OIL & TERRORISM:
HOW TERRORISM AFFECTS OIL RENTS

DILLON F. FARRELL

A Thesis

Submitted to the Faculty of Mercyhurst University

In Partial Fulfillment of the Requirements for

The Degree of

MASTER OF SCIENCE
IN
APPLIED INTELLIGENCE

RIDGE COLLEGE OF INTELLIGENCE STUDIES AND APPLIED SCIENCES
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DEDICATION

I would like to dedicate this thesis to my family, for all their love and support throughout my life. I would also like to especially note my father, who has always been a strong proponent of graduate school and the lessons learned there.

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ABSTRACT OF THE THESIS

Terrorism & Oil:

How Terrorism Affects Oil Prices

A Critical Examination

By

Dillon F. Farrell

Master of Science in Applied Intelligence

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Professor Orlandrew Danzell, Chair

The purpose of this thesis was to assess the impact terrorism has on oil prices. To conduct the study, a mixed-methods approach was used, although primarily quantitative analysis was used to determine terrorism's effect on the oil market. Due to existing data, the dependent variable used was *oil rents*, which is an alternative method for assessing yearly oil prices. The findings indicate that domestic terrorism does increase oil rents, and therefore increases oil prices. Due to terrorism data being coded predominantly as *domestic terrorism*, the general theory can be applied that terrorism increases oil prices. Future research is advised, and the data sample still had some gaps that would ideally be filled to increase the robustness of the study. That said, this study provides results that should assist in policymakers in their decisions regarding energy security, especially as it relates to potential contingency plans regarding terrorist attacks against the oil industry.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ABBREVIATIONS

AQI – Al-Qaeda in Iraq

DHS – Department of Homeland Security

GDP – Gross Domestic Product

GTD – Global Terrorism Database

ISIS – Islamic State of Iraq & Syria

MENA – Middle East & North Africa

NYSE – New York Stock Exchange

OAPEC – Organization of Arab Petroleum Exporting Countries

OPEC – Organization of Petroleum Exporting Countries

PCSE – Panel Corrected Standard Error

START – National Consortium for the Study of Terrorism and Responses to Terrorism

VIF – Variance Inflation Factors

INTRODUCTION

Introduction to the Problem

The primary goal of this thesis is to identify whether terrorism influences the global market price of oil, and if so to what degree is the effect. Due to the existing data, a mix-methods approach was employed for this thesis, although it is primarily quantitative. Due to the existing data available, oil rents as the variable to assess oil prices in the empirical estimations. Ever since that tragic day on September 11th, 2001 and the ensuing conflicts in the Middle East, concerns over global oil prices has grown due to the importance of the oil industry in the Middle East and its nexus with conflict. While there has not been an oil crisis similar to the one during the 1970s, there is growing concern that terrorism can pose a major threat to the world's supply. It is due to this fear among policymakers, American citizens, and economic interest that makes this study crucial and timely. This study attempts to determine primarily in a quantitative way whether terrorism has an effect on oil rents, and as a result assess the effect terrorism has or does not have on oil prices in general.

Existing research is largely dated and limited as far as determining if and how exactly terrorism affects the oil market, and to what degree if any. Also, more recent research is mostly economic driven (not too focused on national security concerns) and a large portion of qualitative or limited to just a few regional cases. Much of the research actually consists of how terrorism is fueled by oil. A recent anecdotