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THE EFFECT OF OIL PRICE MOVEMENTS ON STOCKS AND REAL ESTATE: NET IMPORTING VERSUS NET EXPORTING COUNTRIES

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ABSTRACT

While many researches have studied the effect of oil price movements on stock markets, limited amounts of research exists that distinguish between net importing and exporting countries or the degree of market integration and trading linkages between countries. Also, to my knowledge, there has been no completed research that has studied the effect of oil on international real estate markets. Therefore, this paper is the first to investigate the effect of oil price movements on international stock (sectors level) and real estate markets between the largest trading partners in the world. United States of America (U.S.) and Canada are among the top oil consuming and producing countries in the world; U.S. is the top net importing country purchasing from Canada, which is one of the top exporting countries in the world. I apply ordinary least square (OLS) regression and correlation analysis to test the effect of oil price movements on two different classes of assets, Financial and Real estate in six different sectors in each country. My empirical findings confirm previous studies and add a new finding to the literature. Main empirical findings can be summarized as follows: First, oil price movements have different effects on different sectors based on the degree of dependence on oil as an input or an output. Second, the effect on one sector is different depending on whether the country is a net importer or exporter. Third, the significance and direction of the effect may change over time. Forth, there is a significant effect of oil price movements on real estate markets with a higher significance in net exporting countries. Finally, returns on stocks and real estate markets can be explained and associate with by oil price movements in rational markets.
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INTRODUCTION

Overview

Given the key role of crude oil in global economies, the effect of oil price changes (shocks) has been a matter of great interest in the economic literature pioneered by Hamilton (1983). The general view in the economic and finance literature is that an increase in oil prices will have an adverse impact on the economy and, therefore, on the stock market in that economy. Higher oil prices will increase corporate costs and inflation, which will squeeze corporate profits and future cash flows; this should translate to stocks in rational and efficient stock markets. Limited studies have attempted to distinguish between economies, markets, and industries based on the dependence on oil as an input or an output. Conventional wisdom suggests that while net importing economies and industries that rely on oil as main input will be affected negatively (positively) by an increase (decrease) in oil prices, net exporting economies and industries that depend on oil as main output should have the opposite reaction. Up to September 2003 the price per barrel of crude oil was generally under $25. Oil prices started to increase with relatively high fluctuation after 2003 following a series of events, such as the second Arab Gulf war in Iraq. Also, in July 2008 oil prices peaked at $147.30 before falling to $32 due to the financial crises (U.S EIA, 2013a). Looking at the history of Oil prices alongside Canadian and U.S. stock and real estate markets made me to believe that there is a relationship between oil prices, stock, and real estate markets in the U.S. and Canada. The spot price history of West Texas Intermediate (WTI) is shown in Figure 1, while stock markets history is shown in Figure 2.
Figure 1: WTI Oil Prices since 1986.

Source: U.S. Energy Information Administration EIA (2013b)

Figure 2: U.S. Stock Market (S&P 500) versus Canadian Stock market (S&P/TSX) since 2000.

In this study, I focus on the effects of oil price movements (shocks) on stock and real estate markets in the top net oil-importing and oil-exporting countries which have advanced developed economies with high trading linkages, dissimilar industrial structure, and high reliance on oil as an input or output. I examine the effect of oil price movements on various sectors within the stock and the real estate market in each country.

My main findings indicate that sectors have different reaction to oil price movements within the same stock market based on the degree of dependence on oil as an input or an output. I also find that the effect on one sector in a net importing country is different than the effect on the same sector in a net exporting country. In addition, I find that the significance and the direction of the effect may change over time, which may suggest a maximum threshold for any increase (decrease) in oil prices before seeing any reversal in the direction of the effect. Finally, findings indicate the ability to explain the return of stock and real estate markets using oil price as a leading indicate.

Motivation

The booming shale technology in the U.S. has led to an increasing capacity of oil and gas production in the top importing and consuming country of oil in the world. I expect that such an increase in oil production in the U.S. will have a negative effect on net oil exporting countries that are highly dependent on U.S. oil imports in their GDP, such as Canada. Figure 3 shows this changing trend.
With this changing trend of supply and demand of oil, I see the importance of re-visiting and re-examining the oil–stock market relationship. I extend the research to test the effect of oil price movements’ on international real estate prices, expecting that such a change in the global trend of oil industry may hold a future impact on both the stock markets and the real estate markets in net importing and exporting countries. This study will be important to investment and hedge fund managers, and investors who are interested in diversifying their investment portfolios.

Figure 3: United States total oil production (1980-2012)

Source: U.S. Energy Information Administration, (2013c)
and speculating or hedging against oil price shocks. In addition, audience of this study may include academics, government and regulators.

The rest of this study is organized as follows: the next chapter discusses the review of literature followed by the conceptual model, research objectives, questions and hypothesis. The fourth chapter will present the data set followed by data analysis and discussion of results in the fifth chapter, and the final chapter offers the concluding remarks of the study and future work.
LITERATURE REVIEW AND ANALYSIS

The Effect of Oil Shocks on the Economy

The effect of oil price movements on stock markets indexes has been a popular topic in the economic and finance literature. Hamilton (1983, 2005) pioneered the literature examining the relationship between oil price shocks and macroeconomic variables. He pointed out that shocks in oil prices have an adverse impact on the economy and were a main factor that led to major U.S. post-World War II recessions. Hamilton extended his research and declared that while increases in oil prices have negative effect on the economy, a decrease in oil prices will not cause an economic expansion (Hamilton, 2003). Abeysinghe (2001) extended the literature by examining the effect of oil price shocks on the economy of 12 Asian countries, confirming the findings of Hamilton, (1983, 1996) and concluded that oil price shocks have significantly higher impact on smaller open economies than the U.S. Korhonen and Ledyaeva (2010) studied the effect of oil price shocks on the economies of net importing countries and net exporting countries and found a positive impact of oil price increases on the net exporting economies, such as Russia, and mixed results showing either a positive or negative impact on net importing economies.

Shocks Transmission between Integrated Economies

Other studies have focused on the transmission of shocks in one economy onto their trading partners and co-movements of integrated economies. Frankel and Rose (1997, 1998) found that economies with closer trading linkages have similar business cycles. This finding was supported by the findings of Baxter and Kouparitsas (2005) and Inklaar et al. (2007). Arora and Vamvakidis (2005) argued that economic growth in one country will be transmitted onto their
trading partner depending on the degree of economic integration. Krugman (1993) has pointed out that higher trading partnerships between countries will result in more specialized economies. These studies have led to an increased interest in studying the effect of oil price movements on other economic variables and indicators, such as stock markets and real estate and the different impact of oil price shocks on different stock markets on both national and sector levels.

The Scope of Studies: National Stock Market versus the Sector Level.

National Level

Prior studies focusing on examining the effect of oil price changes on equity market returns can be classified into two general categories. The first group focused on the general effect on national stock market level using national market indexes for one or more countries and regions. The second group expanded the research to examine the effect and the relationship of oil price changes on different sectors or industries within national stock markets for one or more countries. Studies that examined the effect on the national level were pioneered by Jones and Kaul (1996), who analyzed quarterly data for stock and oil indexes from 1947-1999 in order to test whether the stock markets’ movements in the United States, Canada, United Kingdom and Japan can be explained by preceding oil price changes or shocks. They discovered that changes in stock market returns in the United States and Canada can be explained by changes in oil prices, therefore both markets are rational. However, they found that stock markets in the United Kingdom and Japan were irrational and overreact to oil price changes. These findings resulted in the conclusion that increases in oil prices are adversely affecting stock market returns, confirming previous studies by Hamilton (1983) and Gisser and Goodwin (1986).

Huang et al. (1996) examined the relationship between oil future returns and U.S. market stock returns represented by S & P 500. They found that oil movements had no significant
impact on U.S. stock returns. Lee et al (2012) applied causality test and VAR model using monthly data of stock indexes of the G-7 countries and crude oil prices for the period from 1991 to 2009, but added interest rates and industrial production as other influencing factors. They reached the same conclusion as Huang et al. (1996), confirming that oil price shocks have no significant impact on national stock indexes for all of the G-7 countries. However, they found significant impact when applying the VAR test on the sector level and that stock prices in Germany, U.K. and, the U.S. lead the movements in oil prices.

Sector Level

In general, economic theory and empirical results regarding the relationship between oil prices and stock markets suggests the existence of different levels and directions of the impact of oil prices on different national stock markets. Therefore, conventional wisdom suggests that the same effect will apply to the sector level in different stock markets. At the sector level Faff and Brailsford (1999) were the first to examine the effect of oil price changes on different industries in the Australian stock market, declaring a positive impact of oil price increases on Australian oil and gas and diversified resources industries. Lee et al. (2012) examined the feedback relationship on both the national and sector level. They found no evidence of a significant impact of oil prices on the national stock markets in the G-7 countries. However; they find mixed results from the sector level analysis. They discovered that changes in oil prices have a different level of impact on different sectors in each country. While certain sectors were impacted the most by oil prices in certain countries, the same sectors were either not impacted to the same degree or not impacted in other countries. Sadorsky (2001) discovered a positive impact of an increase in oil prices on oil industries. This finding was supported by the results of El-Sharif et al. (2005). Hammoudeh and Li (2005) examined and compared the oil sensitivity of stock returns of oil
based countries (Mexico and Norway) with two major U.S. oil sensitive industries (Oil and transportation). They show a positive relationship with the oil industry. However; a negative relationship between the transportation industry and oil prices was discovered. Nandha and Faff (2008) investigated the effect of oil prices on 35 global industries based on the standard FTSE Global Classification System and found that an increase in oil prices had a negative effect on stocks returns for all industries except mining and oil and gas sectors. In contrast with previous findings of Chen et al. (1986), Huang el al. (1996) and Park (2007), Scholtens and Yurtsever (2012) investigated the relationship in 38 European industries and found that while the decrease in oil prices had a positive impact on most industries, an increase in oil prices did not have a significant effect on most industries. However, some industries, especially oil, gas and mining, did not fall under this conclusion and their returns had a positive correlation with oil prices.

Mixed Findings

The findings of studies focusing on the relationship between oil prices and stock markets are mixed, depending on the variables, methods, data, and stock markets. However, results can be generally categorized into four main groups. The first group of findings have supported a significant negative relationship between oil price movements and stock market returns (e.g. Jones and Kaul, 1996; Sadorsky, 1999; Papapetrou, 2001; Jammazi and Aloui, 2010 and Jammazi, 2012). The second group of findings supports a positive correlation between crude oil prices and stock market returns (e.g. Chen et al., 1996; Narayan and Narayan, 2010; Arouri and Rault, 2011). The third group of findings suggests that results are mixed, and that the relation could be either negative or positive depending on various factors. Fayed and Daly (2011) examined the inter-relationship between oil prices and stock market returns in GCC as oil dependent economies versus U.S. and U.K. as advanced diversified economies in different
periods of stable, rising, and falling oil prices. They found that the impact of oil price changes was more significant in oil dependent economies (GCC) than diversified economies and concluded that the significance and strength of this effect depends on the economy’s degree of reliance on oil. Kilian and Park (2009) distinguished between whether the change in oil prices is a result of shock in the demand or supply of crude oil. They discovered that the uncertainty of future supplies of oil will cause a positive shock to demand, which will further cause an increase in the price of crude oil. They conclude that an increase of oil prices due to uncertainty in oil supply will have a negative impact on stock returns. However, they also argue that an increase in oil prices as a result of an increased demand due to a global expansion will have positive result on stock market returns. Park and Ratti (2008) examined the relationship in the U.S. and 13 European countries from January 1986 to December 2005, and concluded that the responses of these countries to shocks in oil prices depends on whether the country is net exporter or net importer of oil. Filis et al. (2011) divided countries into net exporting and net importing countries and argued that oil price changes have the same effect on oil importing and exporting countries. However, the correlation changes positively or negatively depending on aggregate precautionary demand price shocks, but not for supply side price shocks. They conclude that oil prices have a negative impact on the stock market regardless of the origin of oil price shocks, with one exception of a positive impact found during the 2008 financial crisis. Jammazi (2012) explored the interactions between crude oil (CO) price changes and stock returns of five developed countries: the U.S., Canada, Germany, Japan and U.K. Her findings show a mixed positive (negative) existing relationship between oil prices and stock markets. She concludes that the effect of oil prices varies depending on many factors, such whether the country is net importing or net exporting, the degree of energy efficiency, and the degree of oil shock.
persistence. Wang et al. (2013) applied various factors in order to examine the effect of oil price shocks on stock market returns. They argue that the significance, duration, and direction of stock market response to oil shocks is dependent on whether the country is net exporter or importer of oil and whether these changes in oil prices are driven by aggregate supply or demand. The second factor is the level of contribution of oil to the national economy. In addition, they conclude that the impact of demand uncertainty on stock markets in net oil exporting countries is stronger than net importing countries and that the positive demand shocks cause higher degree of co-movements in the stock markets in net exporting countries, but not the net importing countries.

In contrast to the above findings, the fourth group of findings suggests no significant impact of oil price shocks on stock markets. Apergis and Miller (2009) investigated the relationship in eight developed countries from different regions and conclude that stock markets do not react in a large way to movements in oil prices. They explain that their finding was due to a discovery of a higher impact of other variables used in their study including exchange rates, interest rates, and spending on consumer durables. Miller and Ratti (2009) examined the long term relationship between oil prices and international stock markets from January 1971 to March 2008. Their empirical findings suggest that the negative long term relationship between oil prices and stock markets did not hold in all periods. They found that the negative relationship existed prior to 1980, but did not hold after 1980, with no evidence of significant impact of oil prices on stock markets between the periods of 1980-1999. In addition, they found that the negative relationship was reversed after 1999, suggesting that oil prices do not have the same level of impact on stock markets after that period. Al Janabi et al. (2010) examined the effect of oil and gold indexes on the stock markets of six countries in the Gulf Cooperation Council (GCC) and
concluded no significant impact of oil and gold prices on the stock markets of these countries. Chen et al. (1986) examined whether shocks in macroeconomic variables were impacting the stock market. They concluded that there were no significant impacts of oil prices on stock markets. However, they did find that the spread between short and long term interest rates, industrial production, expected and unexpected inflation, and the spread between low and high grade bonds have significant effects on stock markets. The findings of Bjornland (2009) suggest no direct impact of oil prices on stock prices, but declares that the effect is indirect via other factors, especially monetary policy shocks. Cong et al. (2008) found no significant effect of oil prices on most Chinese stock markets, with one exception of significant impact on the manufacturing sector.

The Effect of Oil Prices on Different Asset Classes

While most studies in the literature examined the effect on stock markets on both national and sector levels in domestic and international stock markets, relatively less attention has been paid to the relationship between oil price movements and different asset classes, such as fixed income, other commodities, and real estate in different markets. Chan et al. (2011) examined the linkage between returns in three asset classes: financial assets (U.S. stock and Treasury bonds), commodities (oil and gold), and real estate assets (U.S. Case-Shiller index). They found two scenarios during the periods of economic expansion and crises. During economic expansion, stock markets have lower volatility and positive equity returns causing a switch from quality (e.g. gold) to stocks. In contrast, the crises periods can be characterized by higher volatility and sharp negative equity returns that spills over to oil and real estate assets. In addition, they find evidence of a flight to quality by switching investment from stocks to Treasury bonds. Huang and Lee (2009) investigate the effect of expected and unexpected oil price changes on Real
Estate Investment Trust (REITs) and the relationship between REIT returns and stock and bond returns. They conclude that an expected increase in oil prices has a significant positive impact on REIT returns. Therefore, REITs can be used as an appropriate hedging asset to inflation and increases in oil prices. However, REIT returns are negatively impacted by deflation and have more sensitivity to interest rates in the long term than in the short term. Sujit and Kumar (2011) examined the dynamic relationship between gold prices, oil prices, exchange rates, and stock returns using daily data from January 1998 to June 2011. They conclude that there is a weak long term relationship between these variables as gold is affected by exchange rates and exchange rates affect oil prices. Exchange rates are affected positively (negatively) by increasing (decreasing) oil prices in net exporting countries, such as Canada, while the reverse relationship was found in net importing countries, such as Japan. In addition, they conclude that changes in exchange rates affect positively or negatively companies’ profits, which has direct impact on stock market returns.

Different Approaches and Variables

While findings in the literature are mixed and studies differ in the methodology, data, period, and stock markets, the common approach in the asset pricing literature is to apply a standard model based on testing the oil price effect while taking into account other factors, such as interest rates, exchange rates, industrial production, and other factors. Hamao (1988), Jones and Kaul (1996) Kaneko and Lee (1995), Papapetrou (2001), Park (2007), Sandusky (1999), and Scholtens and Wang (2008) are a few examples of studies that apply this approach.

Although most of above findings agree that an increase in oil prices is a bad news for economic growth, the direction and the significance of the impact on equity (national and sector level) and real estate returns may vary depending on other factors. Some studies have contributed
this variance to the origin of the oil price shocks. Others have explained the variance by whether the country is net importing or exporting, advanced or oil dependent countries, and other national factors. On the sector level, the common agreement in literature is that positive oil price shocks (increase) will generally have a negative impact on all industries to different degrees, except oil and mining industries. Various studies suggest that variation in impact might be due to the degree of dependence of the industry on oil price, whether oil is a key input or output in the industry, the ability of the sector to use resources efficiently, the degree of competition in the sector, and other factors. Also, oil price shocks might impact financial markets indirectly via other variables, such as exchange rates, monetary policy, consumer confidence, and employment. As oil is either a direct or indirect input for a broad range of products in the vast majority of industries, conventional wisdom suggests that positive oil price shocks should have a negative impact on these industries, and therefore, the employment in these industries, where oil used as an input, and a positive impact on industry where oil is main output, such as oil industry. However, previous studies have shown a positive impact of oil price increases on real estate (Huang and Lee, 2009).

New Approach

Despite the attention that has been given to the effect of oil and other economic variables in the economic and finance literature, a majority of studies have focused on a specific country, region, or sectors. Limited studies focused on examining the effect of oil price changes on the same industries and asset classes, such as Financial, real estates, and commodities, across international markets. In this study, a comprehensive approach will be taken to examine the effect of changes in oil prices on two different asset classes (Financial and Real Estate assets) across international stock sectors and real estate markets. Select countries will be examined to
represent top net exporting and importing countries (Canada and U.S.). Following economic theory and conventional wisdom, the selection of industries is based on the degree of dependence of the industry on oil as an input or an output in net importing and exporting markets, and the documented linkage between the asset classes (oil, stocks and real estate) in highly integrated economies, such as U.S. and Canada.
CONCEPTUAL MODELS, RESEARCH OBJECTIVES, QUESTIONS AND HYPOTHESIS

The main goal of this study is to examine the effect of the movements of oil prices on different sectors within the stock markets and real estate in U.S. as top net importing and consuming country and Canada as one of the world’s top net exporting and consuming countries. The second goal is to test whether this effect (if it exists) is the same in different sectors within the domestic stock market. The third goal is to test whether this effect (if it exists) is the same in two different stock markets for top exporting and importing countries that have a large trading linkage and a high reliance on oil in their economies. The last goal is test if oil price movements can be used to explain the returns of certain sectors in the stock market, as well as real estate prices in the U.S. and Canada. This study attempts to answer the following questions, do all sectors have the same reaction to movements in oil prices? Is the effect on one sector is the same in net importing or exporting countries? Finally, can stock and real estate returns be explained by oil price movements?

Several prior studies in the finance and economic literature have shown mixed results. In general, most studies have confirmed that an increase in oil prices has a negative effect on the economy and, therefore, on the stock market. A limited number of researches have confirmed that the direction and significant of the effect is dependent on whether the country is a net importing or net exporting country. Distinguishing between countries and industries based on the degree of dependence on oil as an input or output made me believe that different industries within the same country will react differently to any increase (decrease) in oil prices. Furthermore, based on economic theory and conventional wisdom, I believe that the significance and direction of the effect is dependent on whether this sector is within a net importing or net exporting country. To our knowledge, no prior researchers have tested the effect on different
asset classes (Real Estate and different sectors within the Stock Markets) within the international markets, more specifically top net importing and exporting countries.

H1: Oil price movements have the same effect on all sectors within the same domestic stock market.

H2: The effect of oil price movements on stock market sectors and real estate is the same in net importing and net exporting countries.

H3: Oil price changes cannot be used to describe and explain stock and real estate returns.
METHODOLOGY AND MODELS

I use OLS multiple regression analysis to test whether oil price movements have an effect on each sector in both markets. I also test the significance and the direction of this effect using regressions and correlation matrix between variables in both current and one month lagged effect. I include and control for various variables depending on the country and the sector. Below are models for each sector.

Real Estate

\[
\% \Delta Y_{\text{CANRE}}(t) = \alpha + \% \Delta \beta_{1\text{OIL}(t)} + \% \Delta \beta_{2\text{TSX}(t)} + \% \Delta \beta_{3\text{CPI}(t)} + \% \Delta \beta_{4\text{MTG}(t)} + \% \Delta \beta_{5\text{POP}(t)} + \% \Delta \beta_{7\text{UNEMP}(t)} + \% \Delta \beta_{8\text{GDPPCAP}(t)} + \% \Delta \beta_{9\text{COMM}(t)} + \% \Delta \beta_{10\text{MNYSPLY}(t)} + \% \Delta \beta_{11\text{CADFX}(t)}
\]

(1)

Canadian Real Estate Model

Where:

\( Y_{\text{CANRE}} \) is the monthly percentage change in real estate prices in Canada represented by SPBCCAU Index S&P Canada BMI Property Price return.

Oil is represented by WTI, MTG is the average mortgage rates for all mortgages in Canada, POP is population size, UNEMP is the employment rate, GDPPCAP is the GDP per Capita, COMM is the average commodity prices, MNYSPLY is the money supply index provided by Bank of Canada, and CADFX is the Canadian exchange rate for USD.

U.S. Real Estate Model

\[
\% \Delta Y_{\text{USRE}}(t) = \alpha + \% \Delta \beta_{1\text{OIL}(t)} + \% \Delta \beta_{2\text{UNEMP}(t)} + \% \Delta \beta_{3\text{IP}(t)} + \% \Delta \beta_{4\text{MTG}(t)} + \% \Delta \beta_{5\text{COMM}(t)} + \% \Delta \beta_{6\text{POP}(t)} + \% \Delta \beta_{7\text{CPI}(t)} + \% \Delta \beta_{8\text{SP500}(t)} + \% \Delta \beta_{9\text{MNYSPLY}(t)} + \% \Delta \beta_{10\text{FORCL}(t)} + \% \Delta \beta_{11\text{PUTCALL}(t)} + \% \Delta \beta_{12\text{RENT}(t)} + \% \Delta \beta_{13\text{INCM}(t)} + \% \Delta \beta_{14\text{USDFX}(t)}
\]

(2)

Where:
Y_{USRE} is the percentage change of monthly returns of the SPCS20 S&P Case - Shiller 20 Composite index, as a proxy of real estate prices in U.S.

I use the same variables used in the Canadian real estate model. However, I added the following variables to the U.S. real estate model; FORCL represents number of foreclosures, and PUTCALL as the put-call ratio index, which represents investor sentiments and expectations about the market, change in average monthly rent, personal income, and UD foreign exchange rate.

Energy

Canadian Energy Sector:

\[
\% \Delta Y_{ENERGY(t)} = \alpha + \% \Delta \beta 1_{OIL(t)} + \% \Delta \beta 2_{GOLD(t)} + \% \Delta \beta 3_{OILSPLY(t)} + \% \Delta \beta 4_{OILMND(t)} + \\
\% \Delta \beta 5_{CADFX(t)} + \% \Delta \beta 6_{HRWAGE(t)} + \% \Delta \beta 7_{OILEXP(t)} + \% \Delta \beta 8_{POP(t)} + \% \Delta \beta 9_{ENRGCON(t)} + \% \Delta \\
\beta 10_{SPTSX(t)}
\]

(3)

U.S. Energy Sector:

\[
\% \Delta Y_{ENERGY(t)} = \alpha + \% \Delta \beta 1_{OIL(t)} + \% \Delta \beta 2_{OILSPLY(t)} + \% \Delta \beta 3_{OILMND(t)} + \% \Delta \beta 4_{OILEXP(t)} + \\
\% \Delta \beta 5_{US.FX(t)} + \% \Delta \beta 6_{GOLD(t)} + \% \Delta \beta 7_{S&P500(t)} + \% \Delta \beta 8_{IP(t)} + \% \Delta \beta 9_{PUTCALL(t)} + \% \Delta \\
\beta 10_{HRWAGE(t)} + \% \Delta \beta 11_{CPI(t)} + \% \beta 11_{ENRGCONS(t)}
\]

(4)

Financial Sector

Canadian Financial Sector

\[
\% \Delta Y_{FIN(t)} = \alpha + \% \Delta \beta 1_{PROPPRICE(t)} + \% \Delta \beta 2_{OIL(t)} + \% \Delta \beta 3_{IP(t)} + \% \Delta \beta 4_{TBILL(t)} + \% \Delta \\
\beta 5_{AVGMTG(t)} + \% \Delta \beta 6_{CADFX(t)} + \% \Delta \beta 7_{GDPERCAP(t)} + \% \Delta \beta 8_{UNEMP(t)} + \% \Delta \beta 9_{POP(t)} + \% \Delta \\
\beta 10_{AVGCOMM(t)} + \% \Delta \beta 11_{MNYSUPPLY(t)}
\]

