy sector in GDP is just around % 10 and employment provided by energy sector is around %17. In other words; although declining oil prices affected Canadian economy negatively, its impacts remained limited. In addition; well performance of non-energy sectors compensated negative performances of energy sector. For example; energy sector declined %2.8 in 2015. In the same year; approximately 26500 job losses were recorded (North, 2016). However; service sector created 159600 new jobs with contribution of manufacturing industry in the same period. In addition; total output in non-energy sector increased around %1.6 (North, 2016). In automotive sector, Canada recorded $90 billion export revenues in 2015. Manufacturing of machinery and equipment which were exported created around $85 billion revenues. Consumer goods and agriculture contributed to export of the country in amount roughly equals to $70 billion and $32 billion respectively (Fraser Institute, 2016). Those numbers show that energy sector is important for Canadian economy but the economy is not solely depending on natural resources or oil industry. Dependency of

the economy on any one sector is very low since it is well diversified. Oil and Gas sectors' share of real GDP is just around %6.

Note: Real GDP is at basic prices, 2007 constant dollars. Oil-related goods-producing industries include oil and gas extraction, support activities for mining and oil and gas extraction, and engineering and other construction activities. Last data point is 2016Q2.
Sources: Statistics Canada; Department of Finance Canada calculations.



Sources: IHS, CANSIM, Euler Hermes

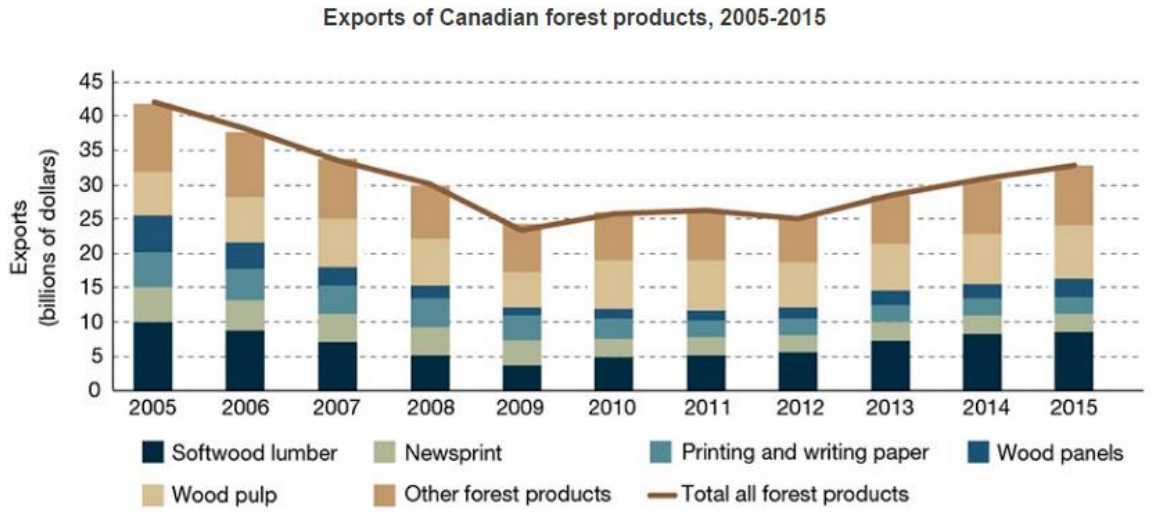
Oil and Gas Sector's Share of Real GDP (Percentage Share)

Source: Statistics Canada. Table 379-0031 - Gross Domestic Product at Basic Prices, by North American Industry Classification System, chained 2007 dollars.

On the other hand; manufacturing sector which is providing approximately 1.7 million employments (all of them is almost full time and well paid) nearly creating % 11 GDP. Weekly wages paid to workers in the manufacturing industry is around $ 1.85 billion. Manufacturing firms made investment in amount equal to $14.8 billion and contributed a lot

to huge infrastructure projects in 2014 only. Contribution of manufacturing sector to trade strength of the country is also immense. % 61 of total merchandise exports was formed by manufacturing industry in 2014 (Ministry of Industry, 2015). Moreover; fishing, telecommunications, computer software, pharmaceuticals, aerospace, automobiles etc. sectors are very productive and they all contribute to export /trade of the country. For example; automobile products are one of the main drivers of the exports, it creates around %11 of total exports (North, 2016). Forest industry which is export oriented manufacturing sector creates %7 of total exports in 2015. Value of forest industry exports was about 32.7 billion Canadian dollars (Minister of Natural Resources, 2016).

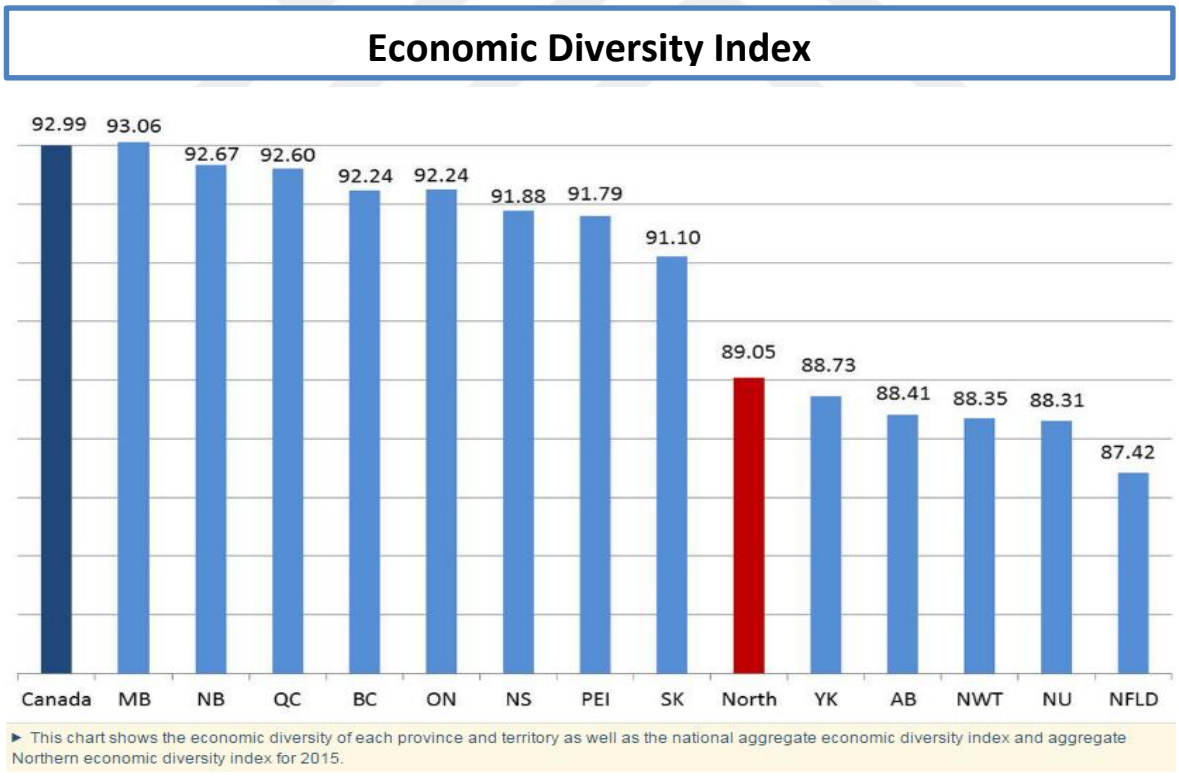
According to the Canada, Minister of Natural Resources; "Canada is the world's largest producer of newsprint and northern bleached softwood kraft pulp and the second-largest producer of softwood lumber. In recent years traditional and other forest products have contributed 8% to 10% of Canada's manufacturing gross domestic product (GDP)" (Minister of Natural Resources, 2016).



Source: (Minister of Natural Resources, 2016)

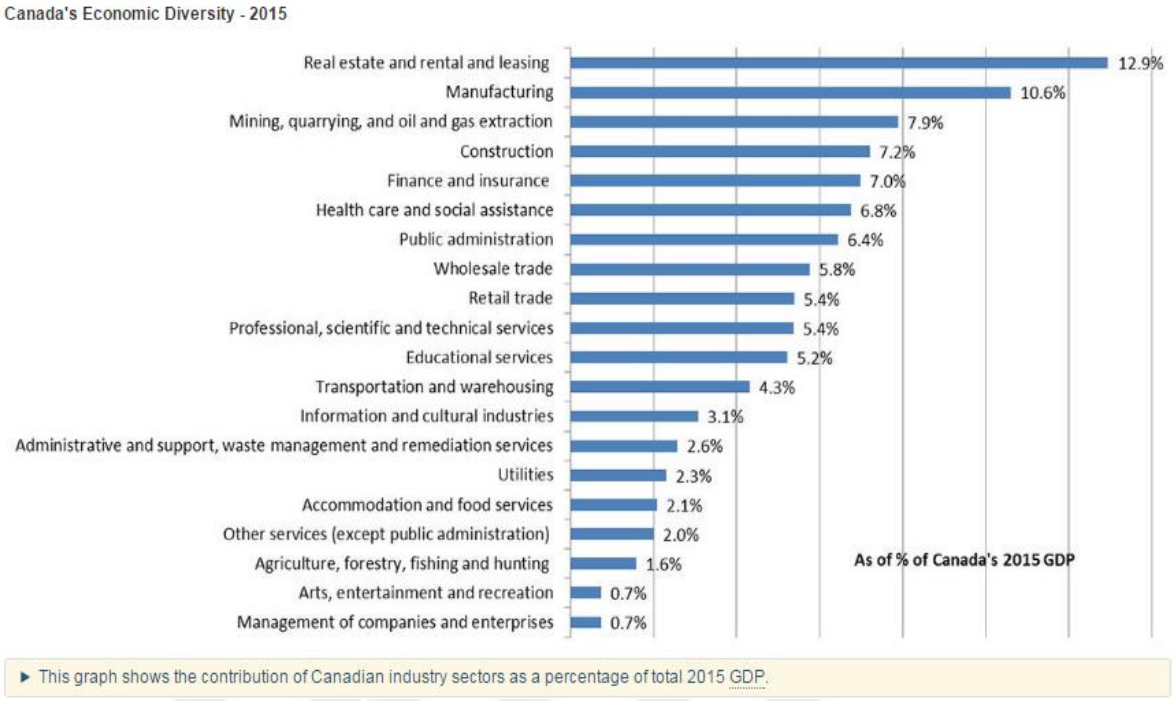
Another important sector for Canadian economy is agriculture and agri-food industry. Value of this industry was around 108.1 billion Canadian dollars in 2014. Its contribution to GDP is %6.6 in the same year. In addition; agriculture and agri-food industry created 2.3 million employments at the same time. It is estimated that approximately 58% of the value of primary agriculture production in Canada is exported, either as primary commodities or as processed food and beverage products (Minister of Agriculture and Agri-

Food, 2016). According to the Canada, Minister of Agriculture and Agri-Food; "The U.S. remains Canada's most important agriculture and agri-food export destination, accounting for 51.4% of total Canadian exports. China accounted for 9.2% of Canadian agriculture and agri-food exports, and Japan, the E.U. and Mexico collectively accounted for 17.1%. Exports to the U.S. increased by 13.1% in 2014 to $26.5 billion, while exports to non-U.S. markets grew by 10.1% to $25.0 billion. (Minister of Agriculture and Agri-Food, 2016). All the data, information and statistics above give one inference to us: Canadian economy is one of the best diversified economies in the world. Canadian Northern Economic Development Agency calculates a diversification index for Canada as a whole and different terriotories of Canada. It is calculated by the formula which is "(1- sum of squares of the (decimal) proportions of each of 20 industry sectors in the total gross domestic product (GDP) at basic prices) x 100 " (Canadian Northern Economic Development Agency, 2016). The graph below shows diversification index of Canadian territories and national aggregate economic diversification index of Canada.



► This chart shows the economic diversity of each province and territory as well as the national aggregate economic diversity index and aggregate Northern economic diversity index for 2015.

At national level, Canadian economic diversification seems very well compared to its territories. The other chart below reflects share of sectors in aggregate national Canadian economy in 2015.



Source: (Canadian Northern Economic Development Agency, 2016)

As it can be seen above, there is no dominance of any one sector in the Canadian economy.

In short; Canadian economy is one of strongest economy in the world. Technological development and innovation in many sectors contribute significantly to the strength of the economy. Shares of sectors in economy are very close to each other. This provides diversification of economy and it would be wrong to talk about dominancy of any one sector in the economy. Although energy sector and crude oil trade are significant for Canadian economy, Canadian economy is not only accounted for by trade of oil and oil products. According to the report of Booz & Company which is a leading global management consulting firm; Canadian economy is the most diversified economy in the world (Abouchakra, Moujaes, Najjar, & Shediac, 2008).

3.4 Observation of United States Economy

Golden age of capitalism was also golden age for U.S. economy as well. After World War 2, U.S economy experienced with long term and sustainable growth. Prosperity had been increased among ordinary people. Until 1970s, this prosperity increase continued. However, collapse of Bretton Woods System and oil crisis in 1970s put health of U.S. economy into danger. Stagnation and high inflation became problems of U.S. economy.

When it came to 1980s, U.S. economy experienced structural transformations with President Ronald Reagan. This economic structural transformation is also called "Reaganomics" in literature (Focus Economics, 2017). This structural transformation brought low taxes on individuals and corporations, less economic rule or regulations (more economic freedom), decreased government spending and tight monetary policy. This meant that Keynesian demand side economic understanding was left and it was replaced by supply side economic understanding. This transformation increased growth and productivity of the U.S. economy but it also caused government debt to increase immensely (Focus Economics, 2017). When it came to 1990s, growth and productivity rise through technological development especially in information and communication technologies which provided prosperity globally and U.S economy benefited from this growth with contribution of high technology companies. It was maybe longest sustainable high growth times for U.S. economy until 2001. Low unemployment, high growth, high income and budget surplus were features of times starting from 1990s until 2001. This high growth and fiscal improvement yielded surge in stock markets. Meanwhile; companies working in internet technology became very popular and their stocks' value increased strongly. End of this huge increase in values of the stocks caused overvaluation and bubble. This process ended with burst of the bubble which is already known as "dot-com bubble" in 2000 (Focus Economics, 2017). This financial event caused economic activity to be slower in addition to the terrorist attack in 2001. The economy started to struggle at the beginning of 2000s once again. The respond of FED to struggling of the economy was lowering interest rate. It is assumed that this response of FED opened a way to bubble in housing sector which caused financial crisis and global recession in 2008. U.S. economy had characteristics which were lower interest rate, excess amount mortgage lending, and weak regulations in financial market before 2008. These were main factors causing collapse of house market and banks and putting the economy into contraction. Government intervened to solve this big turmoil and to stabilize financial system by buying problematic mortgage or mortgage related assets. With a stimulation package (increasing government spending + lowering interest rate + providing money supply in huge amounts) of the government, economy started to recover beginning from late of 2009 (Focus Economics, 2017). Putting aside stimulation packages, government prepared and put new regulations which is called Dodd-Frank act into action in order to reform financial markets in 2010 (Focus Economics, 2017).

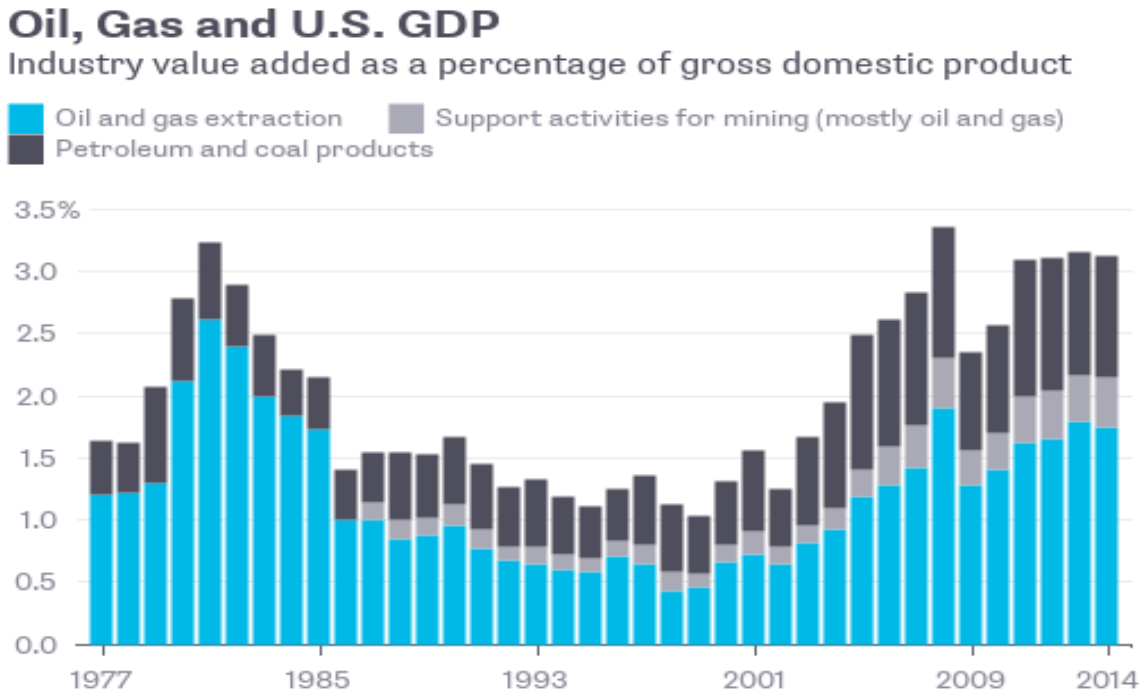
United States (U.S.) is biggest economy in the world today. Although China is taking steps very fast to close the gap, U.S. is still leader with respect to economic size in the world. Today, %20 of total production in the world is produced by U.S and it takes active role in %12 of world trade. High and advanced technology is very important for U.S. economy. Companies benefit from high technology a lot in their production chain. Largest share in the economy is accounted by service sector. Its share is around %80 of whole economy (Focus Economics, 2017). Dominancy of service sector is significantly felt in the U.S. economy. In addition; high technology intensity in service sector is very apparent. The second largest sector in U.S. economy is manufacturing. Its share is around %15 in total (Focus Economics, 2017). In manufacturing area, U.S. is one of the main leaders in the world. U.S. economy is also taking first place in high technology oriented manufacturing sectors such as automobile, aerospace, telecommunication etc. Another sector in U.S. economy is agriculture. Its share in the economy which is %2 is very small. However; U.S. is leader in exporting of agricultural products in the world since it has vast abundant-productive land suitable for agriculture. U.S. makes agricultural production by using advanced technology as it did in manufacturing sector (Focus Economics, 2017).

Trade is also very important for U.S. economy. It takes first place in imports and second place in exports in the world. The United States sells technologically sophisticated goods and materials to world. Most of its exports are manufactured goods with advanced technology. The sectors of its exports are varying from airplanes, industrial machines sectors to motor vehicles and chemistry industry. U.S. total exports reached USD 1.510 trillion in goods in 2015 (Focus Economics, 2017). In addition; U.S. also exports services in many areas especially in knowledge intensive service sectors. Likewise, exports, U.S. is very active in buying goods from abroad. It is leader with respect to import volume in the world. Most of its imports are goods. Share of goods are around %80 in total imports. Around %15 of imported goods is crude oil, fuel oil and petroleum products. Roughly %55 of imported goods is composed of machinery supplies and equipment and capital goods. Imported consumer goods are just around %20 in total imports (Focus Economics, 2017). These statistics show that most of the imported products are used as input in order to make production in U.S.

U.S. experiences with trade deficit for a long time. Oil imports are one of the main reasons for trade deficit. However, this energy gap is getting smaller due to improvements

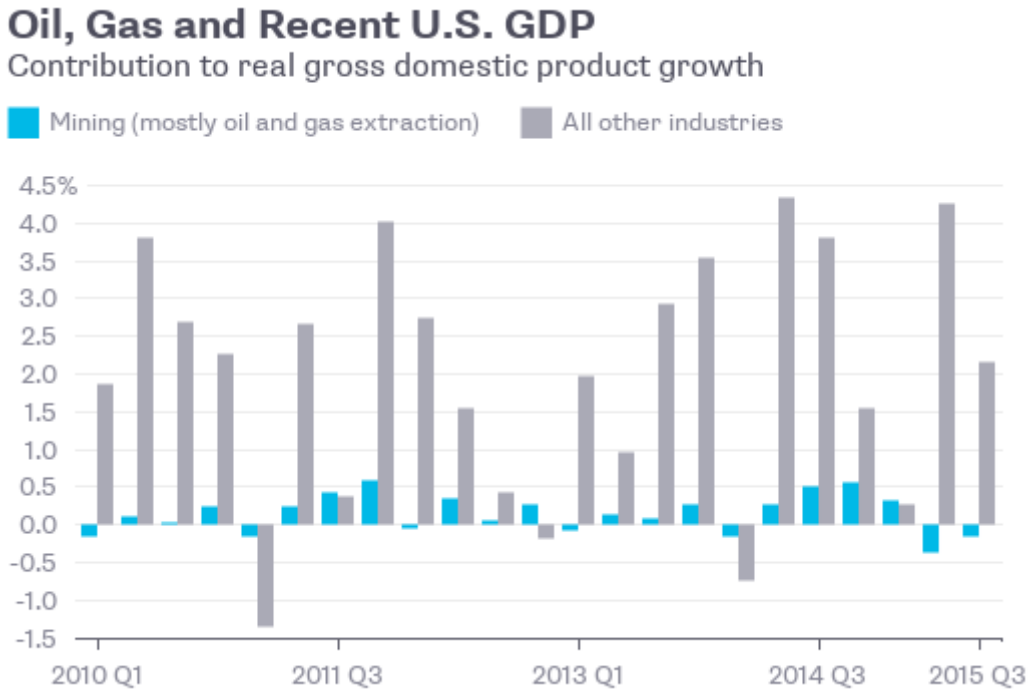
in domestic oil production and improvements in new-sustainable energy sources in production process. Although trade deficit is getting smaller compared to years 2005-2006, (it was around %5.6 of GDP between those years) it is still large. This deficit is mostly financed by foreign direct investments (FDI) coming from developed countries such as United Kingdom, Germany, Netherlands etc. (Focus Economics, 2017). U.S. tries to find solution for trade deficit for a long time. Policymakers especially worry for trade deficit in energy sector for decades. The country had shown dependency on foreign oil after World War 2. Especially in 1970s, disruptions in world oil productions and quickly increasing oil prices were main reasons for problems in the U.S. economy. In 1970s, U.S. economy was stagnating, it was exposing to high inflation and unemployment due to oil crisis (Brown & Yücel, 2013). Oil crisis (sharp increase in its price in world market) in those years cause decline in U.S. GDP and they caused income transfers from U.S. to oil selling countries. U.S. exposed to 11 economic stagnation or recession since World War 2. It is assumed that 9 of 11 recessions were caused by oil shocks (Brown & Huntington, 2013). This result is compatible with the claim asserted by Bohi & Toman (1993). They assert that when an economy starts to consume more oil, it become more vulnerable oil shocks. In addition; source of oil that U.S. imported is also important. Unstable sources of oil for U.S. make its economy more vulnerable to oil disruptions (Brown & Huntington, 2013). Unstable sources of oil and increasing oil consumption of U.S. economy gave U.S. rough times in the past. However; U.S. had learnt a lot from those hard times. Most of the economic decision makers left energy intensive industries between years 1980s and 2000s. Moreover; most of the investment on energy production has been moved out to other sectors. Employment in energy sector decreased significantly in those years. In 1980s, five industries most sensitive to oil prices were providing 1.6 million employments which was %1.8 of nonagricultural employment. However; when it came to 2000s, jobs provided by these industries were just around 450.000 which was only % 0.4 of nonagricultural employment (Brown & Yücel, 2013). In addition to this adjustment made by economic decision makers in U.S. economy, U.S. invented new technology for drilling oil called "shale revolution". This new method of drilling made possible to produce oil and gas in huge amounts from sources in United States. Domestic oil production increased significantly after 2008 with invention of this drilling method. This dramatic rise in domestic oil production and leaving energy intensive industries of economic decision makers for more than 20 years caused decline in foreign energy

dependency of U.S. economy. In addition; they resulted in more diversification in the economy. The share of oil and gas sector in GDP decreased significantly until recent years.



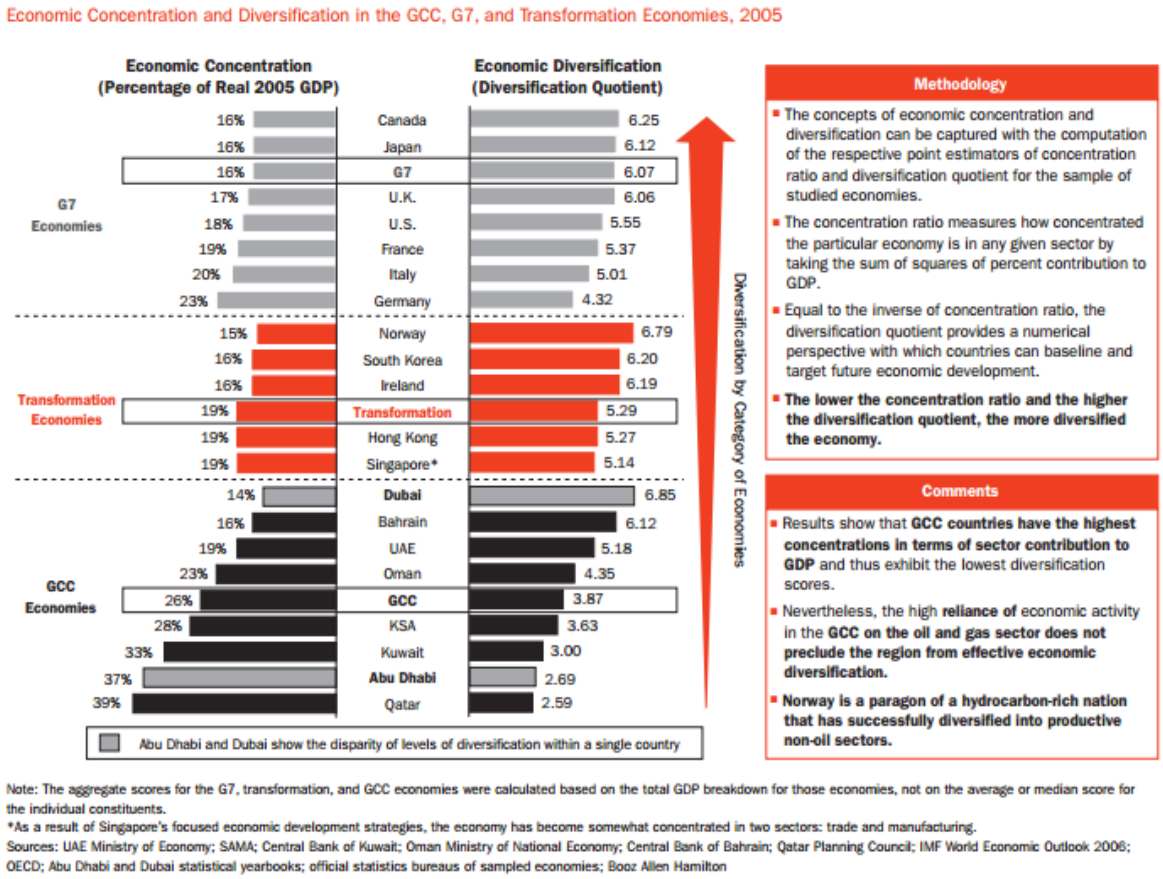
Source: U.S. Bureau of Economic Analysis

Moreover; contribution of oil and gas sector to economic growth remained very limited. All these statistics show that although United States is net importer of oil, its economy's oil and foreign oil dependency is very low. As it can be seen below, contribution of whole mining industry to economic growth is not more than %0.5. It sometimes even makes negative contribution to real gross domestic production of the country. Although U.S. economy started recovery beginning from late 2009 and it worked successfully with respect to employment, inflation, and growth until recently, contribution of mining industry to this success story was very small as it can be seen from the chart below.



Source: U.S. Bureau of Economic Analysis

This shows that U.S. economy is not dependent on only one sector like oil and gas. U.S. has a well-diversified economy. This situation is proven by the Economic Diversification report of Booz & Company which is global management consulting firm. In this report; diversification of Group of Seven (G7), Gulf Cooperation Council (GCC) and Transformation economies, consisting of Hong Kong, Ireland, New Zealand, Norway, Singapore, and South Korea are analyzed. The diversification index or economic concentration level is measured by looking to the distribution of sectors in GDP. If GDP is composed by lots different kinds of sectors whose weights in GDP are close to each other, then it is accepted as a diversified economy. On the contrary; if the large share of GDP is formed by a few sectors, then it is not accepted as a well-diversified economy and it is supposed that the economy is concentrated on a few sectors. In return, sustainable growth for that economy does not seem possible for concentrated economy. In this diversification index order; United States takes fifth place in the world with respect to diversification of its economy and economic concentration (Abouchakra, Moujaes, Najjar, & Shediac, 2008). In other words; the U.S. economy is the fifth most diversified economy in the world.



Source: (Abouchakra, Moujaes, Najjar, & Shediac, 2008)

In short; U.S. is a still superpower economically. Nearly one fifth of the total world GDP is produced by U.S. economy. Huge amount funds or assets in the world are controlled by American fund managers. American financial markets are one of the most liquid markets in the world. Contribution of finance and insurance to U.S. GDP is around %7. Many of the Fortune's Global 500 companies put their headquarters in U.S. today. U.S. economy applies advanced technology in most of the sectors. Manufacturing industry makes production by using mostly high technology. Finally; it is difficult to see dependence on any one sector in U.S. economy. Foreign oil dependency and oil dependency of industries have been decreased significantly in recent years through developments in oil drilling and lower energy intensity in firms.

4. LITERATURE REVIEW WITH THEORETICAL BACKGROUND

1) Firstly; theoretical framework of the scope will be drawn
2) Secondly; the relationship between oil price and aggregate stock indices in past studies in literature will be observed
3) Thirdly; the relationship between oil price and sectoral stock indices in past studies in literature will be focused on

4.1 Theoretical Framework

Before analyzing the relationship between oil prices and stock markets, it is necessary to create theoretical framework of the scope. First of all; oil prices affect economic activity significantly through six transmission mechanisms (Lardic & Mignon, 2005). Affected economic activity which has impact on profitability of firms, inflation and monetary policy influence stock markets as well. Six transmission mechanisms between oil prices and economic activity are supply-side effect, terms of trade effect, real balance effect, inflationary pressure theory, consumption-investment effect and long lasting oil price effect. Supply side effect suggests that oil is one of the main production factors in the production process. When oil prices increase, costs of production rise and therefore potential output and productivity decrease significantly. Specifically; if firm faces unimagined alterations in their inventories, they try to bring to their inventories' level back to normal-old level. Meanwhile; when they face sudden increase in oil prices, their producing costs will go up when they are bringing their inventory level back to original. Therefore; firms will reflect their increasing operational costs to output prices by increasing their sales prices. Reduction amount in inventories is vital for determining output price. If there is less decline in their inventories, their cost increase will also be less and this means lesser rise in their output prices. In short; firms who are using oil as input in their production chain will have to bear with increasing oil prices (rising costs) by reflecting this increase on out prices more or less. If firms do not increase their output prices in case of rise in oil prices, their production level will decline according to the classical supply theory. To summarize; rising oil prices will have negative impact on supply in all cases. Secondly; terms of trade effect asserts that in case of rise in oil prices, trade balance of oil importer countries is negatively influenced. Oil will be more expensive for oil importing countries and oil importing countries will have to pay more

money for same amount of oil. This means an income transfer from oil importing countries to oil exporting countries. In addition; rising oil prices causes decline in purchasing power of firms and households in oil importing countries. On the other hand; rising oil prices will provide extra income for oil exporting countries as stated above. Oil exporting countries will be better off due to increasing oil prices because they will obtain more money for same amount of oil. To summarize; increasing oil prices will have some certain level of impact on terms of trade and it will be against favor of oil importing countries. Next one, real balance effect claims that increase in oil prices causes hike in money demand because oil importing countries (firms and households in oil importing country) will need more cash or money in order to buy same amount of oil. Increasing money demand will force economic units in oil importing countries to sell their bonds in order to fulfill their money demand according to the Keynesian theory. This will cause decline in prices of bonds since bond supply will have been increased. When bond prices go down; their yield or returns will rise. This means an increase in interest rates in oil importing countries. When this situation arises, central bank should intervene to the market and provide money to it. If central banks did not supply enough money which is need to meet increasing money demand, then interest rates rise. Increasing interest rates will increase cost of production and it will deteriorate investments in the economy since borrowing will be much more expensive. At the end; higher interest rates and increasing oil prices will influence economic activity negatively through various channels and this mechanism is called real balance effect. Fourth one is inflationary pressure theory. This theory offers that when oil prices go up inflationary process will be experienced since oil is a critical input for firms. Rising oil prices means an increase in cost of production as stated above. Firms will reflect this cost increase on their output prices and this means an increase in nominal prices. Employees or workers will react to this rising nominal prices by demanding increase in their nominal wages and this demand will cause an upward trend in firms' cost of productions once again. In return, increased wage raises cost of production and it forces firms to increase its sales prices. This process results in wage-price spiral which influences economic activity negatively. In addition; inflationary process is observed in the economy of oil importing countries meanwhile. The fifth one, consumption-investment effect suggests that increase in oil prices decreases disposable income and therefore consumption spending deteriorates. Specifically; rising oil prices means an extra income transferred from oil importing countries to oil exporting countries. Householders will have to pay more for the same amount of outputs since firms has raised their sales prices due to

increase in cost of production coming with increasing oil prices. This situation means loss of income for householders in oil importing countries. In other words; householders' disposable income will be influenced negatively and it will go down in case of rising oil prices. As it is known from Keynesian theory; consumption is depending on the disposable income. When disposable income rises, householders will consume more vice versa. In short; rising oil price will deteriorate consumption spending in oil importing economies. In addition; rise in oil prices discourages investments due to surge in costs of input. To make investment with higher oil prices will be more difficult since costs has gone up. Increasing costs mean less profit for any investment. This makes investments less attractive and it causes decline in investments in oil importing economies. To summarize; declining consumption spending and decreasing investments results in lower economic activity in oil importing economies ultimately. Last one, long lasting price effect. This theory offers that if increase in oil prices becomes permanent, firms cannot bear with this continuous rise in costs. They always need to increase their sales price in each rise of oil prices. This continues increase in output prices of firms can mean loss of customers for firms. Therefore; they do not want to take risk of losing their customers for continuous inflation. To tackle with this problem; firms most probably change their production methods or structures in the long run. In other words; they adopt new production methods which is less depending on oil as an input. Usually; this changing production strategy or structure employs more capital and less labor throughout sectors. This situation significantly changes resources allocation of sectors. Therefore; in the long run with long lasting oil price increases, unemployment problem can arise. As it is easy to predict, increasing unemployment, in return, causes a decline in economic activity. To summarize; economic activity is influenced from changes in oil prices through six mechanisms explained in details above. Economic activity is expected have negative influence on oil importing economies while it affects oil exporting economies positively according to the economic theory.

Economic activity which is affected from rise in oil prices through the six transmission mechanisms has impact on stock markets since it affected profitability of corporations, inflation and monetary policy. To begin with profitability of corporations; this transmission is explained with the model called "equity pricing model". According to this model, price of an equity at any point in time is equal to the expected present value of discounted future cash flow (Basher & Sadorsky, 2006). When oil prices go up, firms which

are using oil as input will have to stand with increasing cost of production. If they do not reflect this increasing cost of production on output prices, their future cash flow will be influenced negatively. In other words; they will earn less profit by selling their products in the future. Firms profitability and dividends will decrease and their cash flow will deteriorate. As equity pricing model suggested, declining profitability and deterioration in cash flow will result in reduction in values of firms' equities. This mechanism is valid if companies are not able to find perfect substitutes of oil. In addition; this transmission mechanism is in favor of oil exporting countries while it is against favor of oil importing countries because oil exporting countries are earning more for same amount of oil whereas oil importing countries are paying more for same amount of oil. Oil exporting countries will earn extra income and cash flow of oil producing companies will be better off. This, in return, will increase value of those companies' equities as equity pricing model suggested. In other words; expected future cash flow of oil producing companies will increase and this will rise value of the oil exporting firms' equities according to the equity pricing model. On the other hand; there will be loss of cash flow for oil importing countries and companies. Their profitability will go down on the condition that they will not increase their sales prices. Declining profitability and deteriorating cash flow will cause decline in values of the oil importing firms' equities as suggested by equity pricing model. Secondly; rising oil prices can create inflationary pressures. Rising oil prices often indicate its effect on prices by increasing cost of production of companies. Firms react to this increasing cost of production by rising its sales price. This, in return, causes wage earners to want more wages. Increasing wages again create cost on production and firms are obliged to increase their output prices in order to keep their profitability constants. This process is repeated and it creates inflation in the economy. Central banks usually respond this inflationary process by increasing interest rates in order to avoid high inflation because higher interest rates discourage consumption and investments and lowers economic activity. In this way, central banks think that they can take inflation under control. However; higher interest rates also make stocks less attractive comparing to bonds. Since bonds have offered higher returns with increasing interest rates, economic decision makers prefer bonds to stocks. This, in return, causes demand for stocks to decline. Decreasing demand to stocks results in lower prices of stocks. In short; increasing oil prices could probably cause declining stock prices through inflationary process in oil importing countries and companies which are using oil as input. The last issue which should be taken into consideration is discount rate in equity pricing

model. As equity pricing model already suggested, value of equity is determined by discounting future cash flows at discount rate. Therefore; any change in the discount rate influences price of equities. Increase in oil prices can create inflationary process as it has been already stated above. This inflationary process is tried to be taken under control by intervention of central banks. Central banks usually respond to inflationary process by increasing interest rates. Increasing interest rates means rising discount rate since discount rate usually is chosen as interest rate in the spot market. In addition; higher inflationary process also causes money demand in the market to increase. Economic decision makers sell their bonds in order to meet their money demand and bonds prices go down due to excess supply of bonds. When bond prices lower, their return in percentages will increase. This means that bonds will provide higher return or higher interest. Furthermore; due to increasing money demand and relatively declining money supply, borrowers will be ready to pay higher interest rates while lenders are demanding higher interest rates. In short; this process will end up with higher interest rate. As it is stated above; higher interest rates mean higher discount rate in the equity pricing model since it is usually chosen as market interest rate. To summarize; due to higher demand for money and inflationary influence, discount rate will go up. Increasing discount rate will cause present value of future cash flows to decline because future cash flows will be discounted at a higher rate. Thus; present value of stocks will also decrease (Basher & Sadorsky, 2006).

To sum up; oil price changes affect stock market through various ways such as profitability of corporation, alterations in cash flow, rising interest rate, inflationary process etc. However; the total effect of changing oil prices on stock values depends on whether the firm is producer or consumer of the oil. If the firm is producer of oil, then it is expected that stock prices of the firm will go up in case of a rising oil prices. When the firms is oil consumer and using the oil as an input, then stock prices of the firm will decline while oil prices increase (Gisser & Goodwin, 1986).

4.2 Literature Review

In this part, past studies related to this study will be observed. It is better to start with analyzing relationship between oil price changes and stock markets. One of the first past studies focusing on these two variables is analyze made by (Chen, Roll, & Ross, 1986). The writers scrutinize relation between stock market returns and macroeconomic variables such

as spread between long and short term interest rates, expected and unexpected inflation rate, industrial production. In addition; they observe relation between stock market returns and oil prices. They find that oil price is the factor affecting stock markets significantly especially in some sectors and some countries which are dependent on oil imports like Japan (Chen, Roll, & Ross, 1986).

In another study, relation between some factors such as economic news about risk premiums, term premiums, the growth rate in industrial production, oil prices and stock market returns in two countries which are U.S. and Japan (Kaneko & Lee, 1995). Kaneko and Lee (1995) find that news about risk premiums, term premiums, and growth rate in industrial production is important element for determining stock market returns in U.S. In addition; oil price changes have impacts stock markets in Japan.

Jones and Kaul (1996) observe relation between oil prices and stock market returns in four countries namely; United States, United Kingdom, Canada and Japan in the postwar period by using quarterly data. The authors find that oil prices have significant impact on stock markets in four countries. Impact of oil prices on stock returns can be certainly explained by current and expected real future cash flows in U.S and Canada. However; future cash flow or any other financial variable could not be enough to explain impact of oil prices on stock market returns in Japan and U.K. In addition; oil prices influence stock market returns adversely in countries observed except U.K in the study (Jones & Kaul, 1996).

Another study probing relation between oil and stock markets was made by Huang, Masulis and Stoll (1996). They argue influence of oil futures on S&P 5000 index and three individual companies' stock returns (Huang, Masulis, & Stoll, 1996). The authors think that if impact of oil on stock returns exists, then oil futures should have some impact on S&P 500. The study was made by using data in 1980s and vector autoregressive (VAR) approach is appointed in the study. The result was interesting. The writers failed to find any relation between oil futures and S&P 500 but they detected relation between individual stocks of the companies and oil futures. The writers add that influence of oil futures on individual oil stocks is small (but statistically significant) as the bid-ask spread in trading the individual oil stocks. However; Ciner (2001) revised this study by using same data with a different approach (Ciner, 2001). He claimed that Huang, Masulis and Stoll neglected influence of nonlinear linkages. Ciner (2001) made his study by taking nonlinear and linear linkages

together into account and he found that there is nonlinear Granger causality from crude oil futures returns to S&P 500 index returns.

Sadorsky (1999) scrutinize same issue which is interaction between oil and stock returns in U.S (Sadorsky, 1999). The author made the study by using impulse response functions and monthly data between 1947 and 1996 years with vector autoregressive (VAR) approach. Contrary to the Huang, Masulis and Stoll (1996), Sadorsky (1999) finds that oil price shocks and volatility in oil prices have significant and adverse impacts on real stock returns in the market.

Papapetrou (2001) argues relations among oil prices, real stock returns, interest rates, real economic activity and employment in Greece (Papapetrou, 2001). Multivariate vector-autoregression (VAR) approach was used in the study. Papapetrou (2001) finds that oil price changes show impacts on employment and economic activity. In addition; impulse response functions in the study prove that there is correlation between fluctuations in oil prices and real stock returns in the market.

El-Sharifa, Browna, Burton, Nixona, Russellb analyzed together influence of oil price changes on stock markets in U.K by using monthly data in a study. They specifically tested relation between oil price movements and firms' stocks in oil and gas sector in U.K which was a major oil producer in Europe. They found a positive correlation between oil price movements and stock returns in oil and gas sector U.K. In addition; they put forward that the whole stock market and oil and gas sector stocks tend to move together (El-Sharifa, Browna, Burtona, Nixona, & Russellb, 2005).

Hammoudeh and Eleisa (2004) make research on sensitivity of stock values to oil prices in Arab countries in Gulf Cooperation Council which are emerging stock markets. Study has been made in Bahrain, Kuwait, Oman, Saudi Arabia, and the United Arab Emirates by using daily data. Researchers found relationship between oil prices and stock prices only in Saudi Arabia stock markets (Hammoudeh & Eleisa, 2004).

Bittlingmayer (2005) observes relationship between stock prices and oil price shocks in U.S. stock markets. He claims that oil price changes affect stock prices but the influence of the changes is normally weak (Bittlingmayer, 2005). However; specific or special events such as political turmoil or war show influence of oil price shocks on stock markets stronger. The researcher asserts that oil shocks in 1973 and 1979 did not cause significant decline in

stock values. In other words; effects of those oil shocks on stock markets were limited. On the other hand; declines in large amounts in stock markets has been observed in 1990 and 2003-2004 oil shocks. This was due to involvement of U.S. to Middle East political turmoil and risk of war. To summarize; the author questions whether all oil price shocks have similar effect on stock markets or not. He concluded that oil price shocks with risk of war cause more decrease in stock markets and more increase in Treasury bond returns (Bittlingmayer, 2005).

Anoruo and Mustafa (2007) observes long and short run relationship between oil prices and in U.S. stock markets applying cointegration and vector error correction model (VECM) analysis. Years coming under observation in the study are between January 1993 and August 2006. The authors used daily data of S&P 500 stock price index, Dow Jones Industrial Averages (DJIA), and NYMEX Light Crude Oil. Results of the study put forward existence of relationship between and stock prices and oil prices. However; the direction of the relationship is one way. Changes in stock prices results in shifts in oil prices but changes in oil prices do not have significant effect on stock markets (Anoruo & Mustafa, 2007). Therefore; there is one-way relationship between oil market and stock markets.

Miller and Ratti (2009) investigate long run relationship between oil price changes and international stock markets for 6 OECD countries namely Canada, France, Germany, Italy, U.K. and U.S. The study covers years between 1971 and 2008. The researchers divide this interval into 4 periods which are 1971-1980, 1980- 1988, 1988-1999 and 1999-2008. Vector error correction model (VECM) is employed in the research. For the two periods which are 1971-1980 and 1988-1999, the researchers put forward that oil price changes have adverse impact on stock market returns and correlation between oil prices and stock markets is statistically significant in those periods. However; long run relationship between two main variables (oil price and stock market returns) is very weak in the periods 1980-1988 and 1999-2008 and it is not significant statistically. The researchers claim that especially after 1999, stock markets do not respond to change in oil prices in a way like in the past periods. The authors estimate that the year 1999 is very critical and it was signal of the permanent change in response of stock markets to oil prices (Miller & Ratti, 2009).

Ewing and Thomson (2007) analyzed dynamic-time varying relationship between changes in oil prices and consumer prices, unemployment and stock markets. The methods applied in the study are filtering methodologies which are Hodrick–Prescott (1980) filter

(HP), Baxter–King (1999) filter (BK) and Christiano and Fitzgerald (2003) (CF). The study specifically observes existence cyclical comovements among West Texas Intermediate crude oil, U.S. aggregate production level in the industry, consumer prices and unemployment rate in U.S and S&P500 index. The study is made through years between 1982 and 2005. The author asserts at the end of the study that changes in crude oil prices deteriorate industrial production and it cause hikes in consumer price index. In addition; stock market is lagged by crude oil prices (Ewing & Thompson, 2007).

Lee and Chiou (2011) observed relationship between oil shocks and stock markets in U.S. The authors investigated this relationship by using regime-switching model. In other words; the writers tried to analyze influence of sharp and quick changes in oil prices on S&P 500 returns. The study is made between years 1992 and 2008 by using daily data. They found that sharply increasing or decreasing oil prices has adverse effect on stock market returns. However; they say that impact of small changes in oil prices is strictly limited and it is not statistically significant (Lee & Chiou, 2011).

Cifarelli and Paladino (2010) searches influence of speculation (daily up and down changes) on oil prices. Specifically; they investigated impact of oil price fluctuations on stock returns and exchange rates by using multivariate CCC-GARCH model. They found that oil price fluctuations influence adversely stock market returns and exchange rates (Cifarelli & Paladino, 2010).

Choi and Hammoudeh (2010) examined relationships among Brent oil, copper, gold, silver, West Texas Intermediation (WTI) oil and S&P 500 returns. They used DCC-GARCH model in the study. The authors concluded that relation between oil prices and stock return is less than relation among Brent oil, WTI oil, copper, gold and silver (Choi & Hammoudeh, 2010).

Park and Ratti (2008) investigated relationship between oil price fluctuations and stock markets for 13 European countries and United States. Some of countries such as Norway are oil exporters while others are oil importing countries in the study. The authors examined this relationship between years 1986 and 2005 by using vector autoregressive model. They concluded that rise in oil prices resulted in hikes in stock returns in oil exporting countries. However; increasing oil prices caused decline in stock markets in oil importing countries. This is only not valid for United States (Park & Ratti, 2008). This result is

compatible with the terms of trade effect which tells that oil price increases is meaning income transfer from oil importing countries to oil exporting countries (Lardic & Mignon, 2005).

Filis (2010) investigates relationships among variables which are oil prices, stock markets, consumer prices and industrial production. The author uses the method called multivariate vector autoregressive to put forward certain relations among the variables. The study covers the years between 1996 and 2008 in Greece. The researcher concluded that oil prices have correlation with consumer prices and stock markets. The oil price changes have adverse influence on consumer price index and stock market returns. However; stock market returns affect consumer prices in a positive way (Filis, Macro economy, stock market and oil prices: Do meaningful relationships exist among their cyclical fluctuations?, 2010).

In a similar study made by Chen (2009), the researcher examines again relationship between oil prices and stock markets with a different perspective. The author searches whether increasing oil prices is a sign of recession in the U.S. stock market or not. The study covers the period between 1957 and 2009. Monthly data is used in the study. The writer employs time-varying transition-probability Markov-switching models and he specifically scrutinizes relationship between oil prices and S&P 500 index. At the end of the study; researcher concludes that rising oil prices can cause a bear market in stock markets in U.S. (Chen S.-S. , 2010).

O'Neill, Penm and Terrell (2008) examine interactions among inflation expectations, stock markets and oil prices in some developed countries namely United States, United Kingdom, France, Canada and Australia. Oil price increases result in stock market returns to decline in oil importing countries which are United States, United Kingdom and France. On the other hand; rising oil prices causes stock market returns to go upward in Canada and Australia which are oil exporting countries (O'Neill, Penm, & Terrell, 2008). This empirical result is very compatible with economic and financial theory.

Gjerde and Saettem (1999) discuss the relation between oil price and stock markets in a small, open economy, Norway. The study actually examines effect of different economic variables on the economy. The researcher employs multivariate vector autoregressive (VAR) method in the study. He concluded that there is negative and strong relationship between

stock market returns and oil prices & interest rates in the Norway economy (Gjerde & Sættem, 1999).

Oberndorfer (2009) examines relationship between oil price volatility and stock market returns in Eurozone. The researcher uses Dow Jones Euro STOXX index for stock returns since it reflects Eurozone stock market. The study covers years between 2002 and 2007. At the end of the study, author concludes that there is strong relationship between oil prices and Eurozone stock markets. Direction of the correlation between oil price fluctuations and the stock market is negative in general except oil and gas sector. Increasing oil prices cause rise in stock returns in oil and gas industry (Oberndorfer, 2009).

Chiou and Lee (2009) observed relationship between S&P 500 index and West Texas Intermediate (WTI) oil prices during years between 1992 and 2006. More importantly, this study investigated influence of expected, unexpected and negative unexpected oil price changes on the stock indices. The researchers applied Autoregressive Conditional Jump Intensity model in the study. They found that considerable changes in oil prices result in adverse impacts in stock returns. In addition; higher volatility cause considerable asymmetric fluctuations in stock returns (Chiou & Lee, 2009).

Arouri and Rault (2011) investigated relationship between oil prices and stock returns in oil exporting countries which are Gulf Cooperation Council (GCC) countries namely Bahrain, Kuwait, Oman and Saudi Arabia between years 1996 and 2007. The researchers applied bootstrap panel cointegration technique and seemingly unrelated regression (SUR) method in the study. Their findings are compatible with the theory. Sharp increase in oil prices affects stock markets in oil exporting GCC countries in a positive way except Saudi Arabia (Arouri & Rault, 2011).

Similar study for GCC countries (Bahrain, Kuwait, Oman, Saudi Arabia, and Abu Dhabi) has been made by Bashar (2006) for years between 2001 and 2005. Bashar (2006) employed vector autoregression (VAR) technique in his study and he used daily data. Empirical findings put forward by Bashar (2006) were compatible with the evidence provided by Arouri and Rault (2011). He asserts that rising oil prices cause positive reactions in stock market in oil exporting countries (Bashar, 2006). These findings are consistent with the financial theory. Because when oil prices increase, an income transfer to oil exporting

countries is seen. This, in return, makes cash flow of corporations better off in those countries. This situation result in rise in value of stocks in the market.

In addition; Hammoudeh and Aleisa (2004) investigated relationship between stock market of five members of GCC oil exporting countries and New York Mercantile Exchange (NYMEX) oil futures during years between 1994 and 2001. The researchers employed Vector Error Correction Model in their analysis. They found that there is strong tie among Saudi Arabia, Kuwait, Bahrain, United Arab Emirates markets while Oman's tie with other GCC market is not very strong. In addition; significant correlation between Saudi Arabia stock indices and NYMEX oil futures is observed in the empirical evidence provided by this study (Hammoudeh & Aleisa, 2004).

Nejad, Jahantigh and Rahbari (2016) investigate relationship between oil price shocks and Tehran stock market returns between years 2003 and 2014. In addition; researchers analyzed influence of structural breaks in oil industry in this study. They applied Value at Risk (VAR) model in the paper. Finally; they clearly put forward that there is significant relationship between oil price changes and Iranian stock indices. Moreover; enforcements put on Iran due to nuclear file by other countries caused depressing in Tehran stock returns (Nejada, Jahantighb, & Rahbari, 2016).

Arouri, Lahiani and Nguyen (2011) observes relationship between Gulf Cooperation Council stock markets and fluctuations in oil prices between years 2005 and 2010 by applying VAR-GARCH model. At the end of the study; they concluded that there is causative interdependency between stock markets of three GCC members and oil price fluctuations. Especially; changes in oil prices significantly have influence on stock markets volatility since these countries are major oil producer in the world (Arouri, Lahiani, & Nguyen, 2011).

Zarour (2006) investigates relationship between oil price volatility and stock markets in oil exporting GCC countries namely Bahrain, Kuwait, Oman, Saudi Arabia, and Abu Dhabi. The study covers the years between 2001 and 2005. Vector autoregression (VAR) analysis is conducted in the study. During the time study is conducted, striking increase in oil prices is observed. Rising oil prices demonstrated significant influence on stock markets of these oil exporting countries since there is significant cash inflow to those countries.

Especially; Saudi Arabia and Oman stock markets reacted to this sharp increase in oil prices according to the empirical evidence put forward by the study (Zarour, 2006).

Arouri, Lahiani and Bellalah (2010) research relationship between oil price volatility and stock market reactions in GCC countries namely Qatar, Oman, Saudi Arabia, United Arab Emirates, Bahrain and Kuwait. The researchers conduct their analysis by employing weekly data between years 2005 and 2008. They make their study through varied multifactor methods. They observe the relationship between oil exporting countries' stock markets and oil prices with the help of linear and nonlinear models. At the end of the study, empirical evidence shows that relationship between oil prices and the stock markets is significant for countries which are Qatar, Oman, Saudi Arabia and United Arab Emirates. However; there is no influence of oil price changes on stock markets of Bahrain and Kuwait (Arouri, Lahiani, & Bellalah, 2010).

Berk and Aydoğan (2015) examine relationship between oil price fluctuations and stock markets in a developing, oil importing country, Turkey. The researchers applied vector autoregression (VAR) model in the study. The study covers years between 1990 and 2011. Distinguishing feature of this research is that authors are observing oil price-stock markets relation under global liquidity conditions. In addition to the Istanbul Stock Exchange National Index (ISE-100) and Brent Crude Oil Prices, they employed S&P 500 market volatility index (VIX) of Chicago Board of Exchange (CBOE) as global liquidity variable in the analysis. The researchers made their study by separating the study period into three sub-periods. At the end of the study; empirical evidence demonstrates interesting results. It shows that there is influence of oil prices on Turkish stock market activity only after 2008 global financial crisis. Furthermore; it is observed that S&P 500 market volatility index (VIX) demonstrates impacts on oil prices and changing stock market returns. Most of the variations in Turkish stock market are due to changes in global liquidity conditions. These results make sense because Turkey significantly needs capital inflow for a long time, especially after liberalization steps in the economy (Berk & Aydoğan, 2015).

Huang, Hwang and Peng (2005) examines oil price fluctuations & stock markets relationship in United States, Canada and Japan between years 1970 and 2002 by employing multivariate threshold model. They found that small changes or fluctuations in oil prices which are under threshold do not have significant impact on stock returns in these countries. However; when changes in oil prices are over the threshold level, then volatility in oil prices

demonstrate considerable influence on stock market returns in United States, Canada and Japan (Huang, Hwang, & Peng, 2005).

Bjørnland (2008) observes an oil exporting country, Norway with respect to influence of oil prices on the economy since Norway has wealth oil resources. The researcher conducts its analysis between years 1993 and 2005 by employing vector autoregression (VAR) method. He concluded that Brent Crude oil prices have serious impact on stock market returns in Norway. In addition; rising oil prices make Norway economy better off with respect to economic activity and unemployment. This result is consistent with the economic and financial theory due to income transfer effect and cash flow approach (Bjørnland, 2008).

Aloui and Jammazi (2009) investigated interaction between oil price volatility and stock market returns in France, United Kingdom and Japan by applying Markov-switching EGARCH model between years 1989 and 2007 and by using monthly data. Empirical evidence displays that net oil price rise explains changes in stock market returns in these countries (Aloui & Jammazi, 2009).

Imarhiagbe (2010) examines relationship between oil prices and stock markets in oil exporting and in oil importing countries which are Mexico, Russia, Saudi Arabia, India, China and United States between years 2000 and 2010. The researcher adds nominal exchange rate as an explanatory variable to the analysis. He employed vector autoregressive (VAR) model in the study. The researcher concludes that stock market returns display relationship with oil price movements in the long run in all countries except China (Imarhiagbe, 2010).

Ravichandran and Alkhathlan (2010) examines interaction between oil price movements and Gulf Cooperation Council (GCC) stock markets which are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates stock markets. The researcher used NYMEX oil price and stock indices in GCC stock markets as variables between years 2008 and 2010. He conducted the analysis through vector autoregression (VAR) analysis. Empirical evidence at the end of the study displays that oil price volatility demonstrates impact on stock indices in these oil exporting countries in the long run. This result is compatible with the economic and financial theory. Due to income transfer in case of a rising

oil prices, macroeconomic factors gets better off and they reflect this influence on stock markets (Ravichandran & Alkhathlan, 2010).

Onour (2007) examines stock market return-oil price fluctuations relationship in GCC countries as well. The findings of this study are very similar to results of the Ravichandran and Alkhathlan (2010). Since GCC countries are major oil producers in the world, oil price changes are expected to have impact on GCC economies and stock markets as well. The researcher showed depending on the empirical evidence that oil price movements display significant effect on stock markets in oil exporting GCC countries (Onour, 2007).

Narayan and Narayan (2010) investigate relationship between oil prices and stock markets in Vietnam. The study covers years between 2000 and 2008 and the researcher used daily data. They used nominal exchange rate as an explanatory variable in the study. At the end of the study, empirical evidence shows that oil price movements and exchange rate affect stock indices positively. However; the authors think that changes in stock market returns can mostly be explained with domestic factors such as capital inflow (Narayan & Narayan, 2010).

Muhtaseb and Al-Assaf (2017) observes relationship between stock market indices and oil price volatility in Amman stock market between years 2000 and 2015. The researchers used quarterly data and they employed asymmetric cointegration model in the analysis. Foreign oil dependency of Jordan is really high. According to the economic and financial theory, significant influence of oil is expected on stock market returns in Jordan. Empirical evidence at the end of the study demonstrates that oil prices affect considerably Amman stock returns. In addition; effect of oil prices on the stock market is asymmetric. In other words; increasing oil prices have influence on the stock market more than declining oil prices (Muhtaseb & Al-Assaf, 2017).

Moghadam (2010) observes stock market reactions to oil price movements by employing Multivariate GARCH model. He used S&P500 and NASDAQ composite index for stock indices. The study period is between 1988 and 2009. The empirical evidence at the end of the study shows that oil price changes influence S&P500 and NASDAQ composite index significantly and adversely. In addition; rising oil prices cause higher impact on the

indices than lowering oil prices. This situation is proving that there is asymmetry in effect of oil price on stock markets (Moghadam, 2016).

Dhaoui and Khraief (2014) investigate influence of sharply increasing oil prices on stock market returns between years 1991 and 2013. The researchers apply EGARCH-M model by using monthly data in the study. The study is made in United States Swiss, France, Canadian, United Kingdom, Australia, Japan and Singapore stock markets which are developed international markets. Empirical evidence at the end of the study displays that oil price volatility affect stock market returns adversely and significantly in all countries except Singapore (Dhaoui & Khraief, 2014).

Diaz, Molero and Gracia (2016) observed reaction of G7 economies' stock markets to change in oil prices between years 1970 and 2014 by considering structural break in 1986. G7 countries are Canada, France, Germany, Italy, Japan, UK and US. The researchers conducted their analysis through vector autoregressive (VAR) model. The analysis includes interest rates, economic activity, oil prices and stock returns as variables. Empirical evidence shows that oil price fluctuations influence stock market returns adversely and significantly (Diaz, Molero, & Gracia, 2016).

Masiha, Peters and Mello (2011) observed impact of oil price changes on South Korea stock market especially taking Asian Financial Crisis of 1997 and Gulf War into consideration. The researchers conduct their analysis through vector error correction model. They made their study for the period between 1988 and 2005. They concluded that fluctuations in oil prices influence Korean stock market considerably and its impact is increasing day by day (Masih, Peters, & Mello, 2011).

Degiannakis, Filis and Floros (2011) research relationship between stock market and oil prices for Canada, Mexico, Brazil, United States, Germany and Netherlands. Canada, Mexico and Brazil are oil exporting countries while Germany, Netherlands and United States are oil importing countries. The study would like to compare empirical results for both oil exporting and oil importing countries. The study covers period between 1987 and 2009 and the researchers conduct their analysis through monthly data in time span. They employ DCC-GARCH model in the analysis. In addition; researchers take origin of oil price shock into account in the analysis. Empirical evidence at the end of the study demonstrates that oil price changes have significant impact on stock market indices for oil exporting and importing

countries. Direction of oil price influence on oil exporting countries is positive while it is negative for oil importing countries. These results are valid in case of aggregate demand side oil price changes. On the other hand; supply side shocks display less influence on stock markets compared to the aggregate demand side oil price shocks. Finally; economic problems in the markets cause positive correlation between oil markets and stock markets while this correlation is negative under non-economic turmoil conditions (Filis, Degiannakis, & Floros, 2011).

Naifar and Al Dohaiman (2013) observed relationship between fluctuating oil prices and stock market in GCC countries. Researchers studied issue with a regime shift approach. They applied Markov regime-switching model. Empricial evidence at the end of the study displayed that regime dependency is clearly seen between GCC stock markets and oil price fluctuations (Naifar & Dohaiman, 2013).

Cunado and Gracia (2014) investigate influence of oil price volatility on stock returns in oil importing 12 European countries namely Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Spain, Portugal and the UK. The period covered in the study is between 1973 and 2011. The researchers employ Vector Autoregressive (VAR) and Vector Error Correction Models (VECM) in the study. They incorporate industrial production and interest rates to understand causes of impacts better. Empirical evidence shows that impact of oil price changes on the stock markets vary due to the origin of the oil price shocks. However; in general, oil price fluctuations affect the stock market returns adversely. This is consistent with economic financial theory which claims negative relationship between oil price changes and stock returns for oil importing countries. In addition; supply side oil shocks are more influential on stock market returns (Cunado & Gracia, 2014).

The studies came under observation until now are mostly and generally assert that there is significant relationship between oil price changes and stock markets in countries which have different characteristics. Some of countries investigated in the studies are developed while others are developing. Empirical evidences in the studies show that oil price increases have positive impact on oil exporting countries while oil importer countries' stock markets are influenced negatively from rise in oil prices in general. From now on; it will be focused on studies which claim that there is no significant relationship between oil prices and stock markets in literature.

To begin with Hamao (1988) examined relationships among Japanese stock markets and some variables such as industrial production, oil prices, inflation rate, confidence level in investors, interest rate. Motivation of the researcher for choosing those variables is the capital asset pricing model. Researcher put forward that inflation, risk premium and term structure have an effect on Japanese stock markets while oil prices have almost no impact on the equity values (Hamao, 1988).

Hammoudeh and Choi (2005) researched correlation between oil prices and S&P 500 index. Main aim of the study was to have look at the relationship among five Gulf Cooperation Council's stock markets, oil prices, S&P500 index and 30-months Treasury bill rate by using weekly data between years 1994 and 2004. Empirical evidence put forward by researchers asserts that there is no influence of oil prices on S&P 500 index (Hammoudeh & Choi, Behavior of GCC stock markets and impacts of US oil and financial markets, 2005).

Maghyereh (2004) made research on interaction between stock markets and oil prices in 22 developing countries. The researcher used the vector autoregression (VAR) analysis techniques by appointing daily data between years 1998 and 2004 and benefiting from forecast error variance decomposition and impulse response functions. He concluded that sharp increases in oil prices don't show any influence on stock returns in developing countries' stock markets (Maghyereh, OIL PRICE SHOCKS AND EMERGING STOCK MARKETS: A Generalized Approach, 2004).

Apergis and Miller (2009) observe interaction between oil price shocks and stock markets in eight countries namely U.K., Italy, Germany, France, Canada, Australia, Japan and U.S. The authors used vector autoregressive model in their study. The study covers period years between 1981 and 2007. The authors divide oil shocks in three parts which are oil supply shocks, global demand shocks and national demand shocks. Different type shocks show different impact on different stock markets. For example; oil supply shocks and global aggregate demand shocks do not have influence on Australia stock markets. On the other hand; idiosyncratic demand shocks have some impact on Canadian stock market returns while other oil shocks do not result in any effect on stock returns in Canada. In overall, oil shocks do not cause any influence on stock markets in countries in the sample (Apergis & Miller, 2009).

Al-Fayoumi (2009) investigates relationship between oil prices and stock markets in oil importing countries which are Turkey, Tunisia and Jordan. The study covers the years between 1997 and 2008. The researcher employed Vector Error Correction Model in the analysis. Interest rates, industrial productions are used in addition to the oil price and sector indices variables. Interestingly; the researcher found out that there is no significant relationship between oil prices and stock market in oil importing countries. Interest rate and industrial production seems that they have considerable influence on stock indices in these countries (Al-Fayoumi, 2009).

Maghyereh and Al-Kandari (2007) studied GCC countries with respect to oil prices stock market relationship. However; the researchers used rank tests of nonlinear cointegration method when analyzing relationship between oil prices and oil exporting GCC stock markets. The study covers the years between 1996 and 2003. Contrary to Zarour (2006), they found that there is not significant correlation between oil prices and stock markets in GCC countries (Maghyereh & Al-Kandari, 2007).

Arouri and Fouquau (2009) investigated oil prices and stock markets relationship in the GCC countries. The researchers conducted their analysis by employing weekly data of six oil exporting countries namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates between years 2005 and 2008. Results depending on the empirical evidence demonstrate interesting conclusions. The authors find out that there is significant positive relationship between oil prices and Qatar, Oman and United Arab Emirates stock markets. However; they are unable to find any significant relationship between oil fluctuations and stock markets for remaining countries namely Bahrain, Kuwait and Saudi Arabia (Arouri & Fouquau, 2009).

Kapusuzoglu (2011) observed interactions between Istanbul stock exchange indices and international Brent oil prices. He conducted his analysis by using National 100, National 50 and National 30 Index of Istanbul Stock Exchange (ISE). The study covers years between 2000 and 2010. The researcher employed Johansen cointegration and Granger causality techniques in order to demonstrate short run and long run correlation among variables. The researcher concluded that there are relations between the stock market indices and international Brent oil price. In addition; he found that there is one way cointegration from stock indices to international Brent oil price. However; the international oil prices do not demonstrate any significant impact on these three indexes (Kapusuzoglu, 2011).

Until now, relationship between aggregate stock index and oil price changes in the literature has been observed. From now on, relationship between oil price changes and sectoral stock indices in literature will be concentrated.

Analysis of Scholtens and Yurtsever (2012) will be started. The researchers scrutinize influence of oil price shocks at the sectoral level in Euro area. They observed reaction of 38 distinct sectors in fifteen countries to oil price changes. The authors conducted their analysis through VAR models and multivariate regression between years 1983 and 2007. Empirical evidence suggests that there is positive correlation between oil prices and "oil and gas products, oil equipments, industrial metals and mines, mining" sector indices. Remaining 33 sectoral indices demonstrate negative relation with oil price changes. In other words; only oil intensive industries become better off with a rise in oil prices. In addition; nearly half of industries are better off with declining oil prices (Scholtens & Yurtsever, 2012).

Arouri (2011) also observes relation between stock returns of European industries and oil price movements in his study for the period between 1998 and 2010. The researcher makes non-linearity analysis and Granger causality test in addition to the multifactor asset pricing model for reactions of sectoral stock returns to fluctuating oil prices. The author used DJ Stoxx 600 index and 12 European sector indices which are Automobile & Parts, Financials, Food & Beverages, Oil & Gas, Health Care, Industrials, Basic Materials, Personal & Household Goods, Consumer Services, Technology, Telecommunications, and Utilities. At the end of the study, he concluded that Automobile & Parts, Financials, Food & Beverages, Health Care, Personal & Household Goods, Technology and Telecommunications and Utilities sectors' stocks display adverse relationship with oil price movements. However; Oil & Gas, Industrials, Basic Materials, Consumer Services demonstrate positive correlation with varying oil prices (Arouri M. E., 2011).

Sadorsky (2001) observes individually oil and gas sector by using multifactor model. The author specifically tries to figure out determiners of oil and gas sector's stock values. The researcher employed monthly data for the years between 1983 and 1999. At the end of the study empirical evidence displayed that there are three determiners of the oil and gas sector's stock values which are exchange rates, crude oil prices and interest rates. Furthermore; Oil price changes demonstrate positive correlation with stock prices in the oil and gas industry in Canada (Sadorsky, 2001).

Boyer and Filion (2007) also investigate Canadian oil and gas sector. He tries to figure out factors deciding the value of the stocks in oil and gas sector in Canada. They similarly make their analysis through multifactor models. The authors employ data of 105 firms in the oil and gas industry. The results of the empirical evidence proved that stock returns in the oil and gas industry is positively correlated with changing oil prices (Boyer & Filion, 2007).

Nandha and Faff (2008) investigate relationship between sectoral stock returns and oil price movements. They employ 35 global industry indices of DataStream between years 1983 and 2005 and the analysis is made through monthly data and with a standard market model increased by the oil price. Results of study demonstrate that oil and gas sector with mining industry display a positive correlation with varying oil prices. However; oil price movements influence 33 remaining sectoral equity returns adversely (Nandha & Faff, Does oil move equity prices? A global view, 2008).

Nandha and Brooks (2009) investigate influence of oil price changes on transport sector for various 38 countries. Specifically, the researchers try to figure out whether oil price movement is one of the deciding variables for stock returns in transport industry. The study covers the period between 1983 and 2006 and the authors employ monthly data in the analysis. At the end of the study empirical results demonstrate that oil price changes have influence on stock returns in transport sector for developed countries, European countries and G7 countries (Nandha & Brooks, 2009).

McSweeney and Worthington (2007) analyze relationship between oil prices and sectoral indices in Australian stock market for the period between 1980 and 2006. The researchers test whether oil price changes are one of the key forces driving sectoral equity returns in Australian stock market. Observed sectors are banking, diversified financials, energy, insurance, media, property trusts, materials, retailing and transportation. The authors employ multifactor model in the study. Furthermore; researchers add market portfolio, exchange rates, and term premium as explanatory variables to the analysis. Empirical evidence at the end of the study demonstrates that there is significant and positive relationship between energy industry stock returns and oil prices. On the other hand; there is adverse relationship between moving oil prices and retailing, banking and transportation equity returns. In addition, oil prices are important factor materials sectoral stock returns (McSweeney & Worthington, 2007).

Cong, Wei, Jiao and Fan (2008) analyze influence of oil price movements on Chinese sectoral indices through multivariate vector auto-regression model. Motivation of the researchers for observing Chinese stock markets is that China is one of the largest oil consumer and oil importer country in the world. The study covers period between 1996 and 2007 and the authors employ monthly data in the analysis. Empirical evidence at the end of the study displays that there is only interaction between oil price fluctuations and manufacturing index. In addition; equity values of some oil firms have certain degree of negative relationship with oil price volatility. For rest of the industries, researchers are not able to figure out any significant relationship with oil price changes (Cong, Wei, Jiao, & Fan, 2008).

Toraman, Başarır, Bayramoğlu (2011) analyzes influence of oil price volatility on sector indices in Istanbul Stock Exchange. Relationship between fluctuating oil prices and sectoral indices are observed through Cointegration tests and Vector Error Correction Model (VECM). The analysis is made in the period between 2009 and 2011. Observed indexes are Istanbul Stock Exchange (ISE) 100 composite index, services index, industrial index and technology index of ISE. Empirical evidence in the study demonstrates that oil price movements definitely have some impacts on sectoral indexes in Istanbul Stock Exchange. However; degree of the influence are varying across industries. More clearly; industrial index is most influenced sector from volatility in oil prices while changing oil prices have limited effect on technology index. The researchers suggest that investor who is thinking to invest in Istanbul Stock Exchange should take influence of oil price movements into consideration (Toraman, Başarır, & Bayramoğlu, 2011).

Eryiğit (2009) observed influence of oil price volatility on sectoral stock indices in İstanbul Stock Exchange for the period between 2000 and 2008 by employing daily data. The researcher applies ordinary least squares method in the analysis. The author figures out correlation between oil price movements and most of the sector indexes which are Electricity, Whole Sale and Retail Trade Insurance, Holding, Investment, Wood, Paper, Printing, Basic metal, Metal Products, Machinery and Nonmetal and Mineral Product. Correlation between oil price fluctuations and indices of Wood, Paper and Printing, Insurance and Electric is positive as suggested by empirical evidence in the study (Eryigit, 2009).

Malik and Ewing (2009) analyze interaction between oil price up-down movements and United States sectoral stock indexes. The researchers focus on transmission mechanism and influence of fluctuations in oil prices on the financial market throughout the study. Analysis is conducted by employing weekly data for the period between 1992 and 2008. Concentrated sectors in the study are five important sector which are financial, industrial, consumer, health and technology. The method applied in the analysis is bivariate GARCH model. Empirical evidence of the study asserts that altering oil prices demonstrate influence on health, technology and consumer sectoral indexes. However; fluctuating oil prices do not seem to have effect on financial and industrial sectoral indexes. In addition; changes or news in sectoral returns in those five industries seem to have some impact on oil price volatility (Malik & Ewing, 2009).

Arouri and Nguyen (2010) research interaction between sectoral indices and oil price fluctuations by employing Dow Jones (DJ) Stoxx600 index and 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 indexes in Euro area. Euro area countries covered in the analysis are Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Austria, Belgium and the United Kingdom. The analysis is conducted by employing weekly data between years 1998 and 2008. Empirical evidence obtained through different econometric methods display that interaction between most of the sector indexes and altering oil prices is positive. Only the adverse relationship between oil prices and sectoral stock indexes is observed in Automobile and Parts, Food and Beverages, and Health Care industries. In addition; degree of correlation between sectoral indexes and oil prices are varying across industries. For example, highly significant interaction with oil prices is observed in oil and gas industry (Arouri & Nguyen, 2010).

Gogineni (2008) analyzed relationship between oil price movements and stock markets at the aggregate and sectoral level taking reason and feature of the oil price shocks into account. The study is conducted by employing daily data for the period between 1983 and 2006 in United States. Empirical results demonstrate interesting conclusions. First; there is not strong correlation between aggregate stock indexes and daily fluctuating oil prices. Only large changes in oil prices display adverse or negative effect on overall stock market.

On the other hand; insignificant daily price fluctuations demonstrate positive influence on aggregate stock indices. In addition; influence of oil price fluctuations is varying according to the dependency type of that sector. More clearly; degree of oil price impact is differentiating due to whether the sector is cost side dependent or demand side dependent. Moreover; it is indicated by empirical evidence that alterations in supply conditions of oil have enormous influence on the stock market. Finally; nearly all sectors have correlation with oil prices. This correlation is higher for oil intensive industries (Gogineni, 2008).

Khamis and Hamdan (2016) observe response of three stock markets namely Saudi Arabia, Kuwait and Oman to oil price movements between years 2012 and 2015. These GCC countries are important oil producers the authors expect strong interaction of these countries' stock markets with altering oil prices. The researchers apply multifactor model in the analysis. Empirical evidence in the study demonstrated that oil price declines display larger influence on three stock markets than rising oil prices. The most influenced country from decreasing oil prices is Saudi Arabia stock market. In addition; nearly all industries in Saudi Arabia have negative correlation with oil price changes. In Kuwait, oil and gas, industrials and consumer goods sectors demonstrate considerable negative correlation with oil price movements. In Oman, it is hardly difficult to find any one sector influenced by altering oil prices. Only industrials sector does not seem having been affected due to change in oil prices. At the end of the study; the authors put forward that three countries display high dependency on oil therefore nearly all stock indices in these countries seem to be influenced from oil price volatility. Moreover; they add that diversification of economy for GCC countries can be accounted only solution for high effect of oil prices (Khamis & Hamdan, 2016).

Mohanty et al. (2013) investigates influence of oil price volatility on stock values in United States oil and gas industry. The analysis period covers years between 1986 and 2008. The researchers concluded that there is an asymmetry with respect to effect of oil price volatility on oil and gas industry. Declining oil prices seem to be more influential on the sector returns than rising oil prices. In addition; company related parameters such as size, market-to-book ratio etc. are influential with respect to degree of oil price volatility impact (Mohanty, Akhigbe, Al-Khyal, & Bugshan, 2013).

Broadstock et al. (2012) observe influence of oil price fluctuations on Chinese energy related stock prices. The researchers employ weekly data for the period 2000 and 2011. They apply traditional GARCH techniques in the study. They conclude that fluctuations in oil

prices have serious effects on energy related stock prices. However; degree of this influence is depending on the time. Impact of fluctuating oil prices became stronger after 2008 financial crisis (Broadstock, Cao, & Zhang, 2012).

Gencer and Demiralay (2013) investigated interaction between oil price movements and sectoral indices in Borsa İstanbul for 18 industries. The analysis covers years between 2002 and 2013 and researchers employ monthly data in the study. The authors employ VAR (Vector Auto-Regression) and VECM (Vector Error Correction Model) in the study to figure out long run and short run relationships among variables. The structural connections are observed through impulse response and Granger causality techniques. At the end of the analysis, researchers conclude that fluctuations in oil prices demonstrate considerable influence on chemical petroleum-plastic sectoral index in the long run. However; they are unable to figure out any correlation between oil price movements and remaining 17 sector indexes in the long run (Gencer & Demiralay, 2013).

Eksi, Senturk and Yildirim (2012) analyze interaction between oil prices and seven sectoral indices in Turkish stock market for years between 1997 and 2009. They employ vector error correction model in order to figure out long term relationship among variables. Sectoral indices are Food-Beverage, Basic Metal, Chemical-Petroleum-Plastic, Textile-Leather, Wood Paper Printing, Metal Products Machinery and Non-Metal Mineral products indexes. The authors empirically demonstrate that Chemical-Petroleum-Plastic and Basic Metal industries are affected from changes in crude oil prices negatively. This result is compatible with the economic and financial theory since oil is a critical input for these sectors. For remaining sectors; the researchers are unable to put forward any relationship (Eksi, Senturk, & Yildirim, 2012).

Jafarian and Safari (2015) investigates Malaysian stock markets with respect to relation between sector indexes and crude oil prices. Analysis is conducted for years between 2000 and 2014. The researchers applied multifactor model in the study. They empirically displayed that there is positive correlation between oil price fluctuations and Financial Times Stock Exchange Kuala Lumpur Composite, consumer staples, energy indexes. However; correlation between oil price volatility and utilities and telecom services indexes is negative. In addition; oil price changes result in changes in value of consumer staple, energy, industrials and telecommunication services according to the Granger causality tests (Jafarian & Safari, 2015).

Abeng (2015) observes Nigerian stock markets with respect to influence of oil prices on sectoral indices between years 1997 and 2014 by employing monthly data. Nigeria is exporter of crude oil and it displays high level dependency on trade of crude oil with world market. The methodology applied in this study is ordinary least squares technique. The researcher empirically put forward that banking, insurance, industry and oil and gas sectors are influenced from fluctuations in oil prices. However; oil price movements are not influential on food beverages and tobacco sector returns (Abeng, 2015).

Bredin and Elder (2011) examines sharply altering oil prices and sectoral stock indexes relation in U.S. market. Specifically; they would like to figure out reaction of 18 sector indexes to oil price shocks by employing the linear factor model (arbitrage pricing theory). Researchers empirically demonstrate that interaction between significant price changes in short term and sector indexes is not strong. Oil price shocks have only some effect on gold, oil and gas, and retail industries indexes in U.S. (Bredin & Elder, 2011).

Gormus (2013) similarly analyze relationship between sectoral indices and oil price volatility in Turkish stock market between years 2000 and 2011. He uses ordinary least square method in the analysis. Sectors coming under investigation are banks, electricity leasing/factoring, food/beverages, holdings/investment, wood/paper/printing, chemical petroleum plastics, metal products/machinery, non-metal products, retail, textile/leather, tourism, transportation and real estate. In addition to the influence of oil price fluctuations; the researcher observes impact of S&P500 index on Turkish sectoral stock indices. The author concluded that most of the sector indices have positive correlation with oil price changes except transportation sector. Transportation sector is influence adversely from changes in oil prices. Transportation sector uses oil as input and it is accepted as cost factor for the industry. Therefore; empirical result is compatible with economic and financial theory. In addition; the researcher figured out that U.S. stock market is very influential on Turkish sectoral stock indices (Gormus, 2013).

Sadorsky (2003) scrutinize factors behind the stocks volatilities in Pacific Stock Exchange Technology 100 index (Sadorsky, 2003). This study shows a different characteristic with respect to being first for comprising relationship between technology stock prices and oil prices. In this study; researcher uses monthly data between 1986 and 2000 years. The researcher finds that movement in oil prices, consumer price index and the

term premium all are factors playing an important role in the volatilities of stocks in Pacific Stock Exchange Technology 100 index.

Faffa and Brailsford (1999) made their research with a similar perspective on the same issue in a different country namely Australia (Faffa & Brailsford, 1999). The researcher observed relationship between oil price movements and Australian industry stock returns. Specifically, relationship between oil price and sectoral stocks are deeply researched and level of sensitivity between them is tried to be determined. The study covers years between 1983 and 1996 and monthly data is appointed in the study. The researchers find that there is positive and strong correlation between oil prices and stock prices in Oil and Gas and Diversified Resources industries. In addition; negative and less significant relationship between oil prices and equity returns is detected in some sectors namely Paper and Packaging, and Transport industries (Faffa & Brailsford, 1999).

The studies on relationship between oil prices and sectoral stock indices in the past generally demonstrate that there is correlation between oil and gas industries' stock indices, considerably oil consuming and producing sectors' stock returns and oil price changes. This main result is consistent with the economic and financial theory.

5. METHODOLOGY

5.1 Data Set

In this analysis, daily closing value of sectoral stock indices, aggregate indices and Brent crude oil have been employed. Russian (MOEX) sectoral and aggregate stock indices for period 09:01:2007 to 30:12:2016 have been used in this analysis. Analyzing relationships of U.S. S&P500 indices with oil prices have been made for the period 30.04.2017 to 30:12:2016. Canadian TSX Capped indices' relationship with changing oil prices is observed by using data which is between 02:01:2007 and 30:12:2016 dates. TOPIX 17 Japan indices have been used in this analysis in order to gauge relation between oil price movements and Japanese stock market and data attained for this analysis is starting from 10:12:2007 and it is ending at 30:12:2016. Data for Brent Crude Oil is already available for period 02:01:2001 to 30:12:2016. In addition; analysis has been repeated for a different period which is 02.01.2002 – 31.12.2006 for some sectoral and aggregate stock indices which they only have available daily data. Specifically; analysis is made for Russian MOEX indices covering period 03:01:2002 to 29:12:2006. Association of U.S. S&P 500 aggregate indices and sectoral indices with oil prices are scrutinized for the periods 02:01:2002 – 29:12:2006 and 09:09:2002 – 29:12:2006 respectively. Analyzing period for Canadian TSX Capped stock market indices is 01:05:2002 to 29:12:2006. Data pertaining Russian sectoral stock indices and main RTS index is obtained from Moscow Stock Exchange Data Distribution System (http://www.moex.com/en/). Daily closing value of S&P 500 index and S&P 500 sectoral stock indices are derived from S&P Dow Jones Indices Data Distribution System (http://www.spindices.com). Data related with Canadian Composite index and sectoral stock indices has been acquired from Toronto Stock Exchange Data Distribution System (http://www.tsx.com). Closing prices of Japanese sectoral and aggregate stocks are received from Tokyo Stock Exchange Data Cloud System (http://db-ec.jpx.co.jp). Finally; Europe Brent spot prices are obtained from U.S. Energy Information Administration Data Distribution System (https://www.eia.gov). Brent crude oil prices have been chosen for this study since it is prevailing with respect to reflecting true value of crude oil in international markets. Microsoft Office Excel 2016 and E-views 9.0 package programs have been utilized in order to make econometric analyses. The data set can be seen at the following table.

Daily Prices of Indices from 02.01.2002 to 31.12.2006

Europe Brent Crude Oil	S&P500 Financials	TSX Industrial
MOEX RTS Main	TSX Consumer Discretionary	TSX Information Technology
MOEX Oil & Gas	TSX Consumer Staples	TSX Materials
MOEX Telecoms	TSX Energy	TSX Real Estate
S&P500 Main	TSX Financials	TSX REIT
S&P500 Energy	TSX Health Care	TSX Telecom Services
TSX Utilities		

Daily Prices of Indices from 02.01.2007 to 30.12.2016

Europe Brent Crude Oil	TSX Financials	S&P500 Industrials
MOEX Main RTS	TSX Health	S&P500 Information Tech.
MOEX Chemicals	TSX Industrial	S&P500 Materials
MOEX Consumer G&S	TSX Information Technologies	S&P500 Real Estate
MOEX Electiric Util.	TSX Materials	S&P500 Telecom Services
MOEX Financials	TSX Real Estate	S&P500 Utilities
MOEX Oil&Gas	TSX REIT	TOPIX 17 Auto&Transport. Equip.
MOEX Manufacturing	TSX Telecom Services	TOPIX 17 Banks
MOEX Metals&Mining	TSX Utilities	TOPIX 17 Commercial&Wholesale
MOEX Telecoms	S&P500 Main	TOPIX 17 Construction&Materials
MOEX Transport	S&P500 Consumer Disc.	TOPIX 17 Electric App.
TSX Composite	S&P500 Energy	TOPIX 17 Electric Power&Gas
TSX Consumer Disc.	S&P500 Financials	TOPIX 17 Energy Resources
TSX Energy	S&P500 Health Care	TOPIX 17 Foods
TOPIX 17 IT&Services, Others	TOPIX 17 Pharmaceutical	TOPIX 17 Retail Trade
TOPIX 17 Machinery	TOPIX17 Raw Materials&Chemicals	TOPIX 17 Steel&Nonferrous Metals
TOPIX 17 Main	TOPIX 17 Real Estate	TOPIX 17 Transport.&Logistics

5.2 Methods

First of all, stationary analyses of data related with variables have been made in the study. Augmented Dickey-Fuller (ADF-1979) tests and Phillips-Perron (PP-1988) tests have been applied for stationary analysis. In order to gauge long run relationship among series, Johansen cointegration technique has been operated later. Vector Error Correction model has been applied in order to demonstrate causality relationship and short run dynamics among variables. Ultimately; Granger causality analysis has been made to get the idea about the direction of the short run causality relationship among series.

5.3 Unit Root Test

Stationary series mean that series always have constant mean, variance and covariance. In other words; mean, variance and covariance of time series do not change over time in the stationary series. Why is it important to make the analysis with stationary series? Because nonstationary series do not allow us to generalize the results taken from the study. Nonstationary series can only give an idea about attitude of variables for certain and limited time period taken into account. In addition; making analysis with nonstationary series can create nonsense or spurious regression problem. Nonsense regression problem can mislead us when evaluating variables with respect to relation among them. Although there is actually no relationship between two variables, it can be seen that there exists relationship between two variables in analyses made by using nonstationary series. In order to avoid this nonsense regression problem and obtain more generalized consequences from the analyses, it is needed to use stationary series in the study (Gujarati, 2004). In addition; nonstationary series can give us deceptive results in Granger causality analysis. Moreover; it must have been sure that series should be integrated from same order before making Johansen cointegration analysis. Therefore; nonstationary series have been converted into stationary series by taking differences of them. This process is called unit root test. If a series has a unit root, then it means that it is nonstationary and vice-versa. Unit root analysis has been made through Augmented Dickey-Fuller (ADF-1979) and Phillips-Perron (PP-1988) tests techniques in the study. In these tests, there are two hypotheses:

Null hypothesis: There is unit root (nonstationary)

Alternative hypothesis: There is no unit root (stationary)

Augmented Dickey-Fuller (ADF-1979) and Phillips-Perron (PP-1988) tests gave statistical results of the series. Then, those statistics have been checked against critical values. If statistical results of the tests are larger than critical values, null hypothesis have been rejected. On the other hand; if statistical results of the tests are smaller than critical values, then null hypothesis was not rejected. If null hypotheses have been rejected, then it meant the series is stationary. However, if null hypothesis could not be rejected, then it meant the series is nonstationary. By taking first differences, nonstationary series have been turned into stationary series in this study. In Augmented Dickey-Fuller (ADF-1979) tests; two kinds of equations have been used which are following:

$\Delta Y_t = a_0 + \theta Y_{t-1} + \sum_{n=1}^{k} a_n \Delta Y_{t-n} + u_t$ (intercept term, no trend)

$\Delta Y_t = a_0 + a_1 t + \theta Y_{t-1} + \sum_{n=1}^{k} a_n \Delta Y_{t-n} + u_t$ (intercept and trend term)

In Phillips-Perron (PP-1988) tests, Bartlett Kernel estimation method and Newey-West bandwidth have been used upon on two different models; intercept, intercept and trend. PP tests have been employed to justify results of ADF tests. PP tests take structural breaks and trends into consideration. This feature of PP test makes it stronger.

Variables mean:

$\Delta Y_t = Y_t - Y_{t-1}$, t is trend variable, u_t is stochastic error term, a_0 is constant term and θ and a_1 are coefficients.

Number of lags have been specified according to Schwarz Info Criterion in ADF tests.

5.4 Johansen Cointegration Analysis

Johansen cointegration analysis has been made in order to display long run relationship among these variables. Engle-Granger cointegration analysis has been further developed by Johansen and Juselius (1990) and they have found new method called Johansen cointegration technique. Engle-Granger cointegration technique is single equation method and it only allows to show long run relationship between two variables. In other words; it is possible to find out only one cointegrating relationship with Engle-Granger method. On the other hand; Johansen cointegration technique allows us to observe relationships among more than two variables at the same time. In other words; Johansen cointegration method makes

possible to detect more than one cointegration relationships among series. There are two hypotheses which has been examined by Johansen cointegration analysis in this study:

Null Hypothesis: There is no cointegration among variables

Alternative Hypothesis: There is cointegration among variables

Johansen cointegration analysis have been made with variables in the same cointegration order. This is rule for this method. In Johansen cointegration analysis, number of cointegrating vectors have been found by looking at trace statistics and maximum eigenvalues. If trace statistics and maximum eigenvalues are higher than critical values, then null hypothesis have been rejected. However; in case where trace statistics and maximum eigenvalues are lower than critical values, then null hypothesis could not be rejected. Number of lags in the cointegration analyses have been chosen according to the Sequential Modified LR Test Statistic (each test at 5% level), Final Prediction Error, Akaike Information, Hannan-Quinn Information, Schwarz Information criterions. Number of lags have been chosen based on mutual decisions of the criterions.

5.5 Vector Error Correction Model (VECM)

Cointegration analysis takes only long run relationship among variables into consideration. It does not pay attention to short run deviations from long run equilibrium in the model. However; it is needed to analyze short run deviations and long run relationship at the same time. Therefore; Vector Error Correction Model (VECM) will be used in order to indicate short run dynamics in the models. Error correction mechanism was firstly utilized by Sargan (Sargan, 1964). Later on Engle and Granger benefited from this mechanism and they increased its popularity (Gujarati, 2004). VECM will show us how quickly deviations in dependent variable will be back to long run equilibrium after an alteration in an explanatory variable. In other words; error correction term will demonstrate returning velocity of the model to long run equilibrium after an exogenous change. This process is called speed of adjustment in the literature.

In order to apply VECM, it must have been sure that the variables are nonstationary at level. However; they have to be stationary at their first differenced. Later on; cointegration between the variables should be searched for. If it is found that there is long run relationship

between the variables (with contribution of Johansen cointegration test), then short run dynamics and long run causality of the models can be looked at. In short; in order to utilize from VECM, all variables should be integrated from same order and they must detect at least one cointegrating vector (long run relationship) as a result of Johansen cointegration analysis. VECM equations used in the study are demonstrated below:

$$\Delta X_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i \Delta Y_{t-i} + \sum_{i=1}^{n} \alpha_i \Delta X_{t-i} + \lambda_1 EC_{t-1} + u_{xt}$$

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{n} \beta_i \Delta Y_{t-i} + \sum_{i=1}^{n} \beta_i \Delta X_{t-i} + \lambda_2 EC_{t-1} + u_{yt}$$

In the models presented above; α and β are parameters to be estimated. Coefficients λ_1 and λ_2 indicate how fast dependent variable turns back to long run equilibrium after an alteration in explanatory variable. EC shows last period variation from long run equilibrium. The error correction term must be negative in order to infer that the model is moving towards the equilibrium. Otherwise; positive sign of error correction term means that the model is moving away from long run equilibrium. In addition; coefficient of the error correction term must be significant and non-zero. When error correction term is significant and its coefficient is negative, it can be told that there is long run causality from independent variable to dependent variable. In addition; if coefficients of independent variables are jointly significant by Wald Test, then it can be easily said that there is short run causality from independent variable to dependent variable.

To summarize; first step for us is to check whether the variables are non-stationary at level or not. After it is guaranteed that the variables have unit root problem at their level, first difference will be taken in order to make them stationary. Later on; Johansen Cointegration test will be run with variable which are integrated from same order. Then, if it is found that there is long run association (relationship) between the dependent and independent variables, vector error correction model will be applied. With contribution of VECM, long run and short run causality relation between variables will be observed. If error correction term is significant and its coefficient is negative, then it can be said that there is long run causality relationship between variables. In addition; short run causality relationship between variables will be observed by applying Wald Test.

5.6 VAR Granger Causality Test

Operational causality between two variables was first defined by Wiener (1956). This definition was improved and expanded by Granger (1969) and hence it is called Granger Causality test today. Granger Causality test observe causality among two variables. The logic behind the causality test is can be told as following: Let's suppose that there are two events: X and Y. Occurring time of these events are different. Assume that event X is older than event Y, meaning that X occurred before Y. This situation create possibility that past values of X may explain some part of Y. In other words; former events may cause later events. Intuition behind Granger Causality test is the idea described above (Gujarati, 2004).

Granger Causality test will be used in VAR framework to observe causality relationship between two variables as aimed by the technique. By applying this method, causality relationship and direction of causality between variables will be analyzed. This technique will be applied to variables which do not have any cointegration between them by Johansen Cointegration analysis. When cointegrating vector between variables have been found by Johansen cointegration technique, VECM model will be used to gauge short run dynamics and long run causality between variables as stated above.

It will be obtained one way (unidirectional), two ways (bilateral) or no causality between variables as a result of the Granger Causality tests. In order to apply the Granger causality test, some conditions must be satisfied. First of all; two variables which are applied the causality tests must be stationary. When they are nonstationary at level, first difference will be taken and they will be made stationary. Then, Granger causality analysis will be made by using series which have been turned into first difference. In addition; error terms in Granger causality terms are assumed that they are uncorrelated. Following models are going to be appointed in Granger causality tests:

$$Yt = \alpha_0 + \sum_{i=1}^{m} \alpha_i Y_{t-i} + \sum_{i=1}^{m} b_i X_{t-i} + u_i$$

$$Xt = c_0 + \sum_{i=1} c_i X_{t-i} + \sum_{i=1} d_i Y_{t-i} + u_i$$

α_0 and c_0 are constants in the model, α,b,c and d are coefficients of lags and m symbolizes number of lags. U is error terms. As it is stated above, it is assumed that there is no correlation between error terms. In addition; number of **lags** are selected according to the Sequential Modified LR Test Statistic (each test at 5% level), Final Prediction Error, Akaike

Information, Hannan-Quinn Information, Schwarz Information criterions in VAR framework. Hypothesis which will be used in the models are:

Null Hypothesis: X does not Granger cause to Y
Alternative Hypothesis: X Granger causes Y

Null Hypothesis: Y does not Granger cause to X
Alternative Hypothesis: Y Granger causes X

To summarize the process; stationarity of series will be checked firstly. If they are unstationary at level, then first difference of them will be taken and they will be made stationary. After it is guaranteed that series are stationary at their first difference, Granger causality tests will be operated with first differenced series. If null hypothesis is rejected (which means statistical value is greater than critical value and probability is less than 0,05), then it can be said that there is Granger causality from independent variable to dependent variable. In other words; to capture rejection of null hypothesis, coefficients in the equations above must be statistically significant.

6. EMPIRICAL EVIDENCE

6.1 Unit Root Tests Results

Stationary analysis in the study has been made with ADF and PP tests. First of all; whether variables are stationary or not at levels I (0) have been analyzed. In this process; two different models which are constant and constant and trend have been applied in both ADF and PP tests. Number of lags have been specified according to Schwarz Info Criterion in ADF tests. In Phillips-Perron tests, Bartlett Kernel estimation method and Newey-West bandwidth have been used. PP tests have been made to validate results of ADF unit root tests. Unit root analyses have been made for series between years 2002-2007 and 2007-2016.