(5)

U.S. Financial Sector

\[
\% \Delta Y_{FIN(t)} = \alpha + \% \Delta \beta 1_{OIL(t)} + \% \Delta \beta 2_{S&P500(t)} + \% \Delta \beta 3_{CASESHILR(t)} + \% \Delta \beta 4_{MNYSPLY(t)} + \\
\% \Delta \beta 5_{MTGRATE(t)} + \% \Delta \beta 6_{INCOME(t)} + \% \Delta \beta 7_{FORCLOS(t)} + \% \Delta \beta 8_{USDFX(t)} + \% \Delta \beta 9_{POP(t)} + \\
\% \Delta \beta 10_{CPI(t)} + \% \Delta \beta 11_{IP(t)} + \% \Delta \beta 12_{GOLD(t)} + \% \Delta \beta 13_{GDPERCAP(t)} + \% \Delta \beta 14_{PUTCALL(t)}
\]

(6)
Basic Material Sector

Canadian Basic Material Sector

\[ \% \Delta Y_{MAT(t)} = \alpha + \% \Delta \beta_{1OIL(t)} + \% \Delta \beta_{2GOLD(t)} + \% \Delta \beta_{3AVGCOM(t)} + \% \Delta \beta_{4CADFX(t)} + \% \Delta \beta_{5IP(t)} + \% \Delta \beta_{6HRWAGE(t)} + \% \Delta \beta_{7UNEMP(t)} + \% \Delta \beta_{8POP(t)} + \% \Delta \beta_{9CPI(t)} + \% \Delta \beta_{10SPTSX(t)} \]  \hspace{1cm} (7)

U.S. Basic Material Sector

\[ \% \Delta Y_{MAT(t)} = \alpha + \% \Delta \beta_{1OIL(t)} + \% \Delta \beta_{2PUTCALL(t)} + \% \Delta \beta_{3USDFX(t)} + \% \Delta \beta_{4COMM(t)} + \% \Delta \beta_{5MS&P500(t)} + \% \Delta \beta_{6IP(t)} + \% \Delta \beta_{7UNEMP(t)} \]  \hspace{1cm} (8)

Utilities Sector

Canadian Utilities Sector

\[ \% \Delta Y_{UTL(t)} = \alpha + \% \Delta \beta_{1SPTSX(t)} + \% \Delta \beta_{2OIL(t)} + \% \Delta \beta_{3POP(t)} + \% \Delta \beta_{4CPI(t)} + \% \Delta \beta_{5ENRGCON(t)} + \% \Delta \beta_{6IP(t)} + \% \Delta \beta_{7UNEMP(t)} + \% \Delta \beta_{8AVGCOM(t)} \]  \hspace{1cm} (9)

U.S. Utilities Sector

\[ \% \Delta Y_{UTL(t)} = \alpha + \% \Delta \beta_{1OIL(t)} + \% \Delta \beta_{2POP(t)} + \% \Delta \beta_{3COMM(t)} + \% \Delta \beta_{4CPI(t)} + \% \Delta \beta_{5IP(t)} + \% \Delta \beta_{6ENRGCONS(t)} + \% \Delta \beta_{7INCOME(t)} + \% \Delta \beta_{8USDFX(t)} + \% \Delta \beta_{9PUTCALL(t)} + \% \Delta \beta_{10GDPERCAP(t)} \] \hspace{1cm} (10)

Consumer Staples

Canadian Consumer Staples Sector

\[ \% \Delta Y_{CS(t)} = \alpha + \% \Delta \beta_{1OIL(t)} + \% \Delta \beta_{2POP(t)} + \% \Delta \beta_{3FX(t)} + \% \Delta \beta_{4CPI(t)} + \% \Delta \beta_{5GDPERCAP(t)} + \% \Delta \beta_{6IP(t)} + \% \Delta \beta_{7MNYSPLY(t)} + \% \Delta \beta_{8UNEMP(t)} + \% \Delta \beta_{9USDFX(t)} + \% \Delta \beta_{10GDPERCAP(t)} + \% \Delta \beta_{11CONCONF(t)} + \% \Delta \beta_{12AVGMTG(t)} + \% \Delta \beta_{13HRWAGE(t)} + \% \Delta \beta_{14TSX(t)} \]  \hspace{1cm} (11)

U.S. Consumer Staples Sector

\[ \% \Delta Y_{CS(t)} = \alpha + \% \Delta \beta_{1OIL(t)} + \% \Delta \beta_{2IP(t)} + \% \Delta \beta_{3FX(t)} + \% \Delta \beta_{4INCONE(t)} + \% \Delta \beta_{5MEDRENT(t)} + \% \Delta \beta_{6USDFX(t)} + \% \Delta \beta_{7GOLD(t)} + \% \Delta \beta_{8MNYSPLY(t)} + \% \Delta \beta_{9POP(t)} + \% \Delta \beta_{10COMM(t)} + \% \Delta \beta_{11CPI(t)} + \% \Delta \beta_{12USUNEM(t)} + \% \Delta \beta_{13GDPERCAP(t)} + \% \Delta \beta_{14HRWAGE(t)} \]  \hspace{1cm} (12)

- \hspace{1cm} Y(t) \text{ for } (t) = 1 \ldots T.

- \hspace{1cm} And \alpha is the intercept. It gives the value of Y (sector returns) where the regression line meet the Y axis and independent values Xs = 0.
- A one, two and three months lag model \((t-1), (t-2)\) and \((t-3)\) is applied on all above models to test the ability to describe the stock and real estate markets using the oil price changes.

- All independent variables are defined in Table 1, while Table defines all dependent variables used in this study.
DATA

I study the impact of oil price movement in different sectors in the U.S. and Canadian market from February 2001 to March 2013. This period covers high fluctuation in oil prices, booms, and busts in both stocks and real estate markets. The sample period includes, apart from the recent financial crisis 2007-2008, other major events, such as some of the bust and rebounding in stock markets due to the .com bubble crises in 2000-2001, War in Iraq in 2003, and boom in housing and real estate markets in both countries in 2006 followed by the financial crises. I collected the data for the monthly percentage changes in oil prices, five stock market sectors, and real estate returns from Bloomberg. I used the Western Texas Intermediary (WTI) crushing crude oil spot prices as one of the world’s benchmark for oil prices due to its high quality. It is also the main price used for oil trading between U.S. and Canada (U.S. Energy Information Administration, 2013a).