Results of unit root tests demonstrated that all variables except TOPIX 17 Energy Resource index (Japanese index) are unstationary at levels, I (0). More specifically; Russian MOEX Main, MOEX Chemicals, MOEX Consumer Goods & Services, MOEX Electric Utilities, MOEX Financials, MOEX Manufacturing, MOEX Metals & Mining, MOEX Oil & Gas MOEX Telecoms, MOEX Transport indexes; U.S. SP500, SP500 Consumer Discretionary, SP500 Consumer Staples, SP500 Energy, SP500 Financials, SP500 Health Care, SP500 Industrials, SP500 Information Technology, SP500 Materials, SP500 Real Estate, SP500 Telecom Services, SP500 Utilities Indexes; Canadian TSX Capped Composite, TSX Capped Consumer Discretionary, TSX Capped Consumer Staples, TSX Capped Energy, TSX Capped Financials, TSX Capped Health Care, TSX Industrial, TSX Capped Information Technology, TSX Capped Materials, TSX Capped Real Estate, TSX Capped REIT, TSX Capped Telecom Services, TSX Capped Utilities indexes; Japanese TOPIX 17 Automobiles & Transportation Equipments, TOPIX 17 Banks, TOPIX 17 Commercial & Wholesale Trade, TOPIX 17 Construction Materials, TOPIX 17 Electric Appliances & Precision Instruments, TOPIX 17 Electric Power & Gas, TOPIX 17 Foods, TOPIX 17 IT Services & Others, TOPIX 17 Machinery, TOPIX 17 Pharmaceutical, TOPIX 17 Raw Materials & Chemicals, TOPIX 17 Real Estate, TOPIX 17 Retail Trade, TOPIX 17 Steel & Nonferrous Metals, TOPIX 17 Transportation & Logistics, TOPIX 17 Main indexes and Europe Brent Crude Oil prices are unstationary at their levels. In other words; their ADF and PP unit root tests statistics are smaller than critical values at I (0) as it is shown in Table 1 and Table 3 below. ADF and PP unit root test statistics of TOPIX 17 Energy Resource are

only values larger than critical value at I (0). Therefore; null hypothesis is rejected (there is unit root) only for TOPIX 17 Energy Resource. Null hypothesis for remaining variables cannot be rejected. This means that those remaining variables have unit root problem.

Since unit root problem have been detected for all variables except TOPIX 17 Energy Resource index, first differences of the series have been taken to avoid this unit root problem. ADF and PP tests have been applied at their first differences which are I (1). Results which are shown at Table 2 and Table 4 below display that all variables became stationary at their first differences, I (1). ADF and PP test statistics at I (1) are larger than critical values. This means that null hypothesis can be easily rejected which asserts that there is unit root.

To summarize; unit root problem has been solved in the series by taking first differences. This consequence shows that all variables except TOPIX 17 Energy Resource index are integrated from same (first) order. Therefore; cointegrating relationship among variables can be wondered or suspected. Since these variables are integrated from first (same) order, it clearly becomes possible to look for whether long run relationship (cointegration) exists or not among the series.

6.2 Johansen Cointegration Test Results

Johansen cointegration analysis have been made in order to gauge long relationship between crude oil price and sectoral and aggregate stock indices for series 2002-2007 and 2007-2016. Cointegration analysis for variables have been made since it has been proved by ADF and PP unit root tests that they are integrated from same order. Since they are integrated from same order, it is logical to scrutinize long run relationship between crude oil prices and indexes in four countries. Number of lags in Johansen cointegration analysis have been chosen according to the Sequential Modified LR Test Statistic (each test at 5% level), Final Prediction Error, Akaike Information, Hannan-Quinn Information, Schwarz Information criterions. Number of lags have been chosen by mutual decision of criterions.

After Johansen cointegration analyses have been made, Eigen, Trace and Maximum Eigen value statistics have been acquired. Later on; those statistics have been compared against critical values of % 1 and % 5. Results of cointegration analyses are shown in Tables 5,6,7 and 8 below. If Trace statistics and Maximum Eigen values are larger than critical values, then null hypothesis have been rejected which asserts that there is no cointegration

or long run relationship between variables. In other words; in case of rejection of null hypothesis, it can be said that there is long run relationship or there is at least one cointegrating vector between the series. On the other hand; if Trace statistics or Maximum Eigen values are smaller than critical values, then null hypothesis could not be rejected. In other words; in case of non-rejection of null hypothesis, inference which says that there is no long run relationship between variables can be obtained.

Results of cointegration analysis demonstrate that there is long run relationship between oil price and MOEX Main RTS, MOEX Chemicals, MOEX Electric Utilities, MOEX Financials, MOEX Metals & Mining, MOEX Oil & Gas, MOEX Telecoms, MOEX Transport, TSX Materials, TOPIX 17 Steel & Nonferrous Metals Indexes for series 2007 and 2016. This long run relationship is shown with cointegrating equation below.

Long Run Relationship for Variables (2007-2016) According to Johansen Cointegration Tests

Independent Variable (X)	Dependent Variable (Y)	Cointegrating Equation
Europe Brent Crude Oil Price	MOEX Main RTS	Y = 1047.438 + 2.051202 X
	MOEX Chemicals	Y = 0.070827 + 1.113165 X
Europe Brent Crude Oil Price	MOEX Electric Utilities	Y = 1154.551 – 14.06551 X
	MOEX Financials	Y = 470.0969 – 3.035067 X
	MOEX Metals & Mining	Y = 332.3657 – 1.904497 X
	MOEX Oil & Gas	Y = 132.5007 + 0.433166 X
	MOEX Telecoms	Y = 2.076062 X
	MOEX Transport	Y = 159.4034 – 1.172405 X
	TSX Materials	Y = 147.4951 + 1.739271 X
	TOPIX 17 Steel & Nonferrous Metals	Y = 221.7550 – 0.405359 X

It can be easily seen above that while most of Russian indexes have long run association with oil prices, indexes of United States, Canada and Japan almost have no cointegration with oil prices in the long run. Specifically; there exists positive relationship between oil prices and MOEX main index. When oil price goes up one unit, MOEX main index will increase more than two units. Similarly; there is positive relationship between

MOEX Chemicals, MOEX Oil Gas and MOEX Telecoms. If price of oil rises one unit, increase in MOEX Chemical index will be more than one unit. Likewise; when oil prices go up 1 unit, its reflection on MOEX Oil & Gas index will be around 0.4 unit. This amount will be bigger in MOEX Telecoms index (which is more than 2 unit) in case of one-unit oil price rise. Lastly; positive association is seen between Canadian TSX Materials index and oil price. One unit of oil price increase will show itself as 1.7 unit rise on TSX Materials.

There are also negative associations between oil prices and MOEX Electric Utilities, MOEX Financials, MOEX Metals Mining MOEX Transport, TOPIX 17 Steel & Nonferrous Metals. One-unit increase in oil price will cause around 14-unit decline in MOEX Electric Utilities. Effect of one unit rise in oil price on MOEX Financials, MOEX Metals & Mining MOEX Transport will nearly be around negative 3 units, 2 units and 1 unit respectively. Finally; while oil price increases 1 unit, there will be decline around 0.4 unit in Japanese index, TOPIX 17 Steel & Nonferrous Metals.

The same Johansen Cointegration analysis has been repeated for 2002-2007 series. Since there is not data for all variables which have series between years 2002 and 2007, analysis has been made with available data for limited number of variables. These variables are MOEX Main, MOEX Oil & Gas, MOEX Telecoms, SP500 Main, SP500 Energy, SP500 Financials, TSX Consumer Discretionary, TSX Consumer Staples, TSX Energy, TSX Financials, TSX Health Care, TSX Industrial, TSX Information Technology, TSX Materials, TSX Real Estate, TSX REIT, TSX Telecoms, TSX Utilities. Results of the cointegration analysis have been shown in Tables 7 and 8**.** According to the results there is long run relationship between oil prices and MOEX Main, MOEX Telecom indexes.

Long Run Relationship for Variables (2002-2007) According to Johansen Cointegration Tests

Independent Variable (X)	**Dependent Variable (Y)**	**Cointegrating Equation**
Europe Brent Crude Oil Price	MOEX Main RTS	Y = 3.980520 X
	MOEX Telecoms	Y = 1.309255 X

Positive correlation between oil prices and MOEX Main index for 2002-2007 series validates positive long run relationship between same variables as it has been demonstrated

for years 2007-2016 above through Johansen cointegration analysis. In addition; there is positive long run association between oil prices and MOEX Telecoms for years 2002-2007 as it has been stated above. This result has been verified with Johansen cointegration test applied on MOEX Telecoms and Oil Price series for 2002-2007. For both MOEX Main RTS and MOEX Telecoms, direction and sign of the relationship is same for 2002-2007 and 2007-2016 series even though their affection levels are different. Influence of oil price on MOEX Main RTS in 2002-2007 is approximately two times bigger than effect of oil price on MOEX Main RTS in 2007-2016. However; influence of oil price on MOEX Telecoms nearly doubles in years between 2007-2016.

To summarize; negative and positive correlation among variables have been observed quantitatively. Most affected financial market from oil prices seems Moscow Stock Exchange. This result can be attributed to high dependency of Russian economy on oil revenues and export. Influence of oil prices on other stock markets seems limited in this study for both years 2002-2007 and 2007-2016. Until now; results of Johansen cointegration analysis have been observed and it has been concentrated on variables having long run relationships. From now on; it will be focused on those variables in order to check causality and short term dynamics among them through Vector Error Correction Model.

6.3 VECM Granger Causality Analysis Results

Until now, long run relationship among the variables with the help of Johansen cointegration method have been observed. From now on, short run and long run causality relationships among those variables will be concentrated on. This causality analysis is going to be made by Vector Error Correction Model (VECM). In order to apply VECM, all variables should be integrated from same order and there must be at least one cointegrating vector between them. Therefore; VECM has been applied on variables which have long run relationship as a result of Johansen cointegration tests. In VECM, variables which have long run relationship have either been employed as dependent variable or independent variable. Through VECM, long run and short run causality from independent variables to dependent variables have been tested. In addition; with VECM it has been demonstrated whether models which are created are moving towards or away from long run equilibrium. Moreover; VECM created proof for how fast the created models are returning back to long run equilibrium. In other words; by applying VECM speed of adjustments have been put in the

models forward. Vector Error Correction Model Causality Analysis have showed us whether there is long run causality or not among variables. If error correction term in VECM is significant and its coefficient is negative, then it can be easily said that there is long run causality from independent variable to dependent variable. Furthermore; it has been checked whether coefficients of independent variables are jointly significant or not by Wald test. If they are jointly significant, it has been told that there is short run causality from independent variable to dependent variable. In the light of those information, VECM Granger Causality Analysis have been made and results of this analysis are shown in Table 9 and 11.

According to the results of VECM analysis, there is bidirectional long run causality between oil price and MOEX Main RTS index for years 2002-2007 and 2007-2016. There is also short run causality from oil price to MOEX Main RTS index for years 2007-2016. This result shows that oil price is one of the main/significant determiner of MOEX Main RTS index. Also, long run relationship between them is positive as it can be seen in results of Johansen cointegration tests. This empirical evidence is coherent with financial theory because Russia is one of biggest oil exporters in the world. Positive change in oil prices is expected to have a positive influence on main index of Moscow Stock Exchange since it means more income for oil exporting country when oil price goes up. Similarly; there is bidirectional long run causality between oil price and MOEX Chemicals. In other words; both of them are granger causes of each other in the long run. Moreover; positive long run relationship between them has been put forward as a consequence of Johansen cointegration tests. This empirical results are also consistent with financial theory. Chemical industry mostly deals with producing petroleum products. Rising oil prices or increasing price of petroleum products mean extra income for the industry. Therefore; positive correlation and causality relation between MOEX Chemicals and oil prices validate financial theory. Unlikely; there is one-way short run and long run causality from oil price to MOEX Electric Utilities index. As stated above in analysis of Johansen cointegration tests, it is clear that there is long run negative relationship between oil price and MOEX Electric Utilities. If result of VECM causality analysis is combined with Johansen cointegration test, it can be concluded that empirical consequences are consistent with the theory. Since oil is significant input for production of electric, change in oil prices mean change in variable costs. This will influence cash flow and profitability of firms producing electrical utilities. Therefore; as it has been demonstrated in empirical analysis, negative long run relationship between oil

prices and MOEX Electric Utilities index and causality from oil price to the index seem meaningful. Another result given by VECM causality analysis is that there is short and long run causality from oil price to MOEX Financials. Existing causality and correlation between these two variables makes sense because alteration in oil prices is expected to have some effect on financial indices as well as on macroeconomic indicators in an oil dependent economy. Another variable whose relationship with oil price is going to be observed is MOEX Metals & Mining. There is unidirectional short and long run causality from oil price to MOEX Metals & Mining and long run relationship between them is negative as it can be seen in the result of Johansen cointegration analysis. This empirical result means that oil price is important for Metals & Mining industry. In addition; negative long run relationship between oil price and the industry marks that oil is probably an input for Metals & Mining industry. Another relationship that is going to observed is between MOEX Oil & Gas Index and oil price. It is clear that positive correlation and causality between them is expected. Empirical results meet expectations. There is long run positive relationship between these two variables as Johansen cointegration test has demonstrated. In addition; there is bidirectional long run causality between MOEX Oil & Gas and oil price. Moreover; there exists short run causality from oil price to MOEX Oil & Gas index. Unlikely; there is long run unidirectional causality from MOEX Telecoms to oil price. Furthermore; there is long run positive association between them. Next variable which is going to be dealt with is MOEX Transport. There is negative long run relationship between oil price and MOEX Transport index. Moreover; one-way short and long run causality from oil price to MOEX Transport exist according to the VECM Granger causality analysis results. Those empirical evidence seems logical and they are compatible with the financial theory. Since oil is a vital input for transportation industry, negative correlation between oil price and MOEX Transport and causality from oil price to MOEX transport do really make sense. Next relationship which is going to be dealt with is between Canadian TSX Materials Index and oil price. Johansen cointegration analysis for these two variables show that there is long run association between them. VECM Granger Causality analysis points out that there is one-way short and long run causality from TSX Materials to oil price. The last index which is going to be concentrated on is Japanese TOPIX 17 Steel & Nonferrous Metals index. Negative long run correlation between oil price and TOPIX 17 Steel & Nonferrous Metals index marks that oil should be an input for steel and metal industry. Furthermore;

unidirectional short and long run causality from oil price to TOPIX 17 Steel & Nonferrous Metals support this argument.

In short; variables which have long run relationship with oil prices have been analyzed in the causality analysis part. It has been shown that there is at least one way long run causality between those variables and oil prices as it can be seen in the results of VECM Granger Causality analysis. Pivoting role is again taken by Moscow Stock Exchange indices. It can be easily concluded that most influenced stock market from oil price seems Moscow Stock Exchange.

6.4 VAR Granger Causality Tests / Block Exogeneity Wald Tests Results

In this part; variables which do not have long run relationship with oil prices according to the Johansen cointegration tests will be concentrated on. Therefore; Granger Causality tests in VAR framework will be applied in order to show direction of causality among variables. To start with; Europe Brent Oil Price Granger causes to MOEX Consumer Goods & Services, MOEX Manufacturing, SP500 Energy, SP500 Financials, SP500 Telecommunication Services, TSX Composite, TSX Consumer Discretionary, TSX Consumer Staples, TSX Energy, TSX Financials, TSX Industrial, TSX Information Technology, TSX Real Estate, TSX Utilities, TOPIX 17 Automotive & Transportation Equipments, TOPIX 17 Banks, TOPIX 17 Commerce and Wholesale Trade, TOPIX 17 Construction Materials, TOPIX 17 Electric App & Prec. Instruments, TOPIX 17 Foods, TOPIX 17 IT & Services and Others, TOPIX 17 Machinery, TOPIX 17 Pharmaceutical, TOPIX 17 Raw Materials & Chemicals, TOPIX 17 Real Estate, TOPIX 17 Retail Trade, TOPIX 17 Transportation Logistics, TOPIX 17 Main indices for years 2007-2016. These results can be seen at the Table 10 below. Although there is no long run relationship among those variables, VAR Granger causality analysis points out that causality from oil price to indices above exists. In addition; there is Granger causality from MOEX Manufacturing, SP500 Consumer Discretionary, SP500 Consumer Staples, SP500 Energy, SP500 Health Care, SP500 Main, SP500 Industrials, SP500 Information Technology, SP500 Materials, SP500 Real Estate, SP500 Telecommunication Services, SP500 Utilities, TSX Composite, TSX Energy, TSX Industrial, TSX REIT indices to oil price. If these two results are combined, it is obtained that there is bidirectional Granger causality between oil prices and MOEX Manufacturing, SP500 Energy, SP500 Telecommunication Services, TSX

Composite, TSX Energy and TSX Industrial indices. If these empirical results are combined with consequences of Johansen cointegration test and VECM Granger causality analysis, it could be said that all of the Moscow Stock Exchange indices are affected from change in oil prices. This result is consistent with beginning expectations before starting to the study. It can be said that oil is vital for Russian economy and it is very normal to see impacts of it on financial indices. For United States, any long run relationship with oil prices and Dow Jones indices could not be found. However; oil price has influence on some U.S. indices which are SP500 Energy, SP500 Financials, SP500 Telecommunication Services according to the VAR Granger Causality tests. Furthermore; SP500 Consumer Discretionary, SP500 Consumer Staples, SP500 Energy, SP500 Health Care, SP500 Main, SP500 Industrials, SP500 Information Technology, SP500 Materials, SP500 Real Estate, SP500 Telecommunication Services, SP500 Utilities Granger cause oil price. Comparing to the Russia, oil has less influence on U.S. Dow Jones indices. For Canada, there is only positive long run relationship between oil price and TSX Materials. According to the results of VAR Granger Causality analysis, oil price has impact on some Canadian indices which are TSX Composite, TSX Consumer Discretionary, TSX Consumer Staples, TSX Energy, TSX Financials, TSX Industrial, TSX Information Technology, TSX Real Estate, TSX Utilities. Moreover; Granger causality exists from TSX Composite, TSX Energy, TSX Industrial, TSX REIT to oil price. Those empirical evidence show that oil price has larger effect on Canadian indices than U.S Dow Jones indices while oil has less influence on Canadian indices than Moscow Stock Exchange indices. The last country which is going to be dealt with is Japan. There is only long run relationship with oil price and Japanese TOPIX 17 Steel & Nonferrous Metals index. In addition; oil price has impact on TOPIX 17 Automotive & Transportation Equipments, TOPIX 17 Banks, TOPIX 17 Commerce and Wholesale Trade, TOPIX 17 Construction Materials, TOPIX 17 Electric App & Prec. Instruments, TOPIX 17 Foods, TOPIX 17 IT & Services and Others, TOPIX 17 Machinery, TOPIX 17 Pharmaceutical, TOPIX 17 Raw Materials & Chemicals, TOPIX 17 Real Estate, TOPIX 17 Retail Trade, TOPIX 17 Transportation Logistics, TOPIX 17 Main indices because oil price Granger causes to those indices. Affection level from oil price in Japanese stock market seems similar with Canadian stock market. However, it can be said that least influenced country from oil price seems United States. In addition; most affected country from oil price is Russia. Observed results above coming from analysis covered years between 2007 and 2016. Analysis of years between 2002-2007 have been made with available data and VAR

Granger Causality tests. It has been concluded that oil price Granger causes to SP500 Energy, TSX Materials, TSX REIT and TSX Utilities indices. For SP500 Energy, TSX Materials and TSX Utilities indices, oil is important and it Granger causes to those indices for both time spans which are 2002-2007 and 2007-2016. However; oil price does not cause TSX REIT index for 2002-2007 years. On the other hand; MOEX Oil & Gas, SP500 Energy, TSX Energy, TSX Financials, TSX Materials, TSX REIT and TSX Utilities Indices Granger cause to oil price. Results obtained for MOEX Oil & Gas, SP500 Energy, TSX Energy, TSX REIT and TSX Utilities indices in VAR Granger Causality analysis for years 2002-2007 validates results of 2007-2016 Granger Causality analysis since analysis of both time spans provide same consequences. Results of 2002-2007-time span analysis are given on Table 12**.**

7. CONCLUSION

In this study; relationship of four stock markets namely; Russian, Canadian, Japanese and U.S. with oil prices have been observed. Two countries which are Russia Federation and Canada are oil exporting countries while other two countries namely U.S. and Japan are oil importing countries. Period of the study is divided into two intervals which are 02:01:2007 -30:12:2016 and 02:01:2002 – 29:12:2006. These dates can expose to small changes for different indices due to availability of the data. It has been analyzed that long run relationship between stock indices and oil prices with Johansen cointegration technique. Later on; Vector Error Correction model has been applied in order to demonstrate causality relationship and short run dynamics among variables. Ultimately; Granger causality analysis has been made to get the idea about the direction of the causality for series which do not have any long run relationship with Johansen cointegration analysis. At the end of the analysis; it has been demonstrated with empirical evidence that there is long run relationship between most of the MOEX (Russian) aggregate and sectoral stock indices and oil prices. To illustrate; there is positive long run association between MOEX Main Index and crude oil prices. The examples can be arrayed as following positive long run relationships: MOEX Chemicals-Crude Oil Price, MOEX Oil & Gas-Crude Oil Price, MOEX Telecoms-Crude Oil Price. In addition; there are long run negative relationship between four MOEX (Russian) sector indices and crude oil price. For example; MOEX Electric Utilities – Crude Oil Price, MOEX Financials – Crude Oil Price, MOEX Metals & Mining – Crude Oil Price and MOEX Transport – Crude Oil Price relations are negative long run relations according to the Johansen cointegration test results. In total, 8 of 10 MOEX indices have long run relationship with crude oil prices. Any cointegration between MOEX Consumer Goods & Services – Crude Oil Price and MOEX Manufacturing and Crude Oil Price could not be found with empirical evidence. In addition; there are bidirectional long run causalities among MOEX Main Index – Crude Oil Price, MOEX Chemicals – Crude Oil Price and MOEX Oil & Gas – Crude Oil Price. Furthermore; there are one-way causalities from crude oil price to MOEX Electric Utilities, MOEX Financials, MOEX Transport. To summarize; strong and strict relationships between most of the MOEX stock market indices and crude oil prices have been found. Half of those long run relationships are positive while remaining associations are negative. Especially; there is long run positive relationship between MOEX Main Index and Crude Oil Price. This

result is compatible with the financial and economic theory. As it has been stated in the beginning of the study, financial and economic theory suggests that there should be positive correlation between stock indices and oil price for net oil exporting countries due to changing conditions in profitability of corporations, inflation and monetary policy as a reaction to moving oil price. Since Russian Federation is a net exporter of oil, high degree of correlation between oil prices and MOEX stock indices seems very logical and it really makes sense. In addition; positive long run relationship between MOEX Main Index and Crude Oil Price is coherent with financial theory. Moreover; number and percentage of affected MOEX stock indices from oil prices is high. This can be attributed to less diversified Russian economy. In a well-diversified economy, impact of oil price changes will be less on economic activity. Economic structure will show necessary reaction in order to recover negative influences of changing oil prices. However; Russian economy is not well diversified and it is mostly depended on oil & gas exports. This makes Russian economy vulnerable to oil price shocks. Negative and positive changes in oil prices are almost reflected on all areas of economy. Therefore; number of affected sectors from change in oil prices becomes more and more. This can easily be seen in the results of the study since eight of ten sector indices have strong relationship between oil price movements.

In this analysis, long run relationship between only Canadian TSX Materials index and crude oil price have been found for Canadian stock market. This long run relationship is positive. According to the financial and economic theory; positive cointegration between Canadian stock market indices and crude oil prices is expected due to changing conditions in profitability of corporations, inflation and monetary policy as a reaction to moving oil price. However; any long run association between Canadian stock market indices and crude oil prices could not be found except TSX Materials index. There are only Granger causalities from crude oil price to TSX Composite, TSX Consumer Discretionary, TSX Consumer Staples, TSX Energy, TSX Financials, TSX Industrial, TSX Information Technology, TSX Real Estate, TSX Utilities indices. Although any long run relationships for indices above could not be found, it has been put forward that Granger causality between those indices and oil prices exist. Positive correlation between Canadian stock market indices and crude oil prices compatible with the theory since Canada is net oil exporter country. However; any other long run relationship between oil price and Canadian stock market indices could not be found. One-way (sometimes two ways) Granger causalities from oil price to the most of

the Canadian indices have been put forward. Overall consequence of empirical analysis shows that oil price changes have some influences on Canadian stock market indices but there is almost no strong cointegration between Canadian TSX aggregate and sectoral indices and crude oil prices. In other words; degree of relationship between Canadian stock market indices and crude oil prices is low. This result can be attributed to the well-diversified Canadian economy which no one can see dominance of any one sector. In a well-diversified economy, impact of changes in one sector remains limited on the whole economy since its share is not big enough to influence all other sectors. Maybe, for this reason, any strong long run relationship between Canadian stock indices and crude oil prices could not be found.

Third country which is going to be handled is United States. Similar to Canada, long run relationship between U.S. S&P500 aggregate / sectoral indices and crude oil prices could not be found. There are Granger causalities from oil price to S&P500 Energy, S&P500 Financials and S&P500 Telecommunication Services. Moreover; there exists one-way Granger causalities from S&P500 Consumer Discretionary, S&P500 Consumer Staples, S&P500 Energy, S&P500 Health Care, S&P500 Main, S&P500 Industrials, S&P500 Information Technology, S&P500 Materials, S&P500 Real Estate, S&P500 Telecommunication Services, S&P500 Utilities to Brent Crude Oil Prices. To sum up; there is no cointegration between S&P500 indices and oil prices and oil prices have some effects on limited number of S&P500 indices. On the contrary; most of S&P500 indices Granger cause to crude oil prices. These results can be interpreted as influence of crude oil on U.S. S&P500 indices is very limited. This result is again can be connected due to well diversification of U.S. economy as explained above.

Empirical evidence of the study demonstrates that there is only long run negative relationship between oil price and Japanese TOPIX 17 Steel & Nonferrous Metals. This negative relationship can be explained by a few reasons. First; Japan is net oil importing country so negative relationship between Japanese stock market indices and crude oil prices is expected according to the financial and economic theory as explained above. Secondly; oil is significant input for Steel & Nonferrous Metals sector. Rising oil prices signals increase in costs for the sector and thus negative relationship between the sector indices and oil price seem very straightforward. It is interesting that there is not any long run association between Japanese stock market indices and crude oil prices except TOPIX 17 Steel & Nonferrous Metals. However; one-way Granger causalities from oil price to TOPIX 17 Auto &

Transport Equipment, TOPIX 17 Banks, TOPIX 17 Commerce & Wholesale Trade, TOPIX 17 Construction Materials, TOPIX 17 Electric App & Prec Instruments, TOPIX 17 Foods, TOPIX 17 IT & Services Others, TOPIX 17 Machinery, TOPIX 17 Pharmaceutical, TOPIX 17 Raw Materials & Chemicals, TOPIX 17 Real Estate, TOPIX 17 Retail Trade, TOPIX 17 Transportation Logistics and TOPIX 17 Main indexes have been found. Although any cointegration between Japanese TOPIX 17 indices and crude oil prices could not be found, it has been demonstrated by Granger causality tests that crude oil prices have some influence on most of Japanese indices. Actually; Japan economy is highly dependent on foreign oil since the country is poor with respect to natural energy resources. Therefore; many long run and negative relationships between Japanese TOPIX 17 indices and crude oil must have been observed according to beginning expectations but there is not even one cointegration between Japanese stock indices and oil price. Although oil is important for Japan economy and its influence on stock markets is seen by consequences of Granger causality tests, strong long run correlation between variables could not be detected with empirical evidence the study provided. This issue can be scrutinized in future studies.

REFERENCES

Abeng, M. O. (2015). Analysis of the Effect of Oil Price Shock on Industry Stock Returns in Neigeria. Abuja, Nigeria.

Abouchakra, R., Moujaes, C. N., Najjar, M. R., & Shediac, R. (2008). *Economic Diversification: The Road to Sustainable Development.* McLean: Booz Company.

Agency, I. E. (2016, September). *Key World Energy Statistics*. Retrieved from International Energy Agency: https://www.iea.org/publications/freepublications/publication/KeyWorld2016.pdf

Al-Fayoumi, N. (2009). Oil Prices and Stock Market Returns in Oil Importing Countries: The Case of Turkey, Tunisia and Jordan. *European Journal of Economics, Finance and Administrative Sciences*, 86-101.

Aloui, C., & Jammazi, R. (2009). The effects of crude oil shocks on stock market shifts behaviour: A regime switching approach. *Energy Economics Volume 31 Issue 5*, 789-799.

Aloui, C., & Jammazi, R. (2009). The effects of crude oil shocks on stock market shifts behaviour: A regime switching approach. *Energy Economics Volume 31, Issue 5*, 789–799.

Alpanda, S., & Peralta-Alva, A. (2010). Oil Crisis, Energy-Saving Technological Change and the Stock Market Crash. *Review of Economic Dynamics 13*, 824-842.

Anderson, D., Botman, D., & B.Hunt. (2014). *Is Japan's Population Aging Deflationary?, IMF Working Paper No. 14/139.* Washington, D.C.: International Monetary Fund: Publication Services.

Anoruo, E., & Mustafa, M. (2007). AN EMPIRICAL INVESTIGATION INTO THE RELATION OF OIL TO STOCK MARKET PRICES. *North American Journal of Finance and Banking Research Vol. 1*, 22-36.

Apergis, N., & Miller, S. M. (2009). Do structural oil-market shocks affect stock prices? *Energy Economics*, 569-575.

Arouri, M. E. (2011). Does crude oil move stock markets in Europe? A sector investigation. *Economic Modelling*, 1716–1725.

Arouri, M. E., & Fouquau, J. (2009). On the shortterm influence of oil price changes on stock markets in GCC countries: linear and nonlinear analyses. *Economics Bulletin*, 806-815.

Arouri, M. E., & Nguyen, D. K. (2010). Oil prices, stock markets and portfolio investment; Evidence from sector analysis in Europe over the last decade. *Energy Policy*, 4528–4539.

Arouri, M. E., & Rault, C. (2011). OIL PRICES AND STOCK MARKETS IN GCC COUNTRIES: EMPIRICAL EVIDENCE FROM PANEL ANALYSIS. *International Journal of Finance Economics*, 242-253.

Arouri, M. E., Lahiani, A., & Bellalah, M. (2010). Oil Price Shocks and Stock Market Returns in Oil-Exporting Countries:The Case of GCC Countries . *International Journal of Economics and Finance*, 132-139.

Arouri, M. E., Lahiani, A., & Nguyen, D. K. (2011). Return and volatility transmission between world oil prices and stock markets of the GCC countries. *Economic Modelling Volume 28, Issue 4*, 1815–1825.

Bashar, A. Z. (2006). Wild oil prices, but brave stock markets! The case of GCC stock markets. *Operational Research*, 145-162.

Basher, S. A., & Sadorsky, P. (2006). Oil Price Risk and Emerging Stock Markets. *Global Finance Journal: Volume 17*, 224-251.

Baxter, M., & King, R. G. (1999). Measuring business cycles: approximate band-pass filters for economic time series. *The Review of Economics and Statistics*, 575-593.

Berk, I., & Aydoğan, B. (2015). Crude Oil Price Shocks and Stock Returns: Evidence from Turkish Stock Market under Global Liquidity Conditions. *INTERNATIONAL JOURNAL OF ENERGY ECONOMICS AND POLICY Vol. 5 No.1*, 54-68.

Berkmen, P. (2012). *Bank of Japan's Quantitative and Credit Easing: Are They Now More Effective?* Washington, D.C.: International Monetary Fund.

Bittlingmayer, G. (2005, December 29). *Oil and Stocks: Is It War Risk?* Retrieved from https://www.researchgate.net/publication/228815668_Oil_and_Stocks_Is_it_War_Risk

Bjørnland, H. C. (2008). OIL PRICE SHOCKS AND STOCK MARKET BOOMS IN AN OIL EXPORTING COUNTRY. *Working papers from Norges Bank*.

Black, B. C. (2015, February). *How did oil come to run our world?* Retrieved from British Broadcasting Corporation Website: http://www.bbc.co.uk/timelines/zqgxtfr

Bohi, D. R., & Toman, M. A. (1993, November). Energy Security: Externalities and Policies. *Energy Policy*, pp. 1093-1109.

Boughton, J. M. (2001, September). *Was Suez in 1956 the First Financial Crisis of the Twenty-First Century?* Retrieved from International Monetary Fund Website: http://www.imf.org/external/pubs/ft/fandd/2001/09/boughton.htm

Boyer, M. M., & Filion, D. (2007). Common and fundamental factors in stock returns of Canadian oil and gas companies. *Energy Economics*, 428–453.

Bredin, D., & Elder, J. (2011, January). US Oil Price Exposure: The Industry Effects. Dublin, Ireland.

Broadstock, D. C., Cao, H., & Zhang, D. (2012). Oil shocks and their impact on energy related stocks in China. *Energy Economics*, 1888–1895.

Brown, S. P., & Huntington, H. G. (2013). Assessing the U.S. Oil Security Premium. *Energy Economics 38*, 118-127.

Brown, S. P., & Yücel, M. K. (2013). *The Shale Gas and Tight Oil Boom: U.S. States' Economic Gains and Vulnerabilities.* New York: Council on Foreign Relations.

Canadian Northern Economic Development Agency. (2016, November 21). *Northern Economic Diversification Index*. Retrieved from Canadian Northern Economic Development Agency Website: http://www.cannor.gc.ca/eng/1388762115125/1388762170542#chp2

Chen, N.-F., Roll, R., & Ross, S. A. (1986). Economic Forces and Stock Market. *Journal of Business Vol. 59*, 383-403.

Chen, S.-S. (2010). Do higher oil prices push the stock market into bear territory? *Energy Economics*, 490-495.

Chiou, J.-S., & Lee, Y.-H. (2009). Jump dynamics and volatility: Oil and the stock markets. *Energy, Volume 34, Issue 6*, 788–796.

Choi, K., & Hammoudeh, S. (2010). Volatility behavior of oil, industrial commodity and stock markets in a regime-switching environment. *Energy Policy*, 4388-4399.

Christiano, L. J., & Fitzgerald, T. J. (2003). The Band Pass Filter. *International Economic Review, 44*, 435-465.

Cifarelli, G., & Paladino, G. (2010). Oil price dynamics and speculation ☆: A multivariate financial approach. *Energy Economics*, 363-372.

Ciner, C. (2001). Energy shocks and financial markets: nonlinear linkages. *Studies in Nonlinear Dynamics and Econometrics*, 203-212.

Citizenship and Immigration Canada. (2016, March 10). *Discover Canada*. Retrieved from Government of Canada Website: http://www.cic.gc.ca/english/pdf/pub/discover.pdf

Cong, R.-G., Wei, Y.-M., Jiao, J.-L., & Fan, Y. (2008). Relationships between oil price shocks and stock market: An empirical analysis from China. *Energy Policy*, 3544– 3553.

Cunado, J., & Gracia, F. P. (2014). Oil price shocks and stock market returns: Evidence for some European countries. *Energy Economics*, 365–377.

Danninger, S., & Steinberg, C. (2012). *Japan's Growth Challenge: What Needs to Be Done and What Can Be Achieved in Japan?* Washington, D.C.: International Monetary Fund.

Delice, G. (2003). FİNANSAL KRİZLER: TEORİK VE TARİHSEL BİR PERSPEKTİF. *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*(20), 57-81.

Dhaoui, A., & Khraief, N. (2014). Empirical Linkage between Oil Price and Stock Market Returns and Volatility: Evidence from International Developed Markets. *Economics, Volume 20, Issue 2*.

Diaz, E. M., Molero, J. C., & Gracia, F. P. (2016). Oil price volatility and stock returns in the G7 economies . *Energy Economics Volume 54*, 417–430.

Duman, S. (2005). Ortadoğu Krizleri ve Türkiye. *Ankara Üniversitesi Türk İnkilap Tarihi Enstitüsü Atatürk Yolu Dergisi*, 313-332.

Economic Weekly. (1957, July 6). *Economic Impact of Suez Crisis on Middle East.* Retrieved from Economic & Political Weekly: http://www.epw.in/system/files/pdf/1957_9/26-27-28/economic_impact_of_suez_crisis_on_middle_east.pdf

Eksi, I. H., Senturk, M., & Yildirim, H. S. (2012). Sensitivity of Stock Market Indices to Oil Prices: Evidence from Manufacturing Sub-Sectors in Turkey. *Panoeconomicus*, 463-474.

El-Sharifa, I., Browna, D., Burtona, B., Nixona, B., & Russellb, A. (2005). Evidence on the nature and extent of the relationship between oil prices and equity values in the UK. *Energy Economics Vol. 27*, 819-830.

Engle, & Granger, C. J. (eds). Long-Run Economic Relationships. *Oxford University Press*, 267-276.

Eryigit, M. (2009). Effects of Oil Price Changes on the Sector Indices of Istanbul Stock Exchange. *International Research Journal of Finance and Economics*, 209-216.

Ewing, B. T., & Thompson, M. A. (2007). Dynamic cyclical comovements of oil prices with industrial production, consumer prices, unemployment, and stock prices. *Energy Policy*, 5535-5540.

Faffa, R. W., & Brailsford, T. J. (1999). Oil price risk and the Australian stock market. *Journal of Energy Finance & Development Volume 4*, 69-87.

Filis, G. (2010). Macro economy, stock market and oil prices: Do meaningful relationships exist among their cyclical fluctuations? *Energy Economics*, 877-886.

Filis, G., Degiannakis, S., & Floros, C. (2011). Dynamic correlation between stock market and oil prices: The case of oil-importing and oil-exporting countries. *International Review of Financial Analysis*, 152–164.

Focus Economics. (2017, January 10). *Russia Economic Outlook*. Retrieved from Focus Economics Website: http://www.focus-economics.com/countries/russia

Focus Economics. (2017, March 28). *U.S. Economic Outlook*. Retrieved from Focus Economics Website: http://www.focus-economics.com/countries/united-states

Ford Motor Company. (2012, August 5). *Model T Facts*. Retrieved from Ford Motor Company Website: https://media.ford.com/content/fordmedia/fna/us/en/news/2013/08/05/model-t-facts.html

Fortune Turkey. (2015, January 11). *Petrol fiyatlarını neler etkiliyor?* Retrieved from Fortune Turkey Website: http://www.fortuneturkey.com/petrol-fiyatlarini-neler-etkiliyor-6208

Fraser Institute. (2016, October). *The Importance of International Trade to the Canadian Economy: An Overview*. Retrieved from Fraser Institute Website: https://www.fraserinstitute.org/sites/default/files/the-importance-of-international-trade-to-the-canadan-economy-an-overview-post.pdf

Frech, H. E., & Lee, W. C. (1987). The Welfare Cost of Rationing-By-Queuing Across Markets: Theory and Estimates from the U. S. Gasoline Crises. *Quarterly Journal of Economics, 102*, 97-108.

Frum, D. (2000). *How We Got Here: The 70's: The Decade that Brought You Modern Life (For Better or Worse).* New York: Basic Books.

Gencer, G., & Demiralay, S. (2013). The impact of oil prices on sectoral returns: an empirical analysis from Borsa Istanbul. *Theoretical and Applied Economics*, 7-24.

Gerald, R. V. (2014). COMPARING JAPAN (KEIRESTU) AND KOREA (CHAEBOL) ECONOMIC EFFICIENCY ON THEIR FINANCIAL STRUCTURES. *uropean Journal of Contemporary Economics and Management*, 102-112.

Gilbert, R. J. (1984). Will Oil Markets Tighten Again? A Survey of Policies to Manage Possible Oil Supply Disruptions. *Journal of Policy Modelling*, 111-142.

Gisser, M., & Goodwin, T. H. (1986). Crude Oil and the Macroeconomy: Tests of Some Popular Notions: Note. *Journal of Money, Credit and Banking*, 95-103.

Gisser, M., & Goodwin, T. H. (1986). Crude Oil and the Macroeconomy: Tests of Some Popular Notions: Note. *Journal of Money, Credit and Banking*, 95-103.

Gjerde, Ø., & Sættem, F. (1999). Causal relations among stock returns and macroeconomic variables in a small, open economy. *Journal of International Financial Markets, Institutions and Money*, 61-74.

Gogineni, S. (2008, March 13). The stock Market Reaction to Oil Price Changes. Oklahoma, Norman, OK, United States.

Gormus, N. A. (2013). Oil Price Shocks and Sub Sector Performance of Turkey: Impact of Dominant Markets. *Journal of Applied Finance and Banking*, 169-180.

Grabowiecki, J. (2006). *Keiretsu Groups: Their Role in the Japanese Economy and a Reference Point (or a Paradigm) for Other Countries.* Chiba: Institute of Developing Economies, Japan External Trade Organization.

Granger, C., & Newbold, P. (1974). Spurious Regression in Econometrics. *Journal of Economics*, 111-120.

Gujarati, D. N. (2004). *Basic Econometrics, 4th Edition.* The McGraw-Hill Companies.

Hamao, Y. (1988). An empirical examination of the Arbitrage Pricing Theory: Using Japanese data. *Japan and the World Economy*, 45-61.

Hamilton, J. D. (1983). Oil and Macroeconomy since World War II. *Journal of Political Economy*, 228-248.

Hamilton, J. D. (2003). What is an oil shock? *Journal of Econometrics*, 363–398.

Hamilton, J. D. (2011, February). Historical Oil Shocks. Cambridge, United Kingdom.

Hammoudeh, S., & Aleisa, E. (2004). Dynamic Relationships Among GCC Stock Markets and NYMEX Oil Futures. *Contemporary Economic Policy, Volume 22, Issue 2*, 250–269.

Hammoudeh, S., & Choi, K. (2005). Behavior of GCC stock markets and impacts of US oil and financial markets. *Research in International Business and Finance 20*, 22-44.

Hammoudeh, S., & Eleisa, L. (2004). Dynamic relationships among GCC stock markets and NYMEX oil futures. *Contemporary Economic Policy Vol. 22*, 250-269.

Hodrick, R. J., & Prescott, E. C. (1980). Postwar U.S. Business Cycles: An Empirical Investigation. *Journal of Money, Credit and Banking, Vol. 29, No. 1*, 1-16.

Hooker, M. A. (1996). What happened to the oil price-macroeconomy relationship? *Journal of Monetary Economics*, 195-213.

Huang, B.-N., Hwang, M., & Peng, H.-P. (2005). The asymmetry of the impact of oil price shocks on economic activities: An application of the multivariate threshold model. *Energy Economics Volume 27, Issue 3*, 455–476.

Huang, R. D., Masulis, R. W., & Stoll, H. R. (1996). Energy Shocks and Financial Markets. *Journal of Futures Markets 16*, 1-27.

Imarhiagbe, S. (2010). IMPACT OF OIL PRICES ON STOCK MARKETS: EMPIRICAL EVIDENCE FROM SELECTED MAJOR OIL PRODUCING AND CONSUMING COUNTRIES. *Global Journal of Finance and Banking Issues Vol. 4. No. 4*.

International Energy Agency. (2016). *Energy Policies of IEA Countries: Japan 2016 Review.* Paris: International Energy Agency.

International Energy Agency. (2016). *Energy Policies of IEA Countries:Canada 2015 Review.* Paris: IEA Publications.

International Monetary Fund. (2016). *IMF Country Report No: 16/268: Japan.* Washington, D.C.: International Monetary Fund: Publication Services.

Jafarian, A., & Safari, M. (2015). Impact of Oil Price Fluctuations on Returns of Different Sectors of Malaysian Stock Market. *Journal of Modern Accounting and Auditing*, 159-167.

Johansen, S. (1991). Estimation and Hypothesis Testing of Cointegration in Gaussian Vector Autoregrsssive Models. *Econometrica*, 1551-1580.

Johansen, S., & Juselius, K. (1990). Maximum Likelihood Estimation and Inference on Cointegration with Application to the Demand for Money. *Oxford Bulletin of Economics and Statistiscs*, 169-21-.

Jones, C. M., & Kaul, G. (1996). Oil and Stock Markets. *The Journal of Finance*, 463-491.

Kaneko, T., & Lee, B.-S. (1995). Relative Importance of Economic Factors in the U.S. and Japanese Stock Markets. *Journal of the Japanese and International Economies Vol. 9*, 290-307.

Kapusuzoglu, A. (2011). Relationships between Oil Price and Stock Market: An Empirical Analysis from Istanbul Stock Exchange (ISE). *International Journal of Economics and Finance Vol.3 No.6*, 99-106.

Khamis, R., & Hamdan, A. (2016). Sectoral Response of GCC Stock Markets to International Oil Prices Changes. London, United Kingdom.

Lardic, S., & Mignon, V. (2005). The impact of oil prices on GDP in European countries: An empirical investigation based on asymmetric cointegration. *Energy Policy: Volume 34*, 3910-3915.

Lee, Y.-H., & Chiou, J.-S. (2011). Oil sensitivity and its asymmetric impact on the stock market. *Energy, Volume 36, Issue 1*, 168–174.

MacRae, M. (2012, April). *Karl Benz*. Retrieved from The American Society of Mechanical Engineers Website: https://www.asme.org/engineering-topics/articles/automotive/karl-benz

Maghyereh, A. (2004). OIL PRICE SHOCKS AND EMERGING STOCK MARKETS: A Generalized Approach. *International Journal of Applied Econometrics and Quantitative Studies. Vol.1*, 27-40.

Maghyereh, A., & Al-Kandari, A. (2007). Oil prices and stock markets in GCC countries: new evidence from nonlinear cointegration analysis. *Managerial Finance Vol. 33 Issue: 7*, 449-460.

Malik, F., & Ewing, B. T. (2009). Volatility transmission between oil prices and equity sector returns. *International Review of Financial Analysis*, 95–100.

Masih, R., Peters, S., & Mello, L. D. (2011). Oil price volatility and stock price fluctuations in an emerging market: Evidence from South Korea. *Energy Economics*, 975–986.

McSweeney, E. J., & Worthington, A. C. (2007). A comparative analysis of oil as a risk factor in Australian industry stock returns, 1980-2006. *University of Wollongong School of Accounting & Finance Working Papers Series*.

Miller, J. I., & Ratti, R. A. (2009). Crude Oil and Stock Markets:Stability, Instability, and Bubbles. *Energy Economics Vol. 34*, 559-568.

Minister of Agriculture and Agri-Food. (2016, May 9). *An Overview of the Canadian Agriculture and Agri-Food System 2016*. Retrieved from Canada, Minister of Agriculture and Agri-Food Website: http://www.agr.gc.ca/eng/about-us/publications/economic-publications/an-overview-of-the-canadian-agriculture-and-agri-food-system-2016/?id=1462288050282

Minister of Natural Resources. (2016, December 1). *How does the forest industry contribute to the economy?* Retrieved from Canada, Minister of Natural Resources Website: http://www.nrcan.gc.ca/forests/report/economy/16517

Ministry of Industry. (2015, 07 30). *Strengthening Canada's Manufacturing Sector*. Retrieved from Government of Canada Website: https://www.ic.gc.ca/eic/site/mfg-fab.nsf/vwapj/Manufacturing-Doc-EN-WEB.pdf/$file/Manufacturing-Doc-EN-WEB.pdf

Moghadam, H. M. (2016, June 5). *Asymmetric Effect of Oil Price Shocks on Stock Markets*. Retrieved from SSRN Website: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2787019

Mohanty, S. K., Akhigbe, A., Al-Khyal, T. A., & Bugshan, T. (2013). Oil and stock market activity when prices go up and down: the case of the oil and gas industry. *Review of Quantitative Finance and Accounting*, 253–272.

Mork, K. A. (1989). Oil and the Macroeconomy When Prices Go Up and Down: An Extension of Hamilton's Results. *University of Chicago Press Journals*, 740-744.

Mork, K. A., Olsen, Ø., & Mysen, H. T. (1994). Macroeconomics Responses to Oil Price Increases and Decreases in Seven OECD Countries. *The Energy Journal*, 19-35.

Muhtaseb, B. M., & Al-Assaf, G. (2017). Oil Price Fluctuations and Their Impact on Stock Market Returns in Jordan: Evidence from an Asymmetric Cointegration Analysis. *International Journal of Financial Research Vol. 8, No. 1*.

Naifar, N., & Dohaiman, M. S. (2013). Nonlinear analysis among crude oil prices, stock markets' return and macroeconomic variables. *International Review of Economics & Finance*, 416–431.

Nandha, M., & Brooks, R. (2009). Oil prices and transport sector returns: an international analysis. *Review of Quantitative Finance and Accounting*, 393–409.

Nandha, M., & Faff, R. (2008). Does oil move equity prices? A global view. *Energy Economics*, 986–997.

Narayan, P. K., & Narayan, S. (2010). Modelling the impact of oil prices on Vietnam’s stock prices. *Applied Energy Volume 87, Issue 1*, 356–361.

Nejada, M. K., Jahantighb, F., & Rahbari, H. (2016). The long run relationship between oil price risk and Tehran stock exchange returns in presence of structural breaks. *Procedia Economics and Finance 36*, 201 – 209.

North, D. (2016). *A tale of two Canadas: the two-speed economy.* Paris: Euler Hermes.

Oberndorfer, U. (2009). Energy prices, volatility, and the stock market: Evidence from the Eurozone. *Energy Policy*, 5787–5795.

OECD. (2016). *DEVELOPMENTS IN INDIVIDUAL OECD AND SELECTED NON-MEMBER ECONOMIES:Japan.* Retrieved from OECD Website: http://www.oecd.org/eco/outlook/economic-forecast-summary-japan-oecd-economic-outlook-november-2016.pdf

Ogaki, M. (1993). Unit Roots in Macroeconometrics: A Survey. *BOJ Monetary and Economic Studies Vol. 11 No.2*.

O'Neill, T. J., Penm, J. H., & Terrell, R. D. (2008). The role of higher oil prices: A case of major developed countries. *Research in Finance*, 287-299.

Onour, I. A. (2007). Impact of oil price volatility on Gulf Cooperation Council stock markets' return. *OPEC Energy Review*, 171-189.

Pant, H. (2016, May 11). *Russia's Economy in 2016*. Retrieved from The Diplomat Website: http://thediplomat.com/2016/05/russias-economy-in-2016/

Papapetrou, E. (2001). Oil price shocks, stock market, economic activity and employment in Greece. *Energy Economics*, 511-532.

Park, J., & Ratti, R. A. (2008). Oil price shocks and stock markets in the U.S. and 13 European countries. *Energy Economics*, 2587-2608.

Paul, J. A. (2002, October). *Great Power Conflict over Iraqi Oil: The World War I Era*. Retrieved from Global Policy Forum Website: https://www.globalpolicy.org/component/content/article/185-general/40479-great-power-conflict-over-iraqi-oil-the-world-war-i-era.html

Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 335-346.

Ravichandran, K., & Alkhathlan, K. A. (2010). Impact of Oil Prices on GCC Stock Market. *Research in Applied Economics*.

Sadorsky, P. (1999). Oil price shocks and stock market activity. *Energy Economics Vol 21*, 449-469.

Sadorsky, P. (2001). Risk factors in stock returns of Canadian oil and gas companies. *Energy Economics*, 17–28.

Sadorsky, P. (2003). The macroeconomic determinants of technology stock price volatility. *Review of Financial Economics*, 191-205.

Sadorsky, P. (2003). The macroeconomic determinants of technology stock price volatility. *Review of Financial Economics*, 191-205.

Sargan, J. D. (1964). Wages and prices in the United Kingdom: A study in econometric methodology. *Econometric analysis for national economic planning*, 25-63.

Scholtens, B., & Yurtsever, C. (2012). Oil price shocks and European industries. *Energy Economics*, 1187–1195.

The Japan Institute for Labour Policy and Training. (2016, March). *Labor Situation in Japan and Its Analysis: General Overview 2015/2016*. Retrieved from The Japan Institute for Labour Policy and Training Website: http://www.jil.go.jp/english/lsj/general/2015-2016/2015-2016.pdf

The World Bank. (2016, October 6). *Russian Federation Overview*. Retrieved from The World Bank Website: http://www.worldbank.org/en/country/russia/overview#3

Toraman, C., Başarır, Ç., & Bayramoğlu, M. F. (2011). Effects of Crude Oil Price Changes on Effects of Crude Oil Price Changes on. *European Journal of Economic and Political Studies*.

U.S. Energy Information Administration. (2016, November 28). *Crude Oil and Petroleum Products: Use of Oil*. Retrieved from U.S. Energy Information Administration Website: http://www.eia.gov/energyexplained/index.cfm?page=oil_use

Uri, N. D., & Boyd, R. (1997). Economic Impact of the Energy Price Increase in Mexico. *Environmental and Resource Economics*, 101-107.

Verrastro, F. A. (2013, October 16). *The Arab Oil Embargo—40 Years Later*. Retrieved from Center for Strategic & International Studies: https://www.csis.org/analysis/arab-oil-embargo—40-years-later

Wiener, N. (1956). *I am a Mathematician: The Later Life of a Prodigy.* Cambridge, Massachusetts: The MIT Press.

World Bank. (2016, March 10). *Data: Trade (% of GDP)*. Retrieved from World Bank Website: http://data.worldbank.org/indicator/NE.TRD.GNFS.ZS?locations=CA

World Bank Group. (2016). *Russian Federation Systematic Country Diagnostic: Pathways to Inclusive Growth.* Moscow: Alex Publishers. Retrieved from World Bank Website: http://pubdocs.worldbank.org/en/184311484167004822/Dec27-SCD-paper-eng.pdf

Yergin, D. (2016). *Para ve Güç Çatışmasının Epik Öyküsü.* (K. Tuncay, Trans.) İstanbul: Türkiye İş Bankası Kültür Yayınları.

Zarour, B. A. (2006). Wild oil prices, but brave stock markets! The case of GCC stock markets. *Operational Research*, 145-162.

APPENDICES

Lıst of Tables

A. TABLE 1: Results of ADF and PP Unit Root Tests (Levels) for Series 2007-2016

	ADF Tests		PP Tests	
Index Name	Constant	Constant and Trend	Constant	Constant and Trend
MOEX Main RTS	-1.638156 [1] (0.4628)	-1.835086 [1] (0.6874)	-1.79260 [7] (0.38464)	-2.090487 [7] (0.5503)
MOEX Chemicals	-1.257604 [1] (0.6512)	-1.778728 [1] (0.7150)	-1.488958 [17] (0.5393)	-2.013081 [18] (0.5933)
MOEX Consumer Goods & Services	-1.567252 [1] (0.4993)	-1.561323 [1] (0.8079)	-1.811368 [23] (0.3753)	-1.804533 [23] (0.7025)
MOEX Electric Utilities	-1.224413 [1] (0.6660)	-1.330464 [1] (0.8799)	-1.301859 [20] (0.6309)	-1.559567 [20] (0.8086)
MOEX Financials	-1.471605 [1] (0.5481)	-1.134186 [1] (0.9217)	-1.682113 [21] (0.4403)	-1.599656 [21] (0.7933)
MOEX Oil & Gas	-2.356690 [1] (0.1544)	-2.342503 [1] (0.4101)	-2.487557 [10] (0.1186)	-2.546663 [9] (0.3054)
MOEX Manufacturing	-0.815553 [4] (0.8141)	-1.482961 [4] (0.8354)	-1.120452 [27] (0.7099)	-1.674864 [27] (0.7623)
MOEX Metals & Mining	-1.356293 [1] (0.6051)	-1.717731 [1] (0.7434)	-1.578433 [16] (0.4935)	-2.032737 [16] (0.5825)
MOEX Telecoms	-0.976125 [1] (0.7637)	-1.558767 [1] (0.8089)	-1.262090 [19] (0.6492)	-1.830651 [19] (0.6897)
MOEX Transport	-3.481324 [5] (0.0086)	-2.657095 [5] (0.2549)	-3.207373 [9] (0.0197)	-2.369657 [9] (0.3955)
TSX Composite	-1.915067 [0] (0.3255)	-2.435411 [0] (0.3609)	-1.752301 [10] (0.4047)	-2.280276 [10] [0.4441]
TSX Consumer Discretionary	- 0.240366 [0] (0.9751)	-1.709926 [0] (0.7469)	-0.239820 [10] (0.9750)	-1.706475 [9] (0.7484)
TSX Energy	-2.151390 [0] (0.2246)	-2.959136 [0] (0.1441)	-2.056531 (12) (0.2627)	-2.864272 [11] (0.1745)
TSX Financials	-0.829734 [0] (0.8100)	-2.274136 [0] (0.4475)	-0.505485 [18] (0.8877)	-2.036877 [17] (0.5802)
TSX Health	-1.046141 [3] (0.7386)	-1.420659 [3] (0.8550)	-1.039554 [7] (0.7410)	-1.492302 [8] (0.8323)

A. TABLE 1: Results of ADF and PP Unit Root Tests (Levels) for Series 2007-2016 (continue)

	ADF Tests		PP Tests	
Index Name	Constant	Constant and Trend	Constant	Constant and Trend
TSX Industrial	-0.204296 [0] (0.9355)	-1.895510 [0] (0.6565)	-0.182269 [6] (0.9383)	-1.895376 [5] (0.6566)
TSX Information Technologies	-0.224979 [0] (0.9329)	-1.618649 [0] (0.7857)	-0.225765 [9] (0.9328)	-1.618108 [9] (0.7859)
TSX Materials	-2.037894 [0] (0.2706)	-2.697501 [0] (0.2377)	-1.870604 [11] (0.3465)	-2.534106 [11] (0.3114)
TSX Real Estate	-0.767068 [1] (0.8275)	-2.249813 [1] (0.4610)	-0.747217 [4] (0.8328)	-2.267169 [4] (0.4513)
TSX REIT	-1.419058 [1] (0.5744)	-1.983667 [1] (0.6094)	-1.361271 [8] (0.6027)	-1.947295 [8] (0.6291)
TSX Telecom. Services	-0.405766 [0] (0.9059)	-1.861046 [0] (0.6743)	-0.197108 [22] (0.9364)	-1.683809 [22] (0.7584)
TSX Utilities	-2.533378 [1] (0.1076)	-3.069545 [1] (0.1139)	-1.945594 [32] (0.3114)	-2.506291 [32] (0.3250)
S&P 500	-0.691693 [0] (0.8469)	-2.426044 [0] (0.3657)	-0.463543 [19] (0.8957)	-2.285616 [19] (0.4411)
S&P500 Consumer Discretionary	-0.122968 [0] (0.9452)	-3.272759 [0] (0.0710)	-0.008187 [17] (0.9567)	-3.245766 [18] (0.0759)
S&P500 Consumer Staples	-0.517394 [0] (0.8854)	-3.028725 [0] (0.1245)	-0.346399 [17] (0.9155)	-2.822073 [16] (0.1893)
S&P 500 Energy	-2.259058 [2] (0.1857)	-2.363914 [2] (0.3985)	-2.519693 [13] (0.1108)	-2.575477 [13} (0.2917)
S&P 500 Financials	-2.160815 [1] (0.2211)	-2.075243 [1] (0.5589)	-2.135345 [22] (0.2308)	-2.029974 [25] (0.5840)
S&P 500 Health Care	-0.489191 [0] (0.8909)	-2.513867 [0] (0.3213)	-0.343347 [18] (0.9160)	-2.437615 [19] (0.3597)
S&P 500 Industrials	-0.467121 [0] (0.8950)	-2.400042 [0] (0.3794)	-0.354443 [9] (0.9143)	-2.328294 [10] (0.4178)
S&P 500 Information Tech.	-0.287317 [0] (0.9244)	-2.808286 [0] (0.1943)	-0.120683 [20] (0.9454)	-2.665980 [20] (0.2510)
S&P 500 Materials	-1.681831 [0] (0.4404)	-2.830848 [0] (0.1862)	-1.552407 [9] (0.5069)	-2.719251 [8] (0.2287)
S&P 500 Real Estate	-1.288751 [1] (0.6370)	-3.031021 [1] (0.1238)	-1.362063 [2] (0.6023)	-3.101869 [2] (0.1060)
S&P500 Telecom. Services	-1.682811 [0] (0.4399)	-2.530848 [0] (0.3130)	-1.457309 [10] (0.5553)	-2.352908 [10] (0.4045)
S&P 500 Utilities	-1.597144 [2] (0.4839)	-2.704015 [2] (0.2350)	-1.341572 [14] (0.6121)	-2.628617 [14] (0.2674)

A. TABLE 1: Results of ADF and PP Unit Root Tests (Levels) for Series 2007-2016 (continue)

	ADF Tests		PP Tests	
Index Name	Constant	Constant and Trend	Constant	Constant and Trend
TOPIX 17 Auto & Transportation Equipments	-1.187787 [0] (0.6819)	-3.034885 [0] (0.1228)	-1.132993 [10] (0.7048)	-2.999325 [11] (0.1325)
TOPIX 17 Banks	-2.867410 [5] (0.0494)	-2.786201 [5] (0.2025)	-3.539356 [20] (0.0071)	-3.431583 [21] (0.0475)
TOPIX 17 Commercial & Wholesale Trade	-2.155667 [0] (0.2230)	-3.166231 [0] (0.0916)	-2.161375 [4] (0.2208)	-3.153519 [5] (0.0943)
TOPIX 17 Construction & Materials	-0.554766 [0] (0.8778)	-3.262814 [0] (0.0728)	-0.416713 [12] (0.9040)	-3.210237 [12] (0.0826)
TOPIX 17 Electric Appliances & Precision Instrum.	-1.952205 [0] (0.3084)	-3.114945 [0] (0.1030)	-1.907579 [8] (0.3290)	-3.093558 [10] (0.1080)
TOPIX 17 Electric Power & Gas	-2.514814 [0] (0.1120)	-2.081988 [0] (0.5550)	-2.516086 [9] (0.1117)	-2.044964 [8] (0.5757)
TOPIX 17 Energy Resources	-4.080621 [0] (0.0011)	-3.931931 [0] (0.0110)	-4.078959 [2] (0.0011)	-3.896147 [3] (0.0123)
TOPIX 17 Foods	-0.244466 [0] (0.9303)	-2.788480 [0] (0.2017)	0.101745 [33] (0.9659)	-2.692961 [33] (0.2396)
TOPIX 17 IT & Services, Others	-0.364743 [0] (0.9126)	-2.878381 [0] (0.1698)	-0.167993 [16] (0.9400)	-2.855957 [18] (0.1774)
TOPIX 17 Machinery	-1.192649 [0] (0.6798)	-3.186107 [0] (0.0874)	-1.181043 [9] (0.6848)	-3.177870 [9] (0.0891)
TOPIX 17 Main	-1.678458 [0] (0.4422)	-1.939952 [0] (0.6330)	-1.606731 [15] (0.4790)	-1.876229 [16] (0.6665)
TOPIX 17 Pharmaceutical	-0.797188 [0] (0.8192)	-2.754159 [0] (0.2148)	-0.528288 [21] (0.8832)	-2.636416 [21] (0.2640)
TOPIX 17 Raw Materials & Chemicals	-0.748329 [0] (0.8325)	-3.130679 [0] (0.0994)	-0.586132 [12] (0.8712)	-3.082622 [13] (0.1107)
TOPIX 17 Real Estate	-1.886448 [0] (0.3390)	-3.269781 [0] (0.0716)	-1.858964 [11] (0.3521)	-3.252665 [12] (0.0746)
TOPIX 17 Retail Trade	-0.321179 [0] (0.9194)	-2.995324 [0] (0.1337)	-0.265116 [7] (0.9275)	-2.974005 [7] (0.1398)
TOPIX 17 Steel & Nonferrous Metals	-3.634125 [0] (0.0052)	-3.296433 [0] (0.0670)	-3.625832 [8] (0.0054)	-3.274310 [8] (0.0708)

A. TABLE 1: Results of ADF and PP Unit Root Tests (Levels) for Series 2007-2016 (continue)

	ADF Tests		PP Tests	
Index Name	Constant	Constant and Trend	Constant	Constant and Trend
TOPIX 17 Transportation & Logistics	-1.306049 [0] (0.6289)	-2.659486 [0] (0.2539)	-1.206051 [9] (0.6740)	-2.626187 [11] (0.2685)
Brent Crude Oil	-1.422951 [0] (0.5725)	-1.687643 [0] (0.7567)	-1.478405 [5] (0.5446)	-1.727068 [4] (0.7392)

Notes: ( ) **MacKinnon** (1996) one-sided p-values, [ ] Lag lengths for ADF and Newey-West bandwidths for PP.

B. TABLE 2: Results of ADF and PP Unit Root Tests (Levels) for Series 2002-2007

	ADF Tests		PP Tests	
Index Name	Constant	Constant and Trend	Constant	Constant and Trend
Oil Price	-1.247689 [0] (0.6555)	-2.872397 [0] (0.1719)	-1.226106 [1] (0.6651)	-2.833408 [5] (0.1854)
MOEX Oil & Gas	0.071221 [1] (0.9635)	-1.514253 [1] (0.8246)	0.039357 [7] (0.9609)	-1.535047 [7] (0.8172)
MOEX RTSI Main Index	1.438948 [1] (0.9992)	-0.723777 [1] (0.9704)	1.361115 [7] (0.9989)	-0.778127 [8] (0.9661)
MOEX Telecoms	2.313726 [1] (1.0000)	0.467985 [1] (0.9992)	2.135721 [13] (0.9999)	0.327191 [12] (0.9987)
S&P 500 Index	-0.412911 [0] (0.9045)	-3.192229 [0] (0.0864)	-0.191062 [19] (0.9371)	-3.071125 [19] (0.1137)
S&P 500 Energy	-0.235849 [0] (0.9313)	-4.053737 [0] (0.0075)	-0.121387 [9] (0.9452)	-4.006214 [3] (0.0088)
S&P 500 Financials	-0.570154 [0] (0.8745)	-3.096594 [0] (0.1076)	-0.363364 [12] (0.9127)	-2.967109 [8] (0.1421)
TSX Consumer Discretionary	0.068459 [0] (0.9632)	-4.575084 [0] (0.0011)	0.030074 [5] (0.9601)	-4.580025 [2] (0.0011)
TSX Consumer Staples	-0.842312 [0] (0.8061)	-1.916920 [0] (0.6449)	-0.920356 [7] (0.7821)	-2.000741 [7] (0.5998)
TSX Energy	-0.627805 [1] (0.8619)	-2.465714 [1] (0.3453)	-0.504285 [9] (0.8878)	-2.247643 [8] (0.4620)
TSX Financial	0.819112 [0] (0.9944)	-2.573986 [0] (0.2925)	0.922704 [11] (0.9958)	-2.519582 [10] (0.3185)

B. TABLE 2: Results of ADF and PP Unit Root Tests (Levels) for Series 2002-2007 (continue)

	ADF Tests		PP Tests	
Index Name	Constant	Constant and Trend	Constant	Constant and Trend
TSX Health Care	-1.874061 [0] (0.3448)	-2.228697 [0] (0.4725)	-1.920603 [3] (0.3229)	-2.292925 [2] (0.4370)
TSX Industrial	-0.634328 [0] (0.8604)	-3.191437 [0] (0.0866)	-0.738685 [7] (0.8349)	-3.191652 [4] (0.0866)
TSX Information Technology	-2.433069 [1] (0.1328)	-3.463603 [1] (0.0438)	-2.117800 [7] (0.2377)	-2.989552 [6] (0.1355)
TSX Materials	0.495778 [1] (0.9866)	-2.489135 [1] (0.3335)	0.591477 [1] (0.9895)	-2.322602 [1] (0.4207)
TSX Real Estate	0.415038 [1] (0.9836)	-3.042199 [1] (0.1212)	0.681250 [18] (0.9917)	-3.003627 [13] (0.1316)
TSX REIT Index	-0.091927 [1] (0.9484)	-2.755908 [1] (0.2143)	0.189611 [11] (0.9719)	-2.393967 [8] (0.3824)
TSX Telecom Services	-0.865941 [0] (0.7990)	-2.460363 [0] (0.3480)	-0.830858 [6] (0.8095)	-2.428900 [3] (0.3642)
TSX Utilities	0.477844 [1] (0.9860)	-2.137290 [0] (0.5238)	0.338571 [11] (0.9802)	-2.136826 [11] (0.5241)

Notes: ( ) MacKinnon (1996) one-sided p-values, [ ] Lag lengths for ADF and Newey-West bandwidths for PP.