I use the monthly percentage change in S&P 500 as a proxy for U.S. stock market, and the S&P/TSX composite index as a proxy for the Canadian stock market. I also use six different sector indices from each country; S&P TSX Capped Real Estate Index as a proxy for Canadian real estate prices and S&P Case-Shiller 20 as a proxy for U.S. real estate prices. In addition, I use the indices of Financial, Energy, Utilities, Consumer staples, and Materials sectors from each country to examine the effect of oil price movements (while controlling for other variables) on each sector within each country and in the two net exporting and importing countries. All above data were collected with a monthly frequency from Bloomberg. I control for various variables, including industrial production as a proxy for output and GDP, exchange rates as it is affected by oil prices and it affect companies’ profits negatively or positively depending on the direction of the change and weather the company and the sector is net importer or exporter. I use mortgages
rates due to their effect on real estate markets. Interest rates has been also used as it could affect the discount rate for companies future cash flows therefore, their stocks expected returns. I include money supply and Consumer Price Index (CPI) as a proxy for inflation and purchasing power. Unemployment rates, personal income, commodity indices, oil export in each country are also some of the variables that I use in research models. In addition, I control for global variables that may affect both countries, such as monthly global demand and supply of oil and monthly gold prices per ounce. All data were collected from Bloomberg with a monthly frequency with the exception of some annual and quarterly data that were converted to a monthly either by dividing by 12 months for annual data or by 3 months for quarterly data.
DATA ANALYSIS AND DISCUSSION OF RESULTS

Real Estate

Correlation coefficients for oil prices within each sector at immediate and 3 different time lags are summarized in table 3. Equations 1-12 were estimated using OLS regression. Results are shown in Table 4. Oil price movements appear to have no significant effect on U.S. real estate market as a net oil importing country with more diversified industries. Correlation analysis show very low negative correlation at -0.07 between oil prices and U.S. real estate. However, this relation changes over the second and the third lag to no correlation with a trend of having positive impact over time. On the other hand, Our regression analysis shows that oil price changes are marginally significant effect on Canadian real estate prices with p-value of 0.159 and higher negative correlation of -0.32. This can be explained by the higher dependence of Canadian economy and, therefore, the real estate and stock markets on oil as main output of the economy that highly contribute to the Canadian GDP.

I performed first; second and third month lagged regression analysis (t-1, t-2 and t-3) to test whether there is a lagged effect of oil prices on real estate. Which, therefore, illustrates the ability to, associate and describe real estate price changes using changes in oil prices. Results for the U.S. market show that the low negative sensitivity to oil price change has disappeared and no significant effect has been found up to the third lag test. On the other hand, the first lag test shows a new finding of highly negative significant effect on Canadian real estate prices at .01 level with a higher negative correlation at -.42. This correlation decrease over the second and the third lag period to a very low positive correlation, which has been noticed as a common trend in both US and Canadian real estate sectors. These mixed results might be due to the different
industrial structure of countries, higher dependence of Canadian economy on oil as a primary out
and main contributor to their GDP compared to more diversified economy in the US. These two
different results of the effect of oil prices on the real estate markets in two different highly
integrated economies allows me to reject the null hypothesis that the effect of oil price changes is
the same in net importing versus exporting countries. It is important to note that I see a closer
correlation between both markets as a result of the NAFTA agreement and the high dependence
of each economy.

Energy

Correlation coefficients for oil prices within each sector at immediate and 3 different time
lags are summarized in Table 3. Equations 3 and 4 were estimated using OLS regression. The
results of simple and multi regression analysis for the energy sector are shown in Table 4. I find
a closer and similar highly negative significant effect of oil prices on the Energy sectors in both
countries at the .01 level in immediate and first month lag. High correlation between the price of
oil and the performance of the sector was found with a slightly higher correlation in the Canadian
market. This result can be interpreted as suggesting that both sectors are affected to a similar
degree due to high dependency on oil prices as an industry output and being in top producing
countries with high trading linkage. While both sectors are highly dependent on oil prices, I find
a slight lower correlation (dependence) of U.S. energy sector on oil prices in both current, one
and two months lagged period This may be due to the booming shale technology that has
increased oil and gas production in the U.S. market, a strong domestic demand, and other factors
that make this sector less sensitive to oil price movements. On the other hand, I find a higher
sensitivity of the Canadian oil sector on oil price movements. This could be due to less
diversified economy where oil production and exports represents a higher percentage of the
Canadian GDP, higher competition by US Energy sector that do not have the added transportation costs that Canadian exporters have to incorporate in their sale price. While finding a high significant effect in both sectors was expected following economic theories and our assumption, finding a negative effect in the short term came as surprising finding. I examined the trend of the correlation and find this negative sensitivity decrease over time. This could be due to the nature of sales and contracting in this sector as current sales contracts are usually based on previous prices of oil. This added risk of relying on highly fluctuating oil prices especially in the last decade, makes participants in this sector such as oil producers, exporters, importers, investors and other interested parties actively involved in a higher usage of hedging and speculation techniques to either mitigate or speculate on oil price fluctuation. This suggests that this sector will need more time to realize the benefits of increased oil prices therefore, increase in their revenues and sectors returns. These results allow me to reject the first and second null hypotheses. In this case both sectors have oil as a main output with high production and consumption rates in both countries. This may explain why there are similar results from both sectors in the two countries.

Financial Sector

I find different results coming out of my analysis to the financial sector. Results are shown in Table 4 in addition to summary of correlation coefficient results in Table 3. While I found a marginal significance effect of oil price movements on U.S. financial sector with p-value of approximately at .14 level with a lower negative correlation, a significant effect on the Canadian financial sector was found with a p-value at .10 level and a higher negative correlation of approximately -.29. Further analysis shows a highly significant one lag negative effect at .01 level in both sectors. Interesting finding that negative correlation in both sectors decreases over
time from a high negative to low positive sensitivity in the third lag period for the Canadian sector comparing to a decease to no correlation in the US sector. This could be due to the larger size and market capitalization of US financial sector, more effective hedging techniques, and more diversified economy, which make other factors and sectors to have a higher contribution to sector’s performance, which is not the case in the Canadian financial sector. Trend analysis of correlation suggest that the short term negative effect may turn into a long term positive effect on the sector, this could be due to the indirect and direct effect that oil may have on increasing wealth, living standards, money supply and improving other factors that may effect this sector.