C. TABLE 3: Results of ADF and PP Unit Root Tests (First Differences) for Series 2007-2016

	ADF Tests		PP Tests	
Index Name	Constant	Constant and Trend	Constant	Constant and Trend
MOEX Main RTS	-43.63258*** [0] (0.0000)	-43.63893*** [0] (0.0000)	-43.70207*** [11] 0.0000	-43.70467*** [11] (0.0000)
MOEX Chemicals	-45.76891*** [0] (0.0001)	-45.76965*** [0] (0.0000)	-46.73941*** [20] (0.0001)	-46.73505*** [20] (0.0000)
MOEX Consumer Goods & Services	-42.34392*** [0] (0.0000)	-42.33604*** [0] (0.0000)	-43.64844*** [19] (0.0000)	-43.63858*** [19] (0.0000)
MOEX Electric Utilities	-38.13098*** [0] (0.0000)	-38.13900*** [0] (0.0000)	-39.87774*** [17] (0.0000)	-39.86729*** [17] (0.0000)
MOEX Financials	-40.93079*** [0] (0.0000)	-40.96092*** [0] (0.0000)	-42.40038*** [20] (0.0000)	-42.37813*** [20] (0.0000)
MOEX Oil & Gas	-44.46039*** [0] (0.0001)	-44.48424*** [0] (0.0000)	-44.36014*** [7] (0.0001)	-44.38056*** [7] (0.0000)
MOEX Manufacturing	-19.42375*** [3] (0.0000)	-19.42228*** [3] (0.0000)	-46.93144*** [22] (0.0001)	-46.91787*** [22] (0.0000)

C. TABLE 3: Results of ADF and PP Unit Root Tests (First Differences) for Series 2007-2016 (continue)

	ADF Tests		PP Tests	
Index Name	Constant	Constant and Trend	Constant	Constant and Trend
MOEX Metals & Mining	-39.08219*** [0] (0.0000)	-39.07738*** [0] (0.0000)	-40.36987*** [18] (0.0000)	-40.36213*** [18] (0.0000)
MOEX Telecoms	-42.86124*** [0] (0.0000)	-42.85212*** [0] (0.0000)	-43.86406*** [16] (0.0000)	-43.85602*** [16] (0.0000)
MOEX Transport	-18.16004*** [4] (0.0000)	-18.30948*** [4] (0.0000)	-50.67335*** [12] (0.0001)	-50.84491*** [11] (0.0000)
TSX Composite	-50.86664*** [0] (0.0001)	-50.86257*** [0] (0.0000)	-51.07427*** [12] (0.0001)	-51.07310*** [12] (0.0000)
TSX Consumer Discretionary	-48.10358*** [0] (0.0001)	-48.16408*** [0] (0.0000)	-48.06406*** [10] (0.0001)	-48.12603*** [8] (0.0000)
TSX Energy	-50.51232*** [0] (0.0001)	-50.50228*** [0] (0.0000)	-50.64839*** [14] (0.0001)	-50.63778*** [14] (0.0000)
TSX Financials	-37.73684*** [1] (0.0000)	-37.77425*** [1] (0.0000)	-50.37026*** [19] (0.0001)	-50.48492*** [20] (0.0000)
TSX Health Care	-31.02340*** [2] (0.0000)	-31.01953*** [2] (0.0000)	-45.16936*** [6] (0.0001)	-45.16071*** [6] (0.0000)
TSX Industrial	-49.42707*** [0] (0.0001)	-49.43508*** [0] (0.0000)	-49.42474*** [6] (0.0001)	-49.44001*** [7] (0.0000)
TSX Information Technologies	-50.89352*** [0] (0.0001)	-50.92635*** [0] (0.0000)	-50.88700*** [9] (0.0001)	-50.92003*** [8] (0.0000)
TSX Materials	-50.94019*** [0] (0.0001)	-50.93714*** [0] (0.0000)	-51.25010*** [13] (0.0001)	-51.25348*** [13] (0.0000)
TSX Real Estate	-46.33596*** [0] (0.0001)	-46.35958*** [0] (0.0000)	-46.33253*** [2] (0.0001)	-46.35958*** [0] (0.0000)
TSX REIT	-45.85811*** [0] (0.0001)	-45.85804*** [0] (0.0000)	-45.74873*** [11] (0.0001)	-45.74660*** [11] (0.0000)
TSX Telecom. Services	-36.38401*** [1] (0.0000)	-36.39718*** [1] (0.0000)	-49.40701*** [21] (0.0001)	-49.47370*** [22] (0.0000)
TSX Utilities	-24.71570*** [4] (0.0000)	-24.71445*** [4] (0.0000)	-43.92298*** [38] (0.0001)	-43.92997*** [38] (0.0000)
S&P 500	-35.89458*** [1] (0.0000)	-35.90470*** [1] (0.0000)	-52.87071*** [13] (0.0001)	-52.91004*** [13] (0.0000)
S&P500 Consumer Discretionary	-47.75527*** [0] (0.0001)	-47.77418*** [0] (0.0000)	-47.86114*** [17] (0.0001)	-47.90751*** [18] (0.0000)
S&P500 Consumer Staples	-36.30329*** [1] (0.0000)	-36.30081*** [1] (0.0000)	-52.10809*** [17] (0.0001)	-52.10948*** [17] (0.0000)
S&P 500 Energy	-36.66203*** [1] (0.0000)	-36.65356*** [1] (0.0000)	-53.77149*** [10] (0.0001)	-53.75964*** [10] (0.0000)

C. TABLE 3: Results of ADF and PP Unit Root Tests (First Differences) for Series 2007-2016 (continue)

	ADF Tests		PP Tests	
Index Name	Constant	Constant and Trend	Constant	Constant and Trend
S&P 500 Financials	-55.89542*** [0] (0.0001)	-56.01012*** [0] (0.0000)	-57.09699*** [21] (0.0001)	-57.65824*** [24] (0.0000)
S&P 500 Health Care	-49.37520*** [0] (0.0001)	-49.37154*** [0] (0.0000)	-50.12130*** [18] (0.0001)	-50.13156*** [18] (0.0000)
S&P 500 Industrials	-49.59372*** [0] (0.0001)	-49.62635*** [0] (0.0000)	-49.63738*** [9] (0.0001)	-49.68367*** [9] (0.0000)
S&P 500 Information Tech.	-48.68158*** [0] (0.0001)	-34.08362*** [1] (0.0000)	-48.89002*** [14] (0.0001)	-48.91671*** [15] (0.0000)
S&P 500 Materials	-33.59723*** [1] (0.0000)	-33.59948*** [1] (0.0000)	-49.44389*** [12] (0.0001)	-49.45238*** [12] (0.0000)
S&P 500 Real Estate	-35.96927*** [1] (0.0000)	-35.98791*** [1] (0.0000)	-57.17300*** [20] (0.0001)	-57.28360*** [21] (0.0000)
S&P 500 Telecom. Services	-36.06183*** [1] (0.0000)	-36.07304*** [1] (0.0000)	-50.56907*** [19] (0.0001)	-50.59468*** [19] (0.0000)
S&P 500 Utilities	-36.05032*** [1] (0.0000)	-36.05011*** [1] (0.0000)	-52.26934*** [14] (0.0001)	-52.27052*** [14] (0.0000)
TOPIX 17 Auto & Transportation Equipments	-46.30576*** [0] (0.0001)	-46.32894*** [0] (0.0000)	-46.33789*** [11] (0.0001)	-46.37999*** [12] (0.0000)
TOPIX 17 Banks	-24.40828*** [4] (0.0000)	-24.48979*** [0] (0.0000)	-45.84844*** [21] (0.0001)	-45.97342*** [22] (0.0000)
TOPIX 17 Commercial & Wholesale Trade	-29.25493*** [2] (0.0000)	-29.30294*** [2] (0.0000)	-44.64923*** [7] (0.0001)	-44.69038*** [8] (0.0000)
TOPIX 17 Construction & Materials	-46.76665*** [0] (0.0001)	-46.82789*** [0] (0.0000)	-46.88953*** [12] (0.0001)	-47.03193*** [13] (0.0000)
TOPIX 17 Electric Appliances & Precision Instrum.	-47.07059*** [0] (0.0001)	-47.13288*** [0] (0.0000)	-47.10553*** [9] (0.0001)	-47.17883*** [11] (0.0000)
TOPIX 17 Electric Power & Gas	-46.24657*** [0] (0.0001)	-46.28037*** [0] (0.0000)	-46.26219*** [9] (0.0001)	-46.30539*** [10] (0.0000)
TOPIX 17 Foods	-48.98177*** [0] (0.0001)	-49.03161*** [0] (0.0000)	-49.86303*** [31] (0.0001)	-50.29724*** [33] (0.0000)
TOPIX 17 IT & Services, Others	-47.85019*** [0] (0.0000)	-47.92995*** [0] (0.0000)	-48.16630*** [16] (0.0001)	-48.37468*** [18] (0.0000)

C. TABLE 3: Results of ADF and PP Unit Root Tests (First Differences) for Series 2007-2016 (continue)

	ADF Tests		PP Tests	
Index Name	Constant	Constant and Trend	Constant	Constant and Trend
TOPIX 17 Machinery	-45.48551*** [0] (0.0001)	-45.51737*** [0] (0.0000)	-45.46138*** [10] (0.0001)	-45.50195*** [11] (0.0000)
TOPIX 17 Main	-49.48159*** [0] (0.0001)	-49.53812*** [0] (0.0000)	-49.63063*** [15] (0.0001)	-49.75009*** [17] (0.0000)
TOPIX 17 Pharmaceutical	-49.21440*** [0] (0.0001)	-49.24896*** [0] (0.0000)	-49.92862*** [20] (0.0001)	-50.08725*** [21] (0.0000)
TOPIX 17 Raw Materials & Chemicals	-48.66982*** [0] (0.0001)	-48.76252*** [0] (0.0000)	-48.84674*** [12] (0.0001)	-49.05227*** [14] (0.0000)
TOPIX 17 Real Estate	-44.28071*** [0] (0.0001)	-44.29816*** [0] (0.0000)	-44.21710*** [14] (0.0001)	-44.24061*** [14] (0.0000)
TOPIX 17 Retail Trade	-47.69268*** [0] (0.0001)	-47.74433*** [0] (0.0000)	-47.71601*** [7] (0.0001)	-47.77483*** [9] (0.0000)
TOPIX 17 Steel & Nonferrous Metals	-45.38963*** [0] (0.0001)	-45.43098*** [0] (0.0000)	-45.37987*** [10] (0.0001)	-45.43104*** [10] (0.0000)
TOPIX 17 Transportation & Logistics	-49.00400*** [0] (0.0001)	-49.06902*** [0] (0.0000)	-49.13326*** [9] (0.0001)	-49.24625*** [10] (0.0000)
Brent Crude Oil	-47.89976*** [0] (0.0001)	-47.91668*** [0] (0.0000)	-47.89969*** [1] (0.0001)	-47.91659*** [1] (0.0000)

Notes: *** symbolizes significance at 1 percent level, ( ) MacKinnon (1996) one-sided p-values, [ ] Lag lengths for ADF and Newey-West bandwidths for PP

D. TABLE 4: Results of ADF and PP Unit Root Tests (First Differences) for Series 2002-2007

	ADF Tests		PP Tests	
Index Name	Constant	Constant and Trend	Constant	Constant and Trend
Oil Price	-37.70022***[0] (0.0000)	-37.68778*** [0] (0.0000)	-37.70022*** [0] (0.0000)	-37.68778*** [0] (0.0000)
MOEX Oil & Gas	-32.05545***[0] (0.0000)	-32.06872*** [0] (0.0000)	-32.07707*** [4] (0.0000)	-32.08772*** [4] (0.0000)
MOEX RTSI Main Index	-32.18417***[0] (0.0000)	-32.28029*** [0] (0.0000)	-32.32829*** [7] (0.0000)	-32.38180*** [6] (0.0000)
MOEX Telecoms	-27.70040***[0] (0.0000)	-27.84274*** [0] (0.0000)	-28.46002***[13] (0.0000)	-28.43501*** [12] (0.0000)

D. TABLE 4: Results of ADF and PP Unit Root Tests (First Differences) for Series 2002-2007 (continue)

	ADF Tests		PP Tests	
Index Name	Constant	Constant and Trend	Constant	Constant and Trend
S&P 500 Index	-37.13360***[0] (0.0000)	-37.20169*** [0] (0.0000)	-37.34570***[18] (0.0000)	-37.55693*** [20] (0.0000)
S&P 500 Energy	-32.78218***[0] (0.0000)	-32.77980*** [0] (0.0000)	-32.91183*** [9] (0.0000)	-32.91422*** [9] (0.0000)
S&P 500 Financials	-34.94267***[0] (0.0000)	-34.93492*** [0] (0.0000)	-35.22857***[12] (0.0000)	-35.22439*** [12] (0.0000)
TSX Consumer Discretionary	-34.85886***[0] (0.0000)	-35.00616*** [0] (0.0000)	-34.85550*** [6] (0.0000)	-34.98984*** [4] (0.0000)
TSX Consumer Staples	-33.49361***[0] (0.0000)	-33.49145*** [0] (0.0000)	-33.52862*** [6] (0.0000)	-33.52519*** [6] (0.0000)
TSX Energy	-31.99448***[0] (0.0000)	-31.98320*** [0] (0.0000)	-31.86119***[11] (0.0000)	-31.84868*** [11] (0.0000)
TSX Financial	-35.40261***[0] (0.0000)	-35.46117*** [0] (0.0000)	-35.42680***[10] (0.0000)	-35.51475*** [11] (0.0000)
TSX Health Care	-32.39995***[0] (0.0000)	-32.38865*** [0] (0.0000)	-32.37505*** [6] (0.0000)	-32.36342*** [6] (0.0000)
TSX Industrial	-32.96614***[0] (0.0000)	-33.10710*** [0] (0.0000)	-33.00727*** [6] (0.0000)	-33.11873*** [4] (0.0000)
TSX Information Technology	-32.50162***[0] (0.0000)	-32.61229*** [0] (0.0000)	-32.55345*** [7] (0.0000)	-32.64276*** [6] (0.0000)
TSX Materials	-31.32873***[0] (0.0000)	-31.40238*** [0] (0.0000)	-31.29339*** [2] (0.0000)	-31.36197*** [4] (0.0000)
TSX Real Estate	-38.09375***[0] (0.0000)	-38.11883*** [0] (0.0000)	-38.87428***[15] (0.0000)	-39.02507*** [16] (0.0000)
TSX REIT Index	-27.7759***[13] (0.0000)	-27.78696*** [0] (0.0000)	-27.46636***[13] (0.0000)	-27.47886*** [14] (0.0000)
TSX Telecom Services	-24.38688***[1] (0.0000)	-24.37496*** [1] (0.0000)	-30.99629*** [7] (0.0000)	-30.98000*** [7] (0.0000)
TSX Utilities	-36.81584***[0] (0.0000)	-36.85972*** [0] (0.0000)	-36.69905***[12] (0.0000)	-36.74408*** [11] (0.0000)

Notes: *** symbolizes significance at 1 percent level, ( ) MacKinnon (1996) one-sided p-values, [ ] Lag lengths for ADF and Newey-West bandwidths for PP

E. TABLE 5: Johansen Cointegration Test Results-Trace Statistics for Series 2007-2016

Models	Number of CE(s)	Eigen Value	Trace Statistics	%5 Critical Value	%1 Critical Value
Oil Price – MOEX Main	None	0.011210	28.32997*** [3] (0.0031)	20.26184	25.07811
	At most 1	0.004199	7.699972 [3] (0.0941)	9.164546	12.76076
Oil Price – MOEX Chemicals	None	0.010776	27.65876** [2] (0.0297)	25.87211	31.15385
	At most 1	0.003329	6.509100 [2] (0.3985)	12.51798	16.55386
Oil Price – MOEX Consumer Goods & Services	None	0.008340	20.45514 [5] (0.2038)	25.87211	31.15385
	At most 1	0.001923	3.822331 [5] (0.7677)	12.51798	16.55386
Oil Price – MOEX Electric Utilities	None	0.009708	23.78377** [4] (0.0157)	20.26184	25.07811
	At most 1	0.004088	7.033573 [4] (0.1246)	9.164546	12.76076
Oil Price – MOEX Financials	None	0.013122	28.91457*** [3] (0.0025)	20.26184	25.07811
	At most 1	0.002588	4.742693 [3] (0.3128)	9.164546	12.76076
Oil Price – MOEX Manufacturing	None	0.004088	14.85908 [7] (0.2345)	20.26184	25.07811
	At most 1	0.003830	7.187013 [7] (0.1169)	9.164546	12.76076
Oil Price – MOEX Metals & Mining	None	0.012106	29.76713*** [3] (0.0018)	20.26184	25.07811
	At most 1	0.004078	7.477936 [3] (0.1034)	9.164546	12.76076
Oil Price – MOEX Oil & Gas	None	0.019200	35.24207*** [6] (0.0002)	20.26184	25.07811
	At most 1	0.004053	6.104422 [6] (0.1828)	9.164546	12.76076
Oil Price – MOEX Telecoms	None	0.010626	27.22403** [3] (0.0338)	25.87211	31.15385
	At most 1	0.002248	4.736592 [3] (0.6345)	12.51798	16.55386

E. TABLE 5: Johansen Cointegration Test Results-Trace Statistics for Series 2007-2016 (continue)

Models	Number of CE(s)	Eigen Value	Trace Statistics	%5 Critical Value	%1 Critical Value
Oil Price – MOEX Transport	None	0.013652	26.07000*** [6] (0.0070)	20.26184	25.07811
	At most 1	0.002110	3.471736 [6] (0.4964)	9.164546	12.76076
Oil Price – SP500 Index	None	0.001468	4.876267 [3] (0.9841)	20.26184	25.07811
	At most 1	0.000544	1.317817 [3] (0.9047)	9.164546	12.76076
Oil Price – SP500 Consumer Discretionary	None	0.005930	17.30820 [3] (0.3923)	25.87211	31.15385
	At most 1	0.001318	3.141749 [3] (0.8592)	12.51798	16.55386
Oil Price – SP500 Consumer Staples	None	0.002727	9.113418 [3] (0.7256)	20.26184	25.07811
	At most 1	0.001094	2.608516 [3] (0.6561)	9.164546	12.76076
Oil Price – SP500 Energy	None	0.002033	6.271353 [3] (0.9377)	20.26184	25.07811
	At most 1	0.000514	1.264138 [3] (0.9134)	9.164546	12.76076
Oil Price – SP500 Financials	None	0.002566	9.022727 [7] (0.7342)	20.26184	25.07811
	At most 1	0.001023	2.571151 [7] (0.6634)	9.164546	12.76076
Oil Price – SP500 Health Care	None	0.003840	10.87805 [3] (0.5539)	20.26184	25.07811
	At most 1	0.000719	1.713253 [3] (0.8338)	9.164546	12.76076
Oil Price – SP500 Industrials	None	0.001361	4.289315 [2] (0.9929)	20.26184	25.07811
	At most 1	0.000448	1.061794 [2] (0.9434)	9.164546	12.76076
Oil Price – SP500 Information Technology	None	0.003647	10.22167 [2] (0.6180)	20.26184	25.07811
	At most 1	0.000659	1.562294 [2] (0.8621)	9.164546	12.76076

E. TABLE 5: Johansen Cointegration Test Results-Trace Statistics for Series 2007-2016 (continue)

Models	Number of CE(s)	Eigen Value	Trace Statistics	%5 Critical Value	%1 Critical Value
Oil Price – SP500 Materials	None	0.001602	4.498318 [2] (0.9903)	20.26184	25.07811
	At most 1	0.000295	0.698336 [2] (0.9828)	9.164546	12.76076
Oil Price – SP500 Real Estate	None	0.001246	4.258823 [2] (0.9932)	20.26184	25.07811
	At most 1	0.000532	1.274228 [2] (0.9118)	9.164546	12.76076
Oil Price – SP500 Telecom Services	None	0.001432	4.532636 [4] (0.9899)	20.26184	25.07811
	At most 1	0.000511	1.191979 [4] (0.9246)	9.164546	12.76076
Oil Price – SP500 Utilities	None	0.001533	4.612693 [2] (0.9887)	20.26184	25.07811
	At most 1	0.000393	0.940516 [2] (0.9588)	9.164546	12.76076
Oil Price – TSX Composite Index	None	0.002226	6.280380 [7] (0.9373)	20.26184	25.07811
	At most 1	0.000276	0.692559 [7] (0.9833)	9.164546	12.76076
Oil Price – TSX Consumer Discretionary	None	0.001769	5.836107 [2] (0.9565)	20.26184	25.07811
	At most 1	0.000555	1.393673 [2] (0.8920)	9.164546	12.76076
Oil Price – TSX Consumer Staples	None	0.004495	16.01106 [6] (0.1739)	20.26184	25.07811
	At most 1	0.001885	4.725382 [6] (0.3149)	9.164546	12.76076
Oil Price – TSX Energy	None	0.004305	14.63234 [7] (0.2482)	20.26184	25.07811
	At most 1	0.001528	3.828433 [7] (0.4382)	9.164546	12.76076
Oil Price – TSX Financials	None	0.001798	5.154004 [7] (0.9779)	20.26184	25.07811
	At most 1	0.000257	0.644917 [7] (0.9868)	9.164546	12.76076

E. TABLE 5: Johansen Cointegration Test Results-Trace Statistics for Series 2007-2016 (continue)

Models	Number of CE(s)	Eigen Value	Trace Statistics	%5 Critical Value	%1 Critical Value
Oil Price – TSX Health Care	None	0.002559	9.034443 [4] (0.7331)	20.26184	25.07811
	At most 1	0.001041	2.609944 [4] (0.6558)	9.164546	12.76076
Oil Price – TSX Industrial	None	0.001812	6.741646 [2] (0.9129)	20.26184	25.07811
	At most 1	0.000873	2.191882 [2] (0.7393)	9.164546	12.76076
Oil Price – TSX Information Technology	None	0.002365	6.419914 [2] (0.9304)	20.26184	25.07811
	At most 1	0.000190	0.477940 [2] (0.9956)	9.164546	12.76076
Oil Price – TSX Materials	None	0.006525	23.34761** [3] (0.0182)	20.26184	25.07811
	At most 1	0.002755	6.921828 [3] (0.1306)	9.164546	12.76076
Oil Price – TSX Real Estate	None	0.001157	3.400853 [2] (0.9987)	20.26184	25.07811
	At most 1	0.000197	0.495213 [2] (0.9949)	9.164546	12.76076
Oil Price – TSX REIT	None	0.001718	5.260110 [2] (0.9752)	20.26184	25.07811
	At most 1	0.000670	1.474692 [2] (0.8779)	9.164546	12.76076
Oil Price – TSX Telecom. Services	None	0.002193	4.796347 [1] (0.9856)	20.26184	25.07811
	At most 1	0.000132	0.272020 [1] (0.9997)	9.164546	12.76076
Oil Price – TSX Utilities	None	0.001663	5.411873 [7] (0.9709)	20.26184	25.07811
	At most 1	0.000737	1.660909 [7] (0.8438)	9.164546	12.76076
Oil Price – TOPIX 17 Auto & Transport Equipment	None	0.000887	1.461035 [4] (1.0000)	20.26184	25.07811
	At most 1	5.15E-06	0.008430 [4] (1.0000)	9.164546	12.76076

E. TABLE 5: Johansen Cointegration Test Results-Trace Statistics for Series 2007-2016 (continue)

Models	Number of CE(s)	Eigen Value	Trace Statistics	%5 Critical Value	%1 Critical Value
Oil Price – TOPIX 17 Banks	None	0.013255	18.98928 [4] (0.2814)	25.87211	31.15385
	At most 1	0.000133	0.187472 [4] (1.0000)	12.51798	16.55386
Oil Price – TOPIX 17 Commerce Wholesale Trade	None	0.002192	4.843175 [2] (0.9847)	20.26184	25.07811
	At most 1	0.000703	1.175850 [2] (0.9270)	9.164546	12.76076
Oil Price – TOPIX 17 Construction Materials	None	0.009028	15.65879 [2] (0.5202)	25.87211	31.15385
	At most 1	0.000302	0.504258 [2] (1.0000)	12.51798	16.55386
Oil Price – TOPIX 17 Electrc App & Prec Instrmnt	None	0.008386	14.59646 [2] (0.6081)	25.87211	31.15385
	At most 1	0.000314	0.523984 [2] (1.0000)	12.51798	16.55386
Oil Price – TOPIX 17 Electric Power & Gas	None	0.005686	10.11852 [2] (0.6282)	20.26184	25.07811
	At most 1	0.000353	0.590431 [2] (0.9902)	9.164546	12.76076
Oil Price – TOPIX 17 Foods	None	0.001188	2.094200 [2] (1.0000)	20.26184	25.07811
	At most 1	6.48E-05	0.108278 [2] (1.0000)	9.164546	12.76076
Oil Price – TOPIX 17 IT & Services & Others	None	0.000551	0.977246 [4] (1.0000)	20.26184	25.07811
	At most 1	0.000138	0.196298 [4] (1.0000)	9.164546	12.76076
Oil Price – TOPIX 17 Machinery	None	0.000887	2.254741 [2] (1.0000)	20.26184	25.07811
	At most 1	0.000462	0.771857 [2] (0.9766)	9.164546	12.76076
Oil Price – TOPIX 17 Pharmaceutical	None	0.000925	1.689529 [2] (1.0000)	20.26184	25.07811
	At most 1	8.69E-05	0.145089 [2] (1.0000)	9.164546	12.76076

E. TABLE 5: Johansen Cointegration Test Results-Trace Statistics for Series 2007-2016 (continue)

Models	Number of CE(s)	Eigen Value	Trace Statistics	%5 Critical Value	%1 Critical Value
Oil Price – TOPIX 17 Raw Materials & Chemicals	None	0.010837	15.65654 [4] (0.5203)	25.87211	31.15385
	At most 1	0.000145	0.206253 [4] (1.0000)	12.51798	16.55386
Oil Price – TOPIX 17 Real Estate	None	0.001267	3.005253 [2] (0.9995)	20.26184	25.07811
	At most 1	0.000535	0.892409 [2] (0.9644)	9.164546	12.76076
Oil Price – TOPIX 17 Retail Trade	None	0.000747	1.864968 [2] (1.0000)	20.26184	25.07811
	At most 1	0.000369	0.617037 [2] (0.9886)	9.164546	12.76076
Oil Price – TOPIX 17 Steel & Nonferrous Metals	None	0.024992	27.98719*** [7] (0.0035)	20.26184	25.07811
	At most 1	0.000227	0.248396 [7] (0.9998)	9.164546	12.76076
Oil Price – TOPIX 17 Transportation & Logistics	None	0.000361	1.193124 [1] (1.0000)	20.26184	25.07811
	At most 1	0.000294	0.535311 [1] (0.9932)	9.164546	12.76076
Oil Price – TOPIX 17 Main	None	0.009005	17.58601 [2] (0.3724)	25.87211	31.15385
	At most 1	0.000491	0.906113 [2] (0.9995)	12.51798	16.55386

***, ** symbolize the significance levels of %1 and %5 respectively, ( ) represents MacKinnon-Haug-Michelis (1999) p-values, [ ] represents Lag lengths for models

F. TABLE 6: Johansen Cointegration Test Results-Maximum Eigen Statistics for Series 2007-2016

Models	Number of CE(s)	Eigen Value	Max Eigen Value	%5 Critical Value	%1 Critical Value
Oil Price – MOEX Main	None	0.011210	20.62999*** [3] (0.0083)	15.89210	20.16121
	At most 1	0.004199	7.699972 [3] (0.0941)	9.164546	12.76076

F. TABLE 6: Johansen Cointegration Test Results-Maximum Eigen Statistics for Series 2007-2016 (continue)

Models	Number of CE(s)	Eigen Value	Max Eigen Value	%5 Critical Value	%1 Critical Value
Oil Price – MOEX Chemicals	None	0.010776	21.14966** [2] (0.0275)	19.38704	23.97534
	At most 1	0.003329	6.509100 [2] (0.3985)	12.51798	16.55386
Oil Price – MOEX Consumer Goods & Services	None	0.008340	16.63281 [5] (0.1202)	19.38704	23.97534
	At most 1	0.001923	3.822331 [5] (0.7677)	12.51798	16.55386
Oil Price – MOEX Electric Utilities	None	0.009708	16.75020** [4] (0.0366)	15.89210	20.16121
	At most 1	0.004088	7.033573 [4] (0.1246)	9.164546	12.76076
Oil Price – MOEX Financials	None	0.013122	24.17187*** [3] (0.0020)	15.89210	20.16121
	At most 1	0.002588	4.742693 [3] (0.3128)	9.164546	12.76076
Oil Price – MOEX Manufacturing	None	0.004088	7.672067 [7] (0.5872)	15.89210	18.52001
	At most 1	0.003830	7.187013 [7] (0.1169)	9.164546	6.634897
Oil Price – MOEX Metals & Mining	None	0.012106	22.28920*** [3] (0.0043)	15.89210	20.16121
	At most 1	0.004078	7.477936 [3] (0.1034)	9.164546	12.76076
Oil Price – MOEX Oil & Gas	None	0.019200	29.13765*** [6] (0.0003)	15.89210	20.16121
	At most 1	0.004053	6.104422 [6] (0.1828)	9.164546	12.76076
Oil Price – MOEX Telecoms	None	0.010626	22.48744** [3] (0.0171)	19.38704	23.97534
	At most 1	0.002248	4.736592 [3] (0.6345)	12.51798	16.55386

F. TABLE 6: Johansen Cointegration Test Results-Maximum Eigen Statistics for Series 2007-2016 (continue)

Models	Number of CE(s)	Eigen Value	Max Eigen Value	%5 Critical Value	%1 Critical Value
Oil Price – MOEX Transport	None	0.013652	22.59826*** [6] (0.0038)	15.89210	20.16121
	At most 1	0.002110	3.471736 [6] (0.4964)	9.164546	12.76076
Oil Price – SP500 Index	None	0.001468	3.558450 [3] (0.9762)	15.89210	20.16121
	At most 1	0.000544	1.317817 [3] (0.9047)	9.164546	12.76076
Oil Price – SP500 Consumer Discretionary	None	0.005930	14.16645 [3] (0.2432)	19.38704	23.97534
	At most 1	0.001318	3.141749 [3] (0.8592)	12.51798	16.55386
Oil Price – SP500 Consumer Staples	None	0.002727	6.504902 [3] (0.7294)	15.89210	20.16121
	At most 1	0.001094	2.608516 [3] (0.6561)	9.164546	12.76076
Oil Price – SP500 Energy	None	0.002033	5.007215 [3] (0.8877)	15.89210	20.16121
	At most 1	0.000514	1.264138 [3] (0.9134)	9.164546	12.76076
Oil Price – SP500 Financials	None	0.002566	6.451576 [7] (0.7358)	15.89210	20.16121
	At most 1	0.001023	2.571151 [7] (0.6634)	9.164546	12.76076
Oil Price – SP500 Health Care	None	0.003840	9.164800 [3] (0.4163)	15.89210	20.16121
	At most 1	0.000719	1.713253 [3] (0.8338)	9.164546	12.76076
Oil Price – SP500 Industrials	None	0.001361	3.227521 [2] (0.9860)	15.89210	20.16121
	At most 1	0.000448	1.061794 [2] (0.9434)	9.164546	12.76076

F. TABLE 6: Johansen Cointegration Test Results-Maximum Eigen Statistics for Series 2007-2016 (continue)

Models	Number of CE(s)	Eigen Value	Max Eigen Value	%5 Critical Value	%1 Critical Value
Oil Price – SP500 Information Technology	None	0.003647	8.659374 [2] (0.4712)	15.89210	20.16121
	At most 1	0.000659	1.562294 [2] (0.8621)	9.164546	12.76076
Oil Price – SP500 Materials	None	0.001602	3.799983 [2] (0.9667)	15.89210	20.16121
	At most 1	0.000295	0.698336 [2] (0.9828)	9.164546	12.76076
Oil Price – SP500 Real Estate	None	0.001246	2.984596 [2] (0.9911)	15.89210	20.16121
	At most 1	0.000532	1.274228 [2] (0.9118)	9.164546	12.76076
Oil Price – SP500 Telecom Services	None	0.001432	3.340657 [4] (0.9830)	15.89210	20.16121
	At most 1	0.000511	1.191979 [4] (0.9246)	9.164546	12.76076
Oil Price – SP500 Utilities	None	0.001533	3.672178 [2] (0.9720)	15.89210	20.16121
	At most 1	0.000393	0.940516 [2] (0.9588)	9.164546	12.76076
Oil Price – TSX Composite Index	None	0.002226	5.587821 [7] (0.8323)	15.89210	20.16121
	At most 1	0.000276	0.692559 [7] (0.9833)	9.164546	12.76076
Oil Price – TSX Composite Discretionary	None	0.001769	4.442434 [2] (0.9312)	15.89210	20.16121
	At most 1	0.000555	1.393673 [2] (0.8920)	9.164546	12.76076
Oil Price – TSX Consumer Staples	None	0.004495	11.28568 [6] (0.2314)	15.89210	20.16121
	At most 1	0.001885	4.725382 [6] (0.3149)	9.164546	12.76076

F. TABLE 6: Johansen Cointegration Test Results-Maximum Eigen Statistics for Series 2007-2016 (continue)

Models	Number of CE(s)	Eigen Value	Max Eigen Value	%5 Critical Value	%1 Critical Value
Oil Price – TSX Energy	None	0.004305	10.80390 [7] (0.2667)	15.89210	20.16121
	At most 1	0.001528	3.828433 [7] (0.4382)	9.164546	12.76076
Oil Price – TSX Financials	None	0.001798	4.509087 [7] (0.9267)	15.89210	20.16121
	At most 1	0.000257	0.644917 [7] (0.9868)	9.164546	12.76076
Oil Price – TSX Health Care	None	0.002559	6.424499 [4] (0.7390)	15.89210	20.16121
	At most 1	0.001041	2.609944 [4] (0.6558)	9.164546	12.76076
Oil Price – TSX Industrial	None	0.001812	4.549764 [2] (0.9238)	15.89210	20.16121
	At most 1	0.000873	2.191882 [2] (0.7393)	9.164546	12.76076
Oil Price – TSX Information Technology	None	0.002365	5.941974 [2] (0.7944)	15.89210	20.16121
	At most 1	0.000190	0.477940 [2] (0.9956)	9.164546	12.76076
Oil Price – TSX Materials	None	0.006525	16.42578** [3] (0.0412)	15.89210	20.16121
	At most 1	0.002755	6.921828 [3] (0.1306)	9.164546	12.76076
Oil Price – TSX Real Estate	None	0.001157	2.905640 [2] (0.9924)	15.89210	20.16121
	At most 1	0.000197	0.495213 [2] (0.9949)	9.164546	12.76076
Oil Price – TSX REIT	None	0.001718	3.785418 [2] (0.9673)	15.89210	20.16121
	At most 1	0.000670	1.474692 [2] (0.8779)	9.164546	12.76076

F. TABLE 6: Johansen Cointegration Test Results-Maximum Eigen Statistics for Series 2007-2016 (continue)

Models	Number of CE(s)	Eigen Value	Max Eigen Value	%5 Critical Value	%1 Critical Value
Oil Price – TSX Telecom. Services	None	0.002193	4.524327 [1] (0.9256)	15.89210	20.16121
	At most 1	0.000132	0.272020 [1] (0.9997)	9.164546	12.76076
Oil Price – TSX Utilities	None	0.001663	3.750964 [7] (0.9688)	15.89210	20.16121
	At most 1	0.000737	1.660909 [7] (0.8438)	9.164546	12.76076
Oil Price – TOPIX 17 Auto & Transport Equipment	None	0.000887	1.452605 [4] (1.0000)	15.89210	20.16121
	At most 1	5.15E-06	0.008430 [4] (1.0000)	9.164546	12.76076
Oil Price – TOPIX 17 Banks	None	0.013255	18.80181 [4] (0.0607)	19.38704	23.97534
	At most 1	0.000133	0.187472 [4] (1.0000)	12.51798	16.55386
Oil Price – TOPIX 17 Commerce Wholesale Trade	None	0.002192	3.667325 [2] (0.9721)	15.89210	20.16121
	At most 1	0.000703	1.175850 [2] (0.9270)	9.164546	12.76076
Oil Price – TOPIX 17 Construction Materials	None	0.009028	15.15453 [2] (0.1854)	19.38704	23.97534
	At most 1	0.000302	0.504258 [2] (1.0000)	12.51798	16.55386
Oil Price – TOPIX 17 Electrc App & Prec Instrmnt	None	0.008386	14.07248 [2] (0.2493)	19.38704	23.97534
	At most 1	0.000314	0.523984 [2] (1.0000)	12.51798	16.55386
Oil Price – TOPIX 17 Electric Power & Gas	None	0.005686	9.528089 [2] (0.3793)	15.89210	20.16121
	At most 1	0.000353	0.590431 [2] (0.9902)	9.164546	12.76076

F. TABLE 6: Johansen Cointegration Test Results-Maximum Eigen Statistics for Series 2007-2016 (continue)

Models	Number of CE(s)	Eigen Value	Max Eigen Value	%5 Critical Value	%1 Critical Value
Oil Price – TOPIX 17 Foods	None	0.001188	1.985922 [2] (0.9995)	15.89210	20.16121
	At most 1	6.48E-05	0.108278 [2] (1.0000)	9.164546	12.76076
Oil Price – TOPIX 17 IT & Services & Others	None	0.000551	0.780948 [4] (1.0000)	15.89210	20.16121
	At most 1	0.000138	0.196298 [4] (1.0000)	9.164546	12.76076
Oil Price – TOPIX 17 Machinery	None	0.000887	1.482884 [2] (1.0000)	15.89210	20.16121
	At most 1	0.000462	0.771857 [2] (0.9766)	9.164546	12.76076
Oil Price – TOPIX 17 Pharmaceutical	None	0.000925	1.544439 [2] (0.9999)	15.89210	20.16121
	At most 1	8.69E-05	0.145089 [2] (1.0000)	9.164546	12.76076
Oil Price – TOPIX 17 Raw Materials & Chemicals	None	0.010837	15.45029 [4] (0.1704)	19.38704	23.97534
	At most 1	0.000145	0.206253 [4] (1.0000)	12.51798	16.55386
Oil Price – TOPIX 17 Real Estate	None	0.001267	2.112844 [2] (0.9991)	15.89210	20.16121
	At most 1	0.000535	0.892409 [2] (0.9644)	9.164546	12.76076
Oil Price – TOPIX 17 Retail Trade	None	0.000747	1.247931 [2] (1.0000)	15.89210	20.16121
	At most 1	0.000369	0.617037 [2] (0.9886)	9.164546	12.76076
Oil Price – TOPIX 17 Steel & Nonferrous Metals	None	0.024992	27.73879*** [7] (0.0005)	15.89210	20.16121
	At most 1	0.000227	0.248396	9.164546	12.76076

F. TABLE 6: Johansen Cointegration Test Results-Maximum Eigen Statistics for Series 2007-2016 (continue)

Models	Number of CE(s)	Eigen Value	Max Eigen Value	%5 Critical Value	%1 Critical Value
Oil Price – TOPIX 17 Transportation & Logistics	None	0.000361	0.657812 [1] (1.0000)	15.89210	20.16121
	At most 1	0.000294	0.535311 [1] (0.9932)	9.164546	12.76076
Oil Price – TOPIX 17 Main	None	0.009005	16.67990 [2] (0.1185)	19.38704	23.97534
	At most 1	0.000491	0.906113 [2] (0.9995)	12.51798	16.55386

***, ** symbolize the significance levels of %1 and %5 respectively, ( ) represents MacKinnon-Haug-Michelis (1999) p-values, [ ] represents Lag lengths for models

G. TABLE 7: Johansen Cointegration Test Results-Trace Statistics for Series 2002-2007

Models	Number of CE(s)	Eigen Value	Trace Statistics	%5 Critical Value	%1 Critical Value
Oil Price – MOEX Main RTSI	None	0.030619	27.75431*** [8] (0.0038)	20.26184	25.07811
	At most 1	0.001211	1.041098 [8] (0.9462)	9.164546	12.76076
Oil Price – MOEX Oil & Gas	None	0.005737	8.020110 [2] (0.8227)	20.26184	25.07811
	At most 1	0.001754	1.875184 [2] (0.8024)	9.164546	12.76076
Oil Price – MOEX Telecoms	None	0.011080	13.22955** [1] (0.0351)	12.32090	16.36188
	At most 1	0.000723	0.806436 [1] (0.4255)	4.129906	6.940559
Oil Price – SP500 Index	None	0.005849	8.852776 [1] (0.7499)	20.26184	25.07811
	At most 1	0.001751	2.036253 [1] (0.7705)	9.164546	12.76076
Oil Price – SP500 Energy	None	0.018113	21.54786 [2] (0.1574)	25.87211	31.15385
	At most 1	0.004111	3.963036 [2] (0.7475)	12.51798	16.55386

G. TABLE 7: Johansen Cointegration Test Results-Trace Statistics for Series 2002-2007 (continue)

Models	Number of CE(s)	Eigen Value	Trace Statistics	%5 Critical Value	%1 Critical Value
Oil Price – SP500 Financials	None	0.005644	8.871618 [1] (0.7482)	20.26184	25.07811
	At most 1	0.003233	3.228519 [1] (0.5389)	9.164546	12.76076
Oil Price – TSX Consumer Discretionary	None	0.009094	11.89055 [1] (0.4586)	20.26184	25.07811
	At most 1	0.001944	2.088223 [1] (0.7601)	9.164546	12.76076
Oil Price – TSX Consumer Staples	None	0.006635	8.681080 [1] (0.7656)	20.26184	25.07811
	At most 1	0.001432	1.537782 [1] (0.8666)	9.164546	12.76076
Oil Price – TSX Energy	None	0.009675	10.69068 [3] (0.2312)	15.49471	19.93711
	At most 1	0.000316	0.336309 [3] (0.5620)	3.841466	6.634897
Oil Price – TSX Financials	None	0.011696	20.02831 [1] (0.0538)	20.26184	25.07811
	At most 1	0.005650	6.510412 [1] (0.1548)	9.164546	12.76076
Oil Price – TSX Health Care	None	0.005278	8.580222 [1] (0.7747)	20.26184	25.07811
	At most 1	0.002700	2.901424 [1] (0.5993)	9.164546	12.76076
Oil Price – TSX Industrial	None	0.009327	11.03765 [1] (0.5385)	20.26184	25.07811
	At most 1	0.000916	0.983290 [1] (0.9536)	9.164546	12.76076
Oil Price – TSX Information Technology	None	0.005949	8.173998 [2] (0.8099)	20.26184	25.07811
	At most 1	0.001416	1.568550 [2] (0.8609)	9.164546	12.76076
Oil Price – TSX Materials	None	0.005875	8.281685 [3] (0.8008)	20.26184	25.07811
	At most 1	0.002420	2.413427 [3] (0.6948)	9.164546	12.76076

G. TABLE 7: Johansen Cointegration Test Results-Trace Statistics for Series 2002-2007 (continue)

Models	Number of CE(s)	Eigen Value	Trace Statistics	%5 Critical Value	%1 Critical Value
Oil Price – TSX Real Estate	None	0.013827	21.60015 [2] (0.1554)	25.87211	31.15385
	At most 1	0.006942	7.203464 [2] (0.3238)	12.51798	16.55386
Oil Price – TSX REIT	None	0.015087	18.44481 [2] (0.3148)	25.87211	31.15385
	At most 1	0.004327	4.093876 [2] (0.7285)	12.51798	16.55386
Oil Price – TSX Telecom. Services	None	0.005676	7.078273 [1] (0.5685)	15.49471	19.93711
	At most 1	0.001612	1.562907 [1] (0.2112)	3.841466	6.634897
Oil Price – TSX Utilities	None	0.007256	7.861078 [1] (0.4804)	15.49471	19.93711
	At most 1	4.39E-05	0.047125 [1] (0.8281)	3.841466	6.634897

***, ** symbolize the significance levels of %1 and %5 respectively, ( ) represents MacKinnon-Haug-Michelis (1999) p-values, [ ] represents Lag lengths for models

H. TABLE 8: Johansen Cointegration Test Results-Maximum Eigen Statistics for Series 2002-2007

Models	Number of CE(s)	Eigen Value	Maximum Eigen Statistics	%5 Critical Value	%1 Critical Value
Oil Price – MOEX Main RTSI	None	0.030619	26.71321*** [8] (0.0007)	15.89210	20.16121
	At most 1	0.001211	1.041098 [8] (0.9462)	9.164546	12.76076
Oil Price – MOEX Oil & Gas	None	0.005737	6.144926 [2] (0.7715)	15.89210	20.16121
	At most 1	0.001754	1.875184 [2] (0.8024)	9.164546	12.76076
Oil Price – MOEX Telecoms	None	0.011080	12.42312** [1] (0.0306)	11.22480	15.09133
	At most 1	0.000723	0.806436 [1] (0.4255)	4.129906	6.940559

H. TABLE 8: Johansen Cointegration Test Results-Maximum Eigen Statistics for Series 2002-2007 (continue)

Models	Number of CE(s)	Eigen Value	Maximum Eigen Statistics	%5 Critical Value	%1 Critical Value
Oil Price – SP500 Index	None	0.005849	6.816523 [1] (0.6918)	15.89210	20.16121
	At most 1	0.001751	2.036253 [1] (0.7705)	9.164546	12.76076
Oil Price – SP500 Energy	None	0.018113	17.58483 [2] (0.0896)	19.38704	23.97534
	At most 1	0.004111	3.963036 [2] (0.7475)	12.51798	16.55386
Oil Price – SP500 Financials	None	0.005644	5.643099 [1] (0.8266)	15.89210	20.16121
	At most 1	0.003233	3.228519 [1] (0.5389)	9.164546	12.76076
Oil Price – TSX Consumer Discretionary	None	0.009094	9.802331 [1] (0.3527)	15.89210	20.16121
	At most 1	0.001944	2.088223 [1] (0.7601)	9.164546	12.76076
Oil Price – TSX Consumer Staples	None	0.006635	7.143298 [1] (0.6520)	15.89210	20.16121
	At most 1	0.001432	1.537782 [1] (0.8666)	9.164546	12.76076
Oil Price – TSX Energy	None	0.009675	10.35437 [3] (0.1897)	14.26460	18.52001
	At most 1	0.000316	0.336309 [3] (0.5620)	3.841466	6.634897
Oil Price – TSX Financials	None	0.011696	13.51789 [1] (0.1139)	15.89210	20.16121
	At most 1	0.005650	6.510412 [1] (0.1548)	9.164546	12.76076
Oil Price – TSX Health Care	None	0.005278	5.678799 [1] (0.8228)	15.89210	20.16121
	At most 1	0.002700	2.901424 [1] (0.5993)	9.164546	12.76076
Oil Price – TSX Industrial	None	0.009327	10.05436 [1] (0.3294)	15.89210	20.16121
	At most 1	0.000916	0.983290 [1] (0.9536)	9.164546	12.76076

H. TABLE 8: Johansen Cointegration Test Results-Maximum Eigen Statistics for Series 2002-2007 (continue)

Models	Number of CE(s)	Eigen Value	Maximum Eigen Statistics	%5 Critical Value	%1 Critical Value
Oil Price – TSX Information Technology	None	0.005949	6.605448 [2] (0.7173)	15.89210	20.16121
	At most 1	0.001416	1.568550 [2] (0.8609)	9.164546	12.76076
Oil Price – TSX Materials	None	0.005875	5.868258 [3] (0.8025)	15.89210	20.16121
	At most 1	0.002420	2.413427 [3] (0.6948)	9.164546	12.76076
Oil Price – TSX Real Estate	None	0.013827	14.39668 [2] (0.2286)	19.38704	23.97534
	At most 1	0.006942	7.203464 [2] (0.3238)	12.51798	16.55386
Oil Price – TSX REIT	None	0.015087	14.35094 [2] (0.2315)	19.38704	23.97534
	At most 1	0.004327	4.093876 [2] (0.7285)	12.51798	16.55386
Oil Price – TSX Telecom. Services	None	0.005676	5.515366 [1] (0.6758)	14.26460	18.52001
	At most 1	0.001612	1.562907 [1] (0.2112)	3.841466	6.634897
Oil Price – TSX Utilities	None	0.007256	7.813954 [1] (0.3979)	14.26460	18.52001
	At most 1	4.39E-05	0.047125 [1] (0.8281)	3.841466	6.634897

***, ** symbolize the significance levels of %1 and %5 respectively, ( ) represents MacKinnon-Haug-Michelis (1999) p-values, [ ] represents Lag lengths for models

I. TABLE 9: VECM Granger Causality Analysis Results for Series 2007-2016

Dependent Variable	Independent Variable	Coefficient of EC	t-Statistics of EC Coefficient	Probability of EC Coefficient	Wald Test Chi-Square	Wald Test Chi-Square Probability	Long Run Causality	Short Run Causality
MOEX Main RTS Index	Oil Price	-0.003911	-2.443808	0.0146	18.53703	0.0001	Exist	Exist
Oil Price	MOEX Main RTS Index	-0.000313	-1.696461	0.0900	0.797065	0.8502	Exist	Does Not Exist
MOEX Chemicals	Oil Price	-0.006365	-2.806427	0.0051	3.688895	0.1581	Exist	Does Not Exist

I. TABLE 9: VECM Granger Causality Analysis Results for Series 2007-2016 (continue)

Dependent Variable	Independent Variable	Coefficient of EC	t-Statistics of EC Coefficient	Probability of EC Coefficient	Wald Test Chi-Square	Wald Test Chi-Square Probability	Long Run Causality	Short Run Causality
Oil Price	MOEX Chemicals	-0.003501	-2.891757	0.0039	3.678654	0.1589	Exist	Does Not Exist
MOEX Electric Util.	Oil Price	-0.000680	-4.387061	0.0000	12.74815	0.0126	Exist	Exist
Oil Price	MOEX Electrc Util.	-0.000637	-0.569745	0.5689	0.460384	0.9772	Does Not Exist	Does Not Exist
MOEX Financials	Oil Price	-0.002229	-3.897472	0.0001	12.06196	0.0072	Exist	Exist
Oil Price	MOEX Financials	0.000506	1.159074	0.2466	2.687470	0.4424	Does Not Exist	Does Not Exist
MOEX Metals Min.	Oil Price	-0.002768	-3.760057	0.0002	15.22608	0.0016	Exist	Exist
Oil Price	MOEX Metals Min.	0.000536	0.949419	0.3425	0.976602	0.8069	Does Not Exist	Does Not Exist
MOEX Oil and Gas	Oil Price	-0.008190	-3.363838	0.0008	43.19050	0.0000	Exist	Exist
Oil Price	MOEX Oil and Gas	-0.001093	-2.625859	0.0087	11.43582	0.0758	Exist	Does Not Exist
MOEX Telecoms	Oil Price	-0.000903	-0.641207	0.5215	8.970377	0.0297	Does Not Exist	Does Not Exist
Oil Price	MOEX Telecoms	-0.004176	-3.068782	0.0022	0.730052	0.8661	Exist	Does Not Exist
MOEX Transport	Oil Price	-0.002978	-3.912090	0.0001	52.54512	0.0000	Exist	Exist
Oil Price	MOEX Transport	0.000239	0.269696	0.7874	9.744806	0.1358	Does Not Exist	Does Not Exist
TSX Materials	Oil Price	-0.003083	-1.476525	0.1399	115.3809	0.0000	Does Not Exist	Exist
Oil Price	TSX Materials	-0.003607	-3.679995	0.0002	17.24772	0.0006	Exist	Exist
TOPIX17 Steel Nofer.	Oil Price	-0.011400	-4.953610	0.0000	29.20155	0.0001	Exist	Exist
Oil Price	TOPIX17 Steel Nofer.	0.000271	0.838348	0.4020	11.96493	0.1017	Does Not Exist	Does Not Exist

J. TABLE 10: VAR Granger Causality Test Results / Block Exogeneity Wald Tests for Series 2007-2016

Dependent	Independent	Chi-Square	df	Probability	Direction
MOEX Consumer Goods & Services	Europe Brent Oil Price	29.72787**	2	0.0000	Unidirectional
Europe Brent Oil Price	MOEX Consumer Goods & Services	0.807923	2	0.6677	No direction
MOEX Manufacturing	Europe Brent Oil Price	22.48320**	5	0.0004	Unidirectional
Europe Brent Oil Price	MOEX Manufacturing	16.87907**	5	0.0047	Unidirectional
S&P 500 Consumer Discretionary	Europe Brent Oil Price	4.575652	2	0.1015	No direction
Europe Brent Oil Price	S&P 500 Consumer Discretionary	19.26671**	2	0.0001	Unidirectional
S&P 500 Consumer Staples	Europe Brent Oil Price	2.664783	2	0.2638	No direction
Europe Brent Oil Price	S&P 500 Consumer Staples	19.28049**	2	0.0001	Unidirectional
S&P 500 Energy	Europe Brent Oil Price	6.009550**	3	0.0495	Unidirectional
Europe Brent Oil Price	S&P 500 Energy	117.6783**	3	0.0000	Unidirectional
S&P 500 Financials	Europe Brent Oil Price	7.455209**	1	0.0063	Unidirectional
Europe Brent Oil Price	S&P 500 Financials	0.315392	1	0.5744	No direction
S&P 500 Health Care	Europe Brent Oil Price	0.989823	2	0.6096	No direction
Europe Brent Oil Price	S&P 500 Health Care	7.632415**	2	0.0220	Unidirectional
S&P 500 Index	Europe Brent Oil Price	3.210334	2	0.2009	No direction
Europe Brent Oil Price	S&P 500 Index	39.18944**	2	0.0000	Unidirectional
S&P 500 Industrials	Europe Brent Oil Price	0.610455	1	0.4346	No direction

J. TABLE 10: VAR Granger Causality Test Results / Block Exogeneity Wald Tests for Series 2007-2016 (continue)

Dependent	Independent	Chi-Square	df	Probability	Direction
Europe Brent Oil Price	S&P 500 Industrials	21.48435**	1	0.0000	Unidirectional
S&P 500 Information Technology	Europe Brent Oil Price	5.659883	2	0.0590	No direction
Europe Brent Oil Price	S&P 500 Information Technology	22.75867**	2	0.0000	Unidirectional
S&P 500 Materials	Europe Brent Oil Price	0.328062	1	0.5668	No direction
Europe Brent Oil Price	S&P 500 Materials	64.10261**	1	0.0000	Unidirectional
S&P 500 Real Estate	Europe Brent Oil Price	2.653687	1	0.1033	No direction
Europe Brent Oil Price	S&P 500 Real Estate	24.28612**	1	0.0000	Unidirectional
S&P 500 Telecommunication Services	Europe Brent Oil Price	12.93011**	3	0.0048	Unidirectional
Europe Brent Oil Price	S&P 500 Telecommunication Services	19.12800**	3	0.0003	Unidirectional
S&P 500 Utilities	Europe Brent Oil Price	1.46E-05	1	0.9970	No direction
Europe Brent Oil Price	S&P 500 Utilities	25.07604**	1	0.0000	Unidirectional
TSX Composite Index	Europe Brent Oil Price	154.1752**	6	0.0000	Unidirectional
Europe Brent Oil Price	TSX Composite Index	23.87449**	6	0.0006	Unidirectional
TSX Consumer Discretionary	Europe Brent Oil Price	33.41441**	5	0.0000	Unidirectional
Europe Brent Oil Price	TSX Consumer Discretionary	9.890707	5	0.0784	No direction
TSX Consumer Staples	Europe Brent Oil Price	16.16593**	5	0.0064	Unidirectional
Europe Brent Oil Price	TSX Consumer Staples	3.821610	5	0.5754	No direction

J. TABLE 10: VAR Granger Causality Test Results / Block Exogeneity Wald Tests for Series 2007-2016 (continue)

Dependent	Independent	Chi-Square	df	Probability	Direction
TSX Energy	Europe Brent Oil Price	213.3318**	6	0.0000	Unidirectional
Europe Brent Oil Price	TSX Energy	50.52063**	6	0.0000	Unidirectional
TSX Financial	Europe Brent Oil Price	64.85627**	2	0.0000	Unidirectional
Europe Brent Oil Price	TSX Financial	4.091885	2	0.1293	No direction
TSX Health Care	Europe Brent Oil Price	6.096877	4	0.1920	No direction
Europe Brent Oil Price	TSX Health Care	5.855817	4	0.2102	No direction
TSX Industrial	Europe Brent Oil Price	51.77570**	6	0.0000	Unidirectional
Europe Brent Oil Price	TSX Industrial	20.61235**	6	0.0022	Unidirectional
TSX Information Technology	Europe Brent Oil Price	11.47060**	1	0.0007	Unidirectional
Europe Brent Oil Price	TSX Information Technology	0.515843	1	0.4726	Unidirectional
TSX Real Estate	Europe Brent Oil Price	31.08840**	1	0.0000	Unidirectional
Europe Brent Oil Price	TSX Real Estate	0.311338	1	0.5769	No direction
TSX REIT Index	Europe Brent Oil Price	0.484239	2	0.7850	No direction
Europe Brent Oil Price	TSX REIT Index	17.72487**	2	0.0000	Unidirectional
TSX Telecommunication Services	Europe Brent Oil Price	0.054383	1	0.8156	No direction
Europe Brent Oil Price	TSX Telecommunication Services	0.318636	1	0.5724	No direction
TSX Utilities Index	Europe Brent Oil Price	55.43571**	6	0.0000	Unidirectional

J. TABLE 10: VAR Granger Causality Test Results / Block Exogeneity Wald Tests for Series 2007-2016 (continue)

Dependent	Independent	Chi-Square	df	Probability	Direction
Europe Brent Oil Price	TSX Utilities Index	3.318376	6	0.7680	No direction
TOPIX 17 Auto & Transport Equipment	Europe Brent Oil Price	11.21391**	4	0.0243	Unidirectional
Europe Brent Oil Price	TOPIX 17 Auto & Transport Equipment	3.928188	4	0.4158	No direction
TOPIX 17 Banks	Europe Brent Oil Price	9.062393**	2	0.0108	Unidirectional
Europe Brent Oil Price	TOPIX 17 Banks	2.173063	2	0.3374	No direction
TOPIX 17 Commerce Wholesale Trade	Europe Brent Oil Price	75.42984**	3	0.0000	Unidirectional
Europe Brent Oil Price	TOPIX 17 Commerce Wholesale Trade	2.035177	3	0.5651	No direction
TOPIX 17 Construction Materials	Europe Brent Oil Price	19.63926**	2	0.0001	Unidirectional
Europe Brent Oil Price	TOPIX 17 Construction Material	1.650429	2	0.4381	No direction
TOPIX 17 Electrc App & Prec Instrmnt	Europe Brent Oil Price	18.25568**	2	0.0001	Unidirectional
Europe Brent Oil Price	TOPIX 17 Electrc App & Prec Instrmnt	0.939884	2	0.6250	No direction
TOPIX 17 Electric Power & Gas	Europe Brent Oil Price	3.120814	1	0.0773	No direction
Europe Brent Oil Price	TOPIX 17 Electric Power & Gas	0.139558	1	0.7087	No direction
TOPIX 17 Foods	Europe Brent Oil Price	8.664152**	2	0.0131	Unidirectional
Europe Brent Oil Price	TOPIX 17 Foods	2.427465	2	0.2971	No direction
TOPIX 17 IT & Services Others	Europe Brent Oil Price	12.79150**	2	0.0017	Unidirectional
Europe Brent Oil Price	TOPIX 17 IT & Services Others	1.836612	2	0.3992	No direction

J. TABLE 10: VAR Granger Causality Test Results / Block Exogeneity Wald Tests for Series 2007-2016 (continue)

Dependent	Independent	Chi-Square	df	Probability	Direction
TOPIX 17 Machinery	Europe Brent Oil Price	20.45218**	2	0.0000	Unidirectional
Europe Brent Oil Price	TOPIX 17 Machinery	0.841913	2	0.6564	No direction
TOPIX 17 Pharmaceutical	Europe Brent Oil Price	9.614632**	2	0.0082	Unidirectional
Europe Brent Oil Price	TOPIX 17 Pharmaceutical	0.798791	2	0.6707	No direction
TOPIX 17 Raw Materials & Chemicals	Europe Brent Oil Price	16.62739**	4	0.0023	Unidirectional
Europe Brent Oil Price	TOPIX 17 Raw Materials & Chemicals	1.153884	4	0.8856	No direction
TOPIX 17 Real Estate	Europe Brent Oil Price	10.79379**	2	0.0045	Unidirectional
Europe Brent Oil Price	TOPIX 17 Real Estate	0.016776	2	0.9916	No direction
TOPIX 17 Retail Trade	Europe Brent Oil Price	8.821020**	2	0.0121	Unidirectional
Europe Brent Oil Price	TOPIX 17 Retail Trade	1.658417	2	0.4364	No direction
TOPIX 17 Transportation Logistic	Europe Brent Oil Price	10.65495**	1	0.0011	Unidirectional
Europe Brent Oil Price	TOPIX 17 Transportation Logistic	0.240459	1	0.6239	No direction
TOPIX 17 Main Index	Europe Brent Oil Price	16.36391**	2	0.0003	Unidirectional
Europe Brent Oil Price	TOPIX 17 Main Index	2.730640	2	0.2553	No direction

** represents the significance level of %5

K. TABLE 11: VECM Granger Causality Analysis Results for Series 2002-2007

Dependent Variable	Independent Variable	Coefficient of EC	t-Statistics of EC Coefficient	Probability of EC Coefficient	Wald Test Chi-Square	Wald Test Chi-Square Probability	Long Run Causality	Short Run Causality
MOEX Main RTS Index	Oil Price	-0.001815	-2.783274	0.0055	1.664579	0.4351	Exist	Does Not Exist
Oil Price	MOEX Main RTS Index	-0.000706	-0.347890	0.7280	3.458947	0.1774	Does Not Exist	Does Not Exist
MOEX Telecoms	Oil Price	-0.001479	-3.504472	0.0005	0.323362	0.5696	Exist	Does Not Exist
Oil Price	MOEX Telecoms	-0.000135	-0.501878	0.6158	0.644002	0.4223	Does Not Exist	Does Not Exist

L. TABLE 12: VAR Granger Causality Test Results / Block Exogeneity Wald Tests for Series 2002-2007

Dependent	Independent	Chi-Square	df	Probability	Direction
MOEX Oil & Gas	Oil Price	0.037202	1	0.8471	No Direction
Oil Price	MOEX Oil & Gas	4.217456**	1	0.0400	Unidirectional
SP 500 Main Index	Oil Price	0.056005	1	0.8129	No Direction
Oil Price	SP 500 Main Index	0.518127	1	0.4716	No Direction
SP 500 Energy	Oil Price	17.94823**	8	0.0216	Unidirectional
Oil Price	SP 500 Energy	62.80235**	8	0.0000	Unidirectional
SP 500 Financials	Oil Price	0.200395	1	0.6544	No Direction
Oil Price	SP 500 Financials	1.235060	1	0.2664	No Direction
TSX Consumer Discretionary	Oil Price	0.372518	1	0.5416	No Direction

L. TABLE 12: VAR Granger Causality Test Results / Block Exogeneity Wald Tests for Series 2002-2007 (continue)

Dependent	Independent	Chi-Square	df	Probability	Direction
Oil Price	TSX Consumer Discretionary	0.174081	1	0.6765	No Direction
TSX Consumer Staples	Oil Price	0.935089	1	0.3335	No Direction
Dependent	Independent	Chi-Square	df	Probability	Direction
Oil Price	TSX Consumer Staples	1.637124	1	0.2007	No Direction
TSX Energy	Oil Price	0.975496	3	0.8072	No Direction
Oil Price	TSX Energy	94.03266**	3	0.0000	Unidirectional
TSX Financials	Oil Price	0.373584	1	0.5411	No Direction
Oil Price	TSX Financials	4.439804**	1	0.0351	Unidirectional
TSX Health Care	Oil Price	0.138269	1	0.7100	No Direction
Oil Price	TSX Health Care	0.022650	1	0.8804	No Direction
TSX Industrial	Oil Price	0.108538	1	0.7418	No Direction
Oil Price	TSX Industrial	1.125784	1	0.2887	No Direction
TSX Information Technologies	Oil Price	2.587811	2	0.2742	No Direction
Oil Price	TSX Information Technologies	0.115397	2	0.9439	No Direction
TSX Materials	Oil Price	8.145261**	3	0.0431	Unidirectional
Oil Price	TSX Materials	27.21276**	3	0.0000	Unidirectional
TSX Real Estate	Oil Price	3.826790	2	0.1476	No Direction
Oil Price	TSX Real Estate	0.903603	2	0.6365	No Direction

L. TABLE 12: VAR Granger Causality Test Results / Block Exogeneity Wald Tests for Series 2002-2007 (continue)

Dependent	Independent	Chi-Square	df	Probability	Direction
TSX REIT Index	Oil Price	18.10371**	6	0.0060	Unidirectional
Oil Price	TSX REIT Index	22.53748**	6	0.0010	Unidirectional
TSX Telecom. Services	Oil Price	2.855010	3	0.4145	No Direction
Oil Price	TSX Telecom. Services	1.309242	3	0.7269	No Direction
TSX Utilities	Oil Price	17.35597**	8	0.0266	Unidirectional
Oil Price	TSX Utilities	22.79574**	8	0.0036	Unidirectional

** represents the significance level of %5

M. TABLE 13: Summary of Literature Review

Author(s)	Variables	Time Frame	Methodology	Outcome of Research
Nai-Fu Chen; Richard Roll; Stephen A Ross (1986)	U.S. Stock Returns, Industrial Production, Inflation, Risk Premium, Term Structure, Consumption and Oil Price	Monthly Data 1953 to 1983	VAR Analysis	The authors have shown that industrial production, unexpected change in risk premium, unexpected inflation and unexpected alterations in terms structure have significant influence on U.S. stock market returns. In addition; impact of oil price on the stock markets (especially in some indices) has been found significant.
Takashi Kaneko; Bong-Soo Lee (1995)	U.S. and Japan Stock Market Returns, Economic News About Risk Premiums, Term Premiums, The Growth Rate in Industrial Production, Inflation, Oil Prices	Monthly Data 1975:1 to 1993:12	VAR Analysis	It is found that news about risk premiums, term premiums, and growth rate in industrial production is important element for determining stock market returns in U.S. In addition; oil price changes have serious impacts especially on stock markets in Japan.
Charles M. Jones; Gautam Kaul (1996)	United States, United Kingdom, Canada and Japan Stock Market Returns, Oil Shocks	Postwar Period (with available quarterly data)	Granger Causality Tests	The authors find that oil prices have significant impact on stock markets in four countries. Impact of oil prices on stock returns can be certainly explained by current and expected real future cash flows in U.S and Canada. However; future cash flow or any other financial variable could not be enough to explain impact of oil prices on stock market returns in Japan and U.K. In addition; oil prices influence stock market returns adversely in countries observed except U.K in the study.
Roger D. Huang; Ronald W. Masulis; Hans R. Stoll (1996)	Oil Futures, SP500 Index, 12 Major Industry Stock Indices, Three Individual Companies' Stock Prices	Daily Data October 9, 1979 to March 16, 1990	VAR Analysis	The writers failed to find any relation between oil futures and S&P 500 but they detected relation between individual stocks of the companies and oil futures. The writers add that influence of oil futures on individual oil stocks is small (but statistically significant) as the bid-ask spread in trading the individual oil stocks.
Perry Sadorsky (1999)	U.S. Stock Returns, Oil Prices and Volatility in Oil Prices	Monthly Data 1947 to 1996	VAR Analysis	The author detected that oil price shocks and volatility in oil prices have significant and adverse impacts on real stock returns in the market.
Evangelia Papapterou (2001)	Oil Prices, Real Stock Returns in Greece, Interest Rates, Real Economic Activity and Employment	Monthly Data 1989:1 to 1999:6	Multivariate VAR Analysis	Papapetrou (2001) finds that oil price changes show impacts on employment and economic activity. In addition; impulse response functions in the study prove that there is correlation between fluctuations in oil prices and real stock returns in the market.
Idris El-Sharif; Dick Brown; Bruce Burton; Bill Nixon; Alex Russell (2005)	Oil Price, Firms' Stocks in Oil and Gas Sector in U.K	Monthly Data 1989:01 to 2001:06	Conventional Multi-factor Model	They found a positive correlation between oil price movements and stock returns in oil and gas sector U.K. In addition; they put forward that the whole stock market and oil and gas sector stocks tend to move together.