Basic Material

Regression results for the basic materials sector are shown in Table 4. Correlation Coefficients of the sector’s correlation with oil price changes are summarized in Table 3. While I find that oil price movements have no immediate significant effect on U.S. and Canadian material sectors; the first lag analysis shows a highly significant negative effect on both sectors at .01 significance level. This could be due to high correlation and dependence of this sector on oil as an input represented by -.40 and -.30 correlation in US and Canada sectors respectively and the cyclical nature of this sector. Increased oil prices increase inflation and costs of production squeezing sectors profits in the short term. If an increase in oil price is a result of an economic expansion, the negative effect may decrease and reverse to a positive effect in the long term. Results might be affected by the recent recession in both countries and the global crises. Hedging and speculating techniques are highly used in this sector. Gold and other basic material are also used to hedge against inflation in the expansion stage as well as a safer heaven for investments in the downturn. All of these suggested reasons might be behind disappearing significant effect in
the immediate, second and third lag results as well as changing trend of correlation with oil prices.

Utilities

Results for the utilities sector are shown in Table 4. Correlation Coefficients of the sector’s correlation with oil price changes are summarized in Table 3. Results shows that oil price changes did not have significant effect on Canadian utilities sector in the immediate and 3 lags period. Results coming from the US utilities sector show a significant negative effect at .05 level in the second lag period with a generally higher correlation with oil prices at -0.21 approximately comparing to a low correlation of -0.07097 in the Canadian sector. These results can be better understood when investigating the nature of this sector. This sector highly invests in infrastructure to generate their revenues which need a high investment capital, higher leverages in their capital structure and therefore, higher sensitivity to interest rates. Hedging techniques are also used to mitigate the risk of fluctuating interest rates, costs of input and operations. The difference between both sectors might be contributed to the different pricing strategies used in each sector, degree of the competition and other factors. Canadian sector tend to be dominated by a few giant companies after long time of government high investment in this sector, less competition and higher ability to mitigate risk by applying variable pricing strategy that pass an increase of input prices to customers therefore, the ability to reduce the impact of oil price movements on their returns which shown to very low negative correlation with oil prices. On the other hand, the US utilities sector is more competitive with a common use of fixed term contracts to penetrate market share which does not allow them to mitigate their risk effectively especially when input prices including oil are rising (Deloitte, 2013).
Consumer Staples

As shown in Table 4, the regression results of sector shows that oil price movements have no significant effect on U.S. and Canadian consumer staples sectors. However, further testing shows a significant one month lagged effect at .05 level on the U.S. sector. Correlation coefficients for oil price association to consumer staples sectors in both countries are summarized in Table 3. Correlation analysis shows interesting results. Canadian sector tend to have a very low negative correlation at -.01294 and -.08077 comparing to a slightly higher negative sensitivity shown in US sector at -.184 and -.178 approximately for the immediate and first lag period respectively. These correlations change for the second and third lag periods in both sectors to a positive correlation and impact. While oil is used as an input in producing a broad range of products, including food, beverages and tobacco, staples are generally known as having a low price elasticity of demand due to the noncyclic nature of this sector. This also may explain the low correlation of this sector to the stock market represented by S&P/TSX & S&P500 in Canada and U.S. In other words, demand for these products is less sensitive to price changes as people always need to buy food and drinks, and they may switch to cheaper substitute products during the downturn of the economy. Further explanation for this difference might be relating back to the role that oil play in the Canadian economy and the effect on the consumer staples in both countries. An increase in oil price benefit the Canadian economy as revenues from oil exports will increase, transferring wealth from the US to the Canadian economy. However, this increase may lead to a stronger Canadian dollar which will boost the purchasing power of Canadian consumers in both Canadian and US consumer staples markets which may explain the reversal of the impact in the second and third lag periods in both sectors.
Based on above analysis, I find that oil price changes can have different levels of effect on different sectors within the same stock market based on the degree of dependence of that sector on oil as an input or an output. Results also indicate that the effect on one sector in oil exporting country is different than the effect on the same sector in oil importing country. Our analysis of lagged effects shows the ability to describe and associate stock and real estate markets using lagged changes in oil prices.
CONCLUSIONS AND FUTURE WORK

In this study, I examine the effect of oil price movements on international stock markets using new approaches. I built my study and hypotheses based on mixed results from previous studies. I also extended the research topic to test the effect of oil price movements on domestic and international sectors and real estate in two top net importing (U.S.A) and top net exporting countries (Canada). Both of these countries highly depend on oil as an input or output in their economies, both are top oil producing and consuming countries with the largest trading partnership in the world. This made me believe that the recent increase in the oil production in US due to booming shale technology that is expected to continue will not only impact the US and Canadian stock and real estate market but will extend to the global stock and real estate markets. In addition, I developed different models for each sector based on the special characteristics of the sector within each market. Finally, to my knowledge, this is the first study that examines the relationship between oil price movements and real estate markets in top net importing and exporting countries.

I apply simple and multiple OLS regression and correlation analysis to test the significance (if any), strength, and direction of the effect on each sector. I based my assumptions on the mixed findings in the economic and finance literature, which generally agree that sectors will be affected based on the degree of reliance on oil as an input or an output in net exporting versus net importing countries. I also tested for one, two and three month lagged effect and found mixed results for each sector in each country. My analysis results in the following empirical findings. First, the effect of oil price movements on stock markets is different across sectors based on the dependence of the sector on oil as an input or output. Therefore, I am able to reject the H1 hypothesis. Secondly, the effect of oil price movements on each sector is different
depending on whether this sector is in a importing or an exporting economy. This finding enabled me to reject the H2 hypothesis. Third, the significance and direction of the effect could change over time. A sector can be affected positively (negatively) in one period. However, this, effect may reverse in the later period as shown in real estate and consumer staples sectors as an example Forth, I find a significant effect of oil price movements on real estate prices in Canada but no significant effect on real estate prices in U.S. which leads to conclude that the return of certain sectors in the stock markets and real estate can be explained and understood by oil price changes. Part of this finding confirms the finding of Jones and Kaul (1996); that oil price movements can predict both U.S. and Canadian stock market. However, I add new findings on the sector level as well as ability to explain and understand real estate market prices in Canada using changes in oil prices. This finding confirms the ability to reject H3. Finally, I also conclude from analyzing all results from each sector that the effect of oil price movements is more significant in oil exporting countries, which is consistent with the findings of Wang et al. (2013).

These findings suggest that investment and portfolio managers, Governments and investors need to hedge against oil price movements in both directions. I found that both stock and real estate markets in U.S. and Canada are highly co-integrated and move together to a certain degree. Therefore, effective diversification cannot be achieved by investing the market indexes unless it is combined with sectors diversification as well. Sectors within each of these markets should not be expected to have the same reaction to changes in oil prices. This suggests that sectors’ diversification is an essential part of an effective diversification strategy within the North American markets, rather than merely a geographical diversification within the region. A greater degree of geographical and sector diversification globally in countries with a lower dependence on oil in their GDP might be beneficial for investors seeking further diversification.
of their investment. Future work may focus on expanding the topic to other countries that are net exporting and highly dependence on oil in their GDP, such as Arab Gulf countries versus non-oil producing countries, developing versus developed, and other groups of countries. Also, a separation of effect based on different economic cycles and periods could be an area for future studies.
REFERENCES


## APPENDICEIS

1. Dependent Variables, Names and Descriptions

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WTI0IL</td>
<td>West Texas Intermediate as a benchmark for oil prices</td>
</tr>
<tr>
<td>USIP</td>
<td>US Industrial production</td>
</tr>
<tr>
<td>HMAFORD</td>
<td>Home buyer affordability index</td>
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<td>HOMSUP</td>
<td>Monthly home supply available for sale (not including foreclosures sale via auctions)</td>
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<td>National average rate for 30 year fixed rate mortgage rate in US</td>
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<td>Hourly wages</td>
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<td>US SP &amp; BMI REIT Index</td>
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<td>Median monthly rent in US</td>
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<td>Global oil supply</td>
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<td>OILDEMND</td>
<td>Global oil demand</td>
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<td>OILEXPORT</td>
<td>Oil export for each country</td>
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<td>FORCLOS</td>
<td>Foreclosure index showing # of outstanding foreclosures in US</td>
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<td>INCOME</td>
<td>Level of household income in USA</td>
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<td>A ratio of the trading volume of put options to call options indicate investors sentiment</td>
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<td>US population</td>
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<td>As a proxy to US stock market</td>
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<td>Average mortgage rates for all Canadian fixed rates mortgages</td>
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2. Independent Variables, Names and Descriptions

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<th>Variable Name</th>
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<tr>
<td>PROPRPRICE</td>
<td>S&amp;P &amp; BMI property prices index for top Canadian metropolitan cities.</td>
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<td>S &amp; P Case Chiller 20 Index (top 20 cities in U.S.) as a proxy to real estate prices in USA</td>
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3. Correlation Coefficients of Oil Correlation with Each Sector

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<td>-0.0942711</td>
<td>-0.026368147</td>
</tr>
</tbody>
</table>
### 3. Summary of Regression Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model</th>
<th>Coefficient (P-Value)</th>
<th>Coefficient (P-Value)</th>
<th>Coefficient (P-Value)</th>
<th>Coefficient (P-Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Canadian Real Estate Model 1</td>
<td></td>
<td>US Real Estate Model 2</td>
<td></td>
<td>Canadian Energy Sector Model 3</td>
</tr>
<tr>
<td>WTIoIL</td>
<td>-6.14555 (0.159305)</td>
<td>0.009466948 (0.994041)</td>
<td>-15.8919 (0.001172)***</td>
<td>-14.90900183 (0.001253)***</td>
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</tr>
<tr>
<td>OILLAG 1</td>
<td>-27.802755 (9.15E-07)***</td>
<td>-0.333993935 (0.778741)</td>
<td>-38.499918 (1.13E-09)***</td>
<td>-27.79614921 (3.27E-06)***</td>
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</tr>
<tr>
<td>OILLAG2</td>
<td>-6.1133444 (0.275947)</td>
<td>0.039275974 (0.974487)</td>
<td>1.44629927 (0.812595)</td>
<td>-0.54164386 (0.927261)</td>
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</tr>
<tr>
<td>OILLAG3</td>
<td>5.8504026 (0.283109)</td>
<td>0.233622185 (0.844754)</td>
<td>1.01635048 (0.86382)</td>
<td>-1.101284371 (0.848472)</td>
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</tr>
<tr>
<td></td>
<td>Canadian Financial Sector Model 5</td>
<td></td>
<td>US Financial Sector Model 6</td>
<td></td>
<td>Canadian Material Sector Model 7</td>
</tr>
<tr>
<td>WTIoIL</td>
<td>-6.69843 (0.081299) *</td>
<td>-5.154080586 (0.139228)</td>
<td>2.669123 (0.600297)</td>
<td>5.584398 (0.182458)</td>
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</tr>
<tr>
<td>OILLAG 1</td>
<td>-16.183754 (0.00025) ***</td>
<td>-19.84387603 (0.003631) ***</td>
<td>-22.108701 (0.002043) ***</td>
<td>-27.43954876 (8.94E-06) ***</td>
<td></td>
</tr>
<tr>
<td>OILLAG2</td>
<td>-5.3290548 (0.23287)</td>
<td>-8.647230144 (0.214182)</td>
<td>-7.6396157 (0.294997)</td>
<td>-9.435585761 (0.127049)</td>
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</tr>
<tr>
<td>OILLAG3</td>
<td>-5.3290548 (0.23287)</td>
<td>-8.647230144 (0.214182)</td>
<td>-8.3043261 (0.241945)</td>
<td>-3.19383279 (0.593587)</td>
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</tr>
<tr>
<td></td>
<td>Canadian Consumer Staples Model 9</td>
<td></td>
<td>US Consumer Staples Model 10</td>
<td></td>
<td>Canadian Utilities Sector Model 11</td>
</tr>
<tr>
<td>WTIoIL</td>
<td>-1.15369 (0.786911)</td>
<td>-1.281640511 (0.755373)</td>
<td>0.228853 (0.966443)</td>
<td>1.835244425 (0.758187)</td>
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</tr>
<tr>
<td>OILLAG 1</td>
<td>-4.0498426 (0.247525)</td>
<td>-6.1344484916 (0.046214)**</td>
<td>-3.3977637 (0.427569)</td>
<td>-5.7115131 (0.209848)</td>
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</tr>
<tr>
<td>OILLAG2</td>
<td>2.84591368 (0.430994)</td>
<td>-2.064018978 (0.513553)</td>
<td>-0.7502027 (0.865233)</td>
<td>-10.6359561 (0.024703)**</td>
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</tr>
<tr>
<td>OILLAG3</td>
<td>0.52369024 (0.881289)</td>
<td>2.998897941 (0.328948)</td>
<td>-3.9242081 (0.36147)</td>
<td>2.294426172 (0.614901)</td>
<td></td>
</tr>
</tbody>
</table>

* = 10% significance  ** = 5% significance  *** = 1% significance