M. TABLE 13: Summary of Literature Review (continue)

Author(s)	Variables	Time Frame	Methodology	Outcome of Research
Shawkat Hammoudeh; Eisa Aleisa (2004)	NYMEX Oil Future Prices, Bahrain, Kuwait, Oman, Saudi Arabia, and the United Arab Emirates' (Five GCC Countries) Stock Market Indices	Daily Data 15 February 1994 to 25 December 2001	Johansen Cointegration Test, VECM and Granger Causality Test	Researchers found relationship between oil prices and stock prices only in Saudi Arabia stock markets.
George Bittlingmayer, (2005)	Oil Price Shocks, U.S. Stock Market Indexes, Real Economic Activity	Oil Shocks From 1970s	Johansen Cointegration Test, VECM and Granger Causality Test	The researcher claims that oil price changes affect stock prices but the influence of the changes is normally weak. However; specific or special events such as political turmoil or war show influence of oil price shocks on stock markets stronger.
Emmanuel Anoruo; Muhammad Mustafa (2007)	S&P 500 stock price index, Dow Jones Industrial Averages (DJIA), and NYMEX Light Crude Oil.	Daily Data 1993 to 2016	Johansen Cointegration Test, VECM and Granger Causality Test	Results of the study put forward existence of relationship between and stock prices and oil prices. However; the direction of the relationship is one way. Changes in stock prices results in shifts in oil prices but changes in oil prices do not have significant effect on stock markets.
Bradley T. Ewing; Mark A. Thompson (2007)	West Texas Intermediate Crude Oil Prices, U.S. Aggregate Production Level in the Industry, Consumer Prices and Unemployment Rate in U.S and S&P500 Index	1982 to 2005	Filtering Methodologies Which are Hodrick–Prescott (1980) filter (HP), Baxter–King (1999) filter (BK) and Christiano and Fitzgerald (2003) (CF)	The author asserts at the end of the study that changes in crude oil prices deteriorate industrial production and it cause hikes in consumer price index. In addition; stock market is lagged by crude oil prices.
Yen-Hsien Lee; Jer-Shiou Chiou (2011)	Oil Prices, S&P500 Returns	Daily Data 1992 to 2008	Regime-Switching Model	They found that sharply increasing or decreasing oil prices has adverse effect on stock market returns. However; they say that impact of small changes in oil prices is strictly limited and it is not statistically significant.
Giulio Cifarelli; Giovanna Paladino (2010)	WTI Oil Price, Dow Jones Stock Index, US Dollar Effective Exchange Rate	Weekly Data October 1992 to June 2008	Univariate GARCH, CCC GARCH-M Models	They search influence of speculation (daily up and down changes) on oil prices. Specifically; they investigated impact of oil price fluctuations on stock returns and exchange rates They found that oil price fluctuations influence adversely stock market returns and exchange rates.
Kyongwook Choi; Shawkat Hammoudeh (2010)	Brent Oil, Copper, Gold, Silver, West Texas Intermediation (WTI) Oil and S&P 500 Returns	Weekly Data January 2 1990 to May 1 2006	DCC-GARCH Model	The authors concluded that relation between oil prices and stock return is less than relation among Brent oil, WTI oil, copper, gold and silver.
Jungwook Park; Ronald A. Ratti (2008)	Oil Prices, Real Stock Returns in U.S. and 13 European Countries	Monthly Data 1986:1 to 2005:12	VAR Analysis	They concluded that rise in oil prices resulted in hikes in stock returns in oil exporting countries. However; increasing oil prices caused decline in stock markets in oil importing countries.

M. TABLE 13: Summary of Literature Review (continue)

Author(s)	Variables	Time Frame	Methodology	Outcome of Research
George Filis (2010)	Consumer Price Index, Industrial Production, Stock Market and Oil Prices in Greece	Monthly Data 1996:1 to 2008:6	Johansen Cointegration Test, VECM and Granger Causality Test	The researcher concluded that oil prices have correlation with consumer prices and stock markets. The oil price changes have adverse influence on consumer price index and stock market returns. However; stock market returns affect consumer prices in a positive way.
Shiu-Sheng Chen (2010)	Oil Price, S&P500 Index	Monthly Data 1957 to 2009	Time-Varying Transition-Probability Markov-Switching Models	Researcher concludes that rising oil prices can cause a bear market in stock markets in U.S.
T. J. O'Neill; J. Penm; R. D. Terrel (2008)	Inflation Expectations, Stock Markets and Oil Prices in Some Developed Countries Namely United States, United Kingdom, France, Canada And Australia	Early 2003 to late 2006	VAR Analysis	Oil price increases result in stock market returns to decline in oil importing countries which are United States, United Kingdom and France. On the other hand; rising oil prices causes stock market returns to go upward in Canada and Australia which are oil exporting countries.
Øystein Gjerdea; FrodeSættemb (1999)	Oil Prices, Stok Market Returns in Norway, Real Interest Rate Changes, Inflation	Monthly Data 1974 to 1994	Multivariate Vector Autoregressive (VAR)	He concluded that there is negative and strong relationship between stock market returns and oil prices & interest rates in the Norway economy.
Ulrich Oberndorfer (2009)	Dow Jones Euro STOXX Indexes, Oil Price Volatility	Daily Data January 1 2002 to August 15 2007	VAR Analysis	The author concludes that there is strong relationship between oil prices and Eurozone stock markets. Direction of the correlation between oil price fluctuations and the stock market is negative in general except oil and gas sector. Increasing oil prices cause rise in stock returns in oil and gas industry.
Jer-Shiou Chiou; Yen-Hsien Lee (2009)	S&P 500 Index, West Texas Intermediate (WTI) Oil Price	Daily Data January 1 1992 to November 7 2006	Autoregressive Conditional Jump Intensity	They found that considerable changes in oil prices result in adverse impacts in stock returns. In addition; higher volatility cause considerable asymmetric fluctuations in stock returns.
Mohamed El Hedi Arouri; Christophe Rault (2011)	Oil Prices and Stock Returns in Oil Exporting Countries Which are Gulf Cooperation Council (GCC) Countries Namely Bahrain, Kuwait, Oman And Saudi Arabia	Daily Data 1996 to 2007	Panel Cointegration Technique and Seemingly Unrelated Regression (SUR) Method	It is detected that sharp increase in oil prices affects stock markets in oil exporting GCC countries in a positive way except Saudi Arabia.
Abu Zarour Bashar (2006)	Oil Prices and Stock Returns in Oil Exporting Countries Which are Gulf Cooperation Council (GCC) Countries Namely Bahrain, Kuwait, Oman, Saudi Arabia, Abu Dhabi	Daily Data 2001 to 2005	VAR Analysis	He asserts that rising oil prices cause positive reactions in stock market in oil exporting countries.

M. TABLE 13: Summary of Literature Review (continue)

Author(s)	Variables	Time Frame	Methodology	Outcome of Research
Shawkat Hammoudeh; Eisa Aleisa (2004)	New York Mercantile Exchange (NYMEX) Oil Futures, Stock Returns in Oil Exporting Countries Which are Five Gulf Cooperation Council (GCC) Countries	Daily Data 1994 to 2001	Johansen Cointegration Test, VECM and Granger Causality Test	They found that there is strong tie among Saudi Arabia, Kuwait, Bahrain, United Arab Emirates markets while Oman's tie with other GCC market is not very strong. In addition; significant correlation between Saudi Arabia stock indices and NYMEX oil futures is observed.
Malek Khojasteh Nejad; Forough Jahantigh; Hadi Rahbari (2016)	Oil Price Risk and Tehran Stock Exchange Returns	Daily Data 2003 to 2014	Value at Risk (VAR) Model	They clearly put forward that there is significant relationship between oil price changes and Iranian stock indices. Moreover; enforcements put on Iran due to nuclear file by other countries caused depressing in Tehran stock returns.
Mohamed El Hedi Arouri; Amine Lahiani; Duc Khuong Nguyen (2011)	GCC Countries' Stock Exchange Returns; Oil Price Volatility	Daily Data 2005 to 2010	VAR-GARCH Model	They concluded that there is causative interdependency between stock markets of three GCC members and oil price fluctuations. Especially; changes in oil prices significantly have influence on stock markets volatility since these countries are major oil producer in the world.
Bashar Abu Zarour (2006)	GCC Countries' Stock Exchange Returns; Oil Price Volatility	Daily Data 2001 to 2005	VAR Analysis	Rising oil prices demonstrated significant influence on stock markets of these oil exporting countries since there is significant cash inflow to those countries. Especially; Saudi Arabia and Oman stock markets reacted to this sharp increase in oil prices.
Mohamed El Hédi Arouri; Amine Lahiani; Makram Bellalah	GCC Countries' Stock Exchange Returns; Oil Price Volatility	Weekly Data 2005 to 2008	Conventional Multi-factor Model	It is detected that relationship between oil prices and the stock markets is significant for countries which are Qatar, Oman, Saudi Arabia and United Arab Emirates. However; there is no influence of oil price changes on stock markets of Bahrain and Kuwait.
Berna Aydoğan; İstemi Berk (2015)	Istanbul Stock Exchange National Index (ISE 100), Brent Crude Oil Prices, S&P 500 Market Volatility Index (VIX)	Daily Data January 2 1990 to November 1 2011	VAR Analysis	It is detected that there is influence of oil prices on Turkish stock market activity only after 2008 global financial crisis. Furthermore; it is observed that S&P 500 market volatility index (VIX) demonstrates impacts on oil prices and changing stock market returns. Most of the variations in Turkish stock market are due to changes in global liquidity conditions.
Bwo-Nung Huang; M. J. Hwang; Hsiao-Ping Peng (2005)	Oil Price Fluctuations & Stock Markets Relationship in United States, Canada and Japan	Monthly Data 1970 to 2002	Multivariate Threshold Model	It is found that small changes or fluctuations in oil prices which are under threshold do not have significant impact on stock returns in these countries. However; when changes in oil prices are over the threshold level, then volatility in oil prices demonstrate considerable influence on stock market returns in United States, Canada and Japan.

M. TABLE 13: Summary of Literature Review (continue)

Author(s)	Variables	Time Frame	Methodology	Outcome of Research
Hilde C. Bjørnland (2008)	Norway Stock Market Returns, Oil Prices, Economic Output and Unemployment	Monthly Data 1993 to 2005	VAR Analysis	He concluded that Brent Crude oil prices have serious impact on stock market returns in Norway. In addition; rising oil prices make Norway economy better off with respect to economic activity and unemployment.
Chaker Aloui; Rania Jammazi (2009)	Oil Price Volatility and Stock Market Returns in France, United Kingdom and Japan	Monthly Data 1989 to 2007	Markov-Switching EGARCH Model	Empirical evidence displays that net oil price rise explains changes in stock market returns in these countries.
Samuel Imarhiagbe (2010)	Oil Price, Nominal Exchange Rate, Stock Returns in Oil Importing and Exporting Countries	Daily Data January 26 2000 to January 22 2010	VAR Analysis	The researcher concludes that stock market returns display relationship with oil price movements in the long run in all countries except China
Ravichandran Krishnamurthy; Abdullah Khalid	NYMEX Oil Price and Stock Indices in GCC Stock Markets	Daily Data 2008 to 2010	VAR Analysis	Empirical evidence at the end of the study displays that oil price volatility demonstrates impact on stock indices in these oil exporting countries in the long run.
Ibrahim A. Onour (2007)	Oil Price and Stock Indices in GCC Stock Markets	Daily Data 2001 to 2006	VAR Analysis	The researcher showed depending on the empirical evidence that oil price movements display significant effect on stock markets in oil exporting GCC countries.
Paresh Kumar Narayan; Seema Narayan (2010)	Vietnam Stock Prices, Oil Prices, Nominal Exchange Rate	Daily Data 2000 to 2008	Johansen Cointegration Test, VECM and Granger Causality Test	It has been found that oil price movements and exchange rate affect stock indices positively. However; the authors think that changes in stock market returns can mostly be explained with domestic factors such as capital inflow.
Buthaina Al-Muhtaseb; Ghazi Al-Assaf (2017)	Amman Stock Returns and Oil Prices	Quarterly Data 2000 to 2015	Johansen Cointegration Test, VECM and Granger Causality Test	It is detected that oil prices affect considerably Amman stock returns. In addition; effect of oil prices on the stock market is asymmetric. In other words; increasing oil prices have influence on the stock market more than declining oil prices.
Hamed Markazi Moghadam (2010)	S&P500 Index, NASDAQ Composite Index, Oil Prices (US price of West Texas Intermediate Cushing)	Daily Data 1988 to 2009	Multivariate GARCH Model	Oil price changes influence S&P500 and NASDAQ composite index significantly and adversely. In addition; rising oil prices cause higher impact on the indices than lowering oil prices. This situation is proving that there is asymmetry in effect of oil price on stock markets.
Abderrazak Dhaoui; Naceur Khraief (2014)	Oil Price Volatility, Selected Seven Countries' Stock Market Returns	Monthly Data January 1991 to September 2013	EGARCH-M Model	Oil price volatility affect stock market returns adversely and significantly in all countries except Singapore.

M. TABLE 13: Summary of Literature Review (continue)

Author(s)	Variables	Time Frame	Methodology	Outcome of Research
Elena Maria Diaz; Juan Carlos Molero; Fernando; Perez de Gracia (2016)	G7 Economies' Stock Market Returns, Oil Price Changes, Interest Rates, Economic Activity	Monthly Data 1970 to 2014	VAR Analysis	Empirical evidence shows that oil price fluctuations influence stock market returns adversely and significantly.
Rumi Masih; Sanjay Peters; Lurion De Mello (2011)	Oil Price, Korean Real Stock Returns, Interest Rate	Monthly Data May 1988 to January 2005	Johansen Cointegration Test, VECM and Granger Causality Test	They concluded that fluctuations in oil prices influence Korean stock market considerably and its impact is increasing day by day.
George Filis; Stavros Degiannakis; Christos Floros (2011)	Oil Prices, Stock Market Returns in Oil İmporting and Exporting Countries	Monthly Data 1987 to 2009	DCC-GARCH-GJR Model	Oil price changes have significant impact on stock market indices for oil exporting and importing countries. Direction of oil price influence on oil exporting countries is positive while it is negative for oil importing countries. These results are valid in case of aggregate demand side oil price changes. On the other hand; supply side shocks display less influence on stock markets compared to the aggregate demand side oil price shocks.
Nader Naifar; Mohammed Saleh Al Dohaiman (2013)	Oil Price, GCC Countries' Stock Market Returns, Interest Rates, Inflation Rates	Daily Data July 7 2004 to November 10 2011	Markov Regime-Switching Model	Regime dependency is clearly seen between GCC stock markets and oil price fluctuations.
Juncal Cunado; Fernando Perez de Gracia (2014)	12 European Countries' Stock Returns, Industrial Production, Interest Rate, Oil Price	Monthly Data 1973:02 to 2011:12	Vector Autoregressive (VAR) and Vector Error Correction Models (VECM)	Empirical evidence shows that impact of oil price changes on the stock markets vary due to the origin of the oil price shocks. However; in general, oil price fluctuations affect the stock market returns adversely.
Yasushi Hamao (1988)	Japanese Stock Markets, Industrial Production, Oil Prices, Inflation Rate, Confidence Level in Investors, Interest Rate	Monthly Data January 1975 to December 1984	Conventional Multi-factor Model	Researcher puts forward that inflation, risk premium and term structure have an effect on Japanese stock markets while oil prices have almost no impact on the equity values.
Shawkat Hammoude; Kyongwook Choi (2006)	Oil Price, S&P500 Index, GCC Countries' Stock Market Returns, U.S. 30-Months Treasury Bill Rate	Weekly Data February 1994 to December 2004	Johansen Cointegration Test, VECM and Granger Causality Test	Empirical evidence puts forward by researchers asserts that there is no influence of oil prices on S&P 500 index.
Aktham Maghyereh (2004)	Stock Market Returns in 12 Develoing Countries,	Daily Data 1998 to 2004	VAR Analysis	He concluded that sharp increases in oil prices don't show any influence on stock returns in developing countries' stock markets.
Nicholas Apergis; Stephen M. Miller (2009)	Oil Supply Shocks, Oil Demand Shocks, Stock Market Returns in 8 Developed Countries	Monthly Data 1981 to 2007	VAR Analysis	Oil shocks do not cause any influence on stock markets in countries in the sample.

M. TABLE 13: Summary of Literature Review (continue)

Author(s)	Variables	Time Frame	Methodology	Outcome of Research
Nedal Al-Fayoumi (2009)	Industrial Production, Oil Price Stock Market Returns in Turkey, Tunisia and Jordan, Interest Rates	Monthly Data December 1997 to March 2008	Johansen Cointegration Test, VECM and Granger Causality Test	It is found out that there is no significant relationship between oil prices and stock market in oil importing countries. Interest rate and industrial production seems that they have considerable influence on stock indices in these countries
Aktham Maghyereh; Ahmad Al-Kandari (2007)	Oil Prices, Gulf Cooperation Council (GCC) Countries' Stock Market Indices	Monthly Data 1996 to 2003	Rank Tests of Nonlinear Cointegration Method	They found that there is not significant correlation between oil prices and stock markets in GCC countries
Mohamed El Hedi Arouri; Julien Fouquau (2009)	GCC Stock Markets' Indices, Oil Prices	Weekly Data 2005 to 2008	VAR Analysis	The authors find out that there is significant positive relationship between oil prices and Qatar, Oman and United Arab Emirates stock markets. However; they are unable to find any significant relationship between oil fluctuations and stock markets for remaining countries namely Bahrain, Kuwait and Saudi Arabia.
Ayhan Kapusuzoglu (2011)	İstanbul Stock Exchange National 100, National 50 and National 30 Indexes and Brent Oil Price	Daily Data 04.01.2000 to 04.01.2010	Johansen Cointegration Test, VECM and Granger Causality Test	The researcher concluded that there are relations between the stock market indices and international Brent oil price. In addition; he found that there is one way cointegration from stock indices to international Brent oil price. However; the international oil prices do not demonstrate any significant impact on these three indexes.
Bert Scholtens; Cenk Yurtsever (2012)	Oil Price Shocks; 38 Different Industries' Indices in Euro Area	Monthly Data August 1983 to November 2007	Dynamic VAR Models and Multivariate Regressions	Empirical evidence suggests that there is positive correlation between oil prices and "oil and gas products, oil equipments, industrial metals and mines, mining" sector indices. Remaining 33 sectoral indices demonstrate negative relation with oil price changes. In other words; only oil intensive industries become better off with a rise in oil prices. In addition; nearly half of industries are better off with declining oil prices
Mohamed El Hedi Arouri (2011)	12 Stock Returns of European Industries, DJ Stoxx 600 Index, Oil Prices	Weekly Data January 1 1998 to July 1 2010	Non-Linearity Analysis, Granger Causality Test	It is concluded that Automobile & Parts, Financials, Food & Beverages, Health Care, Personal & Household Goods, Technology and Telecommunications and Utilities sectors' stocks display adverse relationship with oil price movements. However; Oil & Gas, Industrials, Basic Materials, Consumer Services demonstrate positive correlation with varying oil prices.

M. TABLE 13: Summary of Literature Review (continue)

Author(s)	Variables	Time Frame	Methodology	Outcome of Research
Perry Sadorsky (2001)	Oil & Gas Sector's Stock Returns, Oil Price, Interest Rate, Exchange Rate	Monthly Data 1983 to 1999	Conventional Multi-factor Model	Empirical evidence displayed that there are three determiners of the oil and gas sector's stock values which are exchange rates, crude oil prices and interest rates. Furthermore; Oil price changes demonstrate positive correlation with stock prices in the oil and gas industry in Canada.
M. Martin Boyer; Didier Filion (2007)	Canadian Oil and Gas Company Stock Returns, Crude Oil Prices, Gas Prices, Exchange Rate	Quarterly Data 1995 to 2002	Conventional Multi-factor Model	The results of the empirical evidence proved that stock returns in the oil and gas industry is positively correlated with changing oil prices.
Mohan Nandha; Robert Faff (2008)	35 DataStream Global Industry Indices, Oil Price, Real Output	Monthly Data April 1983 to September 2005	Conventional Multi-factor Model	Results of study demonstrate that oil and gas sector with mining industry display a positive correlation with varying oil prices. However; oil price movements influence 33 remaining sectoral equity returns adversely.
Mohan Nandha; Robert Brooks (2009)	Oil Price, Transport Sector Stock Indices in 38 Countries	Monthly Data 1983 to 2006	Conventional Multi-factor Model	Empirical results demonstrate that oil price changes have influence on stock returns in transport sector for developed countries, European countries and G7 countries
Evan J. McSweeney; Andrew C. Worthington (2007)	Oil Price, Exchange Rate, Term Premium, 9 Australian Industry Stock Returns, Market Portfolio	Monthly Data 1980 to 2006	Conventional Multi-factor Model	Empirical evidence at the end of the study demonstrates that there is significant and positive relationship between energy industry stock returns and oil prices. On the other hand; there is adverse relationship between moving oil prices and retailing, banking and transportation equity returns.
Rong-Gang Cong; Yi-Ming Wei; Jian-Lin Jiao; Ying Fan (2008)	Chinese Sectoral Indices, Oil Price	Monthly Data 1996 to 2007	VAR Analysis	Empirical evidence at the end of the study displays that there is only interaction between oil price fluctuations and manufacturing index. In addition; equity values of some oil firms have certain degree of negative relationship with oil price volatility.
Cengiz Toraman; Cagatay Basarir; M. Fatih Bayramoglu (2011)	Istanbul Stock Exchange (ISE) 100 Composite Index, Services Index, Industrial Index, Technology Index of ISE, Oil Price	Daily Data 2009 to 2011	Johansen Cointegration Test, VECM and Granger Causality Test	Empirical evidence in the study demonstrates that oil price movements definitely have some impacts on sectoral indexes in Istanbul Stock Exchange. However; degree of the influence is varying across industries. More clearly; industrial index is most influenced sector from volatility in oil prices while changing oil prices have limited effect on technology index.

M. TABLE 13: Summary of Literature Review (continue)

Author(s)	Variables	Time Frame	Methodology	Outcome of Research
Mehmet Eryigit (2009)	Oil Price, Sector Indices in Istanbul Stock Exchange, Exchange Rate	Daily Data January 1 2000 to November 1 2008	Ordinary Least Square Regressions	The author figures out correlation between oil price movements and most of the sector indexes which are Electricity, Whole Sale and Retail Trade Insurance, Holding, Investment, Wood, Paper, Printing, Basic metal, Metal Products, Machinery and Nonmetal and Mineral Product. Correlation between oil price fluctuations and indices of Wood, Paper and Printing, Insurance and Electric is positive as suggested by empirical evidence in the study.
Farooq Malik; Bradley T. Ewing (2009)	Oil Price Changes, U.S. Sectoral Indices	Weekly Data 1992 to 2008	Bivariate GARCH Model	Empirical evidence of the study asserts that altering oil prices demonstrate influence on health, technology and consumer sectoral indexes. However; fluctuating oil prices do not seem to have effect on financial and industrial sectoral indexes.
Mohamed El Hedi Arouri; Duc Khuong Nguyen (2010)	Dow Jones (DJ) Stoxx600, Sectoral Indices in Euro Area	Weekly Data 1998 to 2008	Conventional Multi-factor Model	Empirical evidence obtained through different econometric methods display that interaction between most of the sector indexes and altering oil prices is positive. Only the adverse relationship between oil prices and sectoral stock indexes is observed in Automobile and Parts, Food and Beverages, and Health Care industries.
Sridhar Gogineni (2008)	Oil Price, Daily Value-Weighted Returns of NYSE/NASDAQ/AMEX Indexes	Daily Data April 1983 to December 2006	Conventional Multi-factor Model	First; there is not strong correlation between aggregate stock indexes and daily fluctuating oil prices. Only large changes in oil prices display adverse or negative effect on overall stock market. On the other hand; insignificant daily price fluctuations demonstrate positive influence on aggregate stock indices. In addition; influence of oil price fluctuations is varying according to the dependency type of that sector.
Reem Khamis; Allam Hamdan (2016)	Oil Price, Stock Market Returns in Saudi Arabia, Kuwait and Oman	Daily Data 2012 to 2015	Granger Causality and Regression Tests	The authors put forward that three countries display high dependency on oil therefore nearly all stock indices in these countries seem to be influenced from oil price volatility. Moreover; they add that diversification of economy for GCC countries can be accounted only solution for high effect of oil prices.

M. TABLE 13: Summary of Literature Review (continue)

Author(s)	Variables	Time Frame	Methodology	Outcome of Research
Sunil K. Mohanty; Aigbe Akhigbe; Tawfeek A. Al-Khyal; Turki Bugshan (2013)	Oil Price Volatility, Equity Returns, Trading Volumes, Return Variances, Market Betas of Oil and Gas Industry in U.S.	Daily Data January 1986 to July 2008	Conventional Multi-factor Model	The researchers concluded that there is an asymmetry with respect to effect of oil price volatility on oil and gas industry. Declining oil prices seem to be more influential on the sector returns than rising oil prices. In addition; company related parameters such as size, market-to-book ratio etc. are influential with respect to degree of oil price volatility impact
David C. Broadstock; Hong Cao; Dayong Zhang (2012)	Oil Price, Chinese Energy Related Stock Values	Weekly Data January 7 2000 to May 27 2011	Traditional GARCH Techniques	They conclude that fluctuations in oil prices have serious effects on energy related stock prices. However; degree of this influence is depending on the time. Impact of fluctuating oil prices became stronger after 2008 financial crisis.
Gaye Gencer; Sercan Demiralay (2013)	Oil Price, 18 Sectoral Indices in BİST	Monthly Data 2002 to 2013	Johansen Cointegration Test, VECM and Granger Causality Test	Researchers conclude that fluctuations in oil prices demonstrate considerable influence on chemical petroleum-plastic sectoral index in the long run. However; they are unable to figure out any correlation between oil price movements and remaining 17 sector indexes in the long run
Ibrahim Halil Eksi; Mehmet Senturk; H. Semih Yildirim (2012)	7 Manufacturing Sector Indices in Turkish Stock Market, Oil Price	Monthly January 1997 to November 2008	Johansen Cointegration Test, VECM and Granger Causality Test	The authors empirically demonstrate that Chemical-Petroleum-Plastic and Basic Metal industries are affected from changes in crude oil prices negatively.
Atousa Jafarian; Meysam Safari (2015)	Malaysian Sectoral Indices, Oil Price	Monthly Data January 2000 to March 2014	Conventional Multi-factor Model	They empirically displayed that there is positive correlation between oil price fluctuations and Financial Times Stock Exchange Kuala Lumpur Composite, consumer staples, energy indexes. However; correlation between oil price volatility and utilities and telecom services indexes is negative.
Magnus O. Abeng (2015)	Nigerian Sectoral Returns, Oil Price, Market Returns, Exchange Rate, Inflation Rate	Monthly Data 1997 to 2014	Conventional Multi-factor Model	The researcher empirically put forward that banking, insurance, industry and oil and gas sectors are influenced from fluctuations in oil prices. However; oil price movements are not influential on food beverages and tobacco sector returns.
Don Bredin; John Elder (2011)	U.S. Aggregate and 18 Industry Stock Returns, Oil Price	Monthly Data December 1974 to December 2009	VAR Analysis	Researchers empirically demonstrate that interaction between significant price changes in short term and sector indexes is not strong. Oil price shocks have only some effect on gold, oil and gas, and retail industries indexes in U.S.

M. TABLE 13: Summary of Literature Review (continue)

Author(s)	Variables	Time Frame	Methodology	Outcome of Research
N. Alper Gormus (2013)	S&P 500 Index, ISE-100 Index, BIST Sectoral Indices	Daily Data January 4 2000 to January 11 2008	Ordinary Least Square Regressions	The author concluded that most of the sector indices have positive correlation with oil price changes except transportation sector. Transportation sector is influence adversely from changes in oil prices. In addition; the researcher figured out that U.S. stock market is very influential on Turkish sectoral stock indices
Perry Sadorsky (2003)	Pacific Stock Exchange Technology 100 Index, West Texas Intermediate Crude Oil Price, Term Premium, Consumer Price Index	Monthly Data July 1986 to December 2000	VAR Analysis	The researcher finds that movement in oil prices, consumer price index and the term premium all are factors playing an important role in the volatilities of stocks in Pacific Stock Exchange Technology 100 index.
Robert W.Faff; Timothy J.Brailsford (1999)	Australian Industry Equity Returns, Oil Price	Monthly Data 1983 to 1996	Conventional Multi-factor Model	The researchers find that there is positive and strong correlation between oil prices and stock prices in Oil and Gas and Diversified Resources industries. In addition; negative and less significant relationship between oil prices and equity returns is detected in some sectors namely Paper and Packaging, and Transport industries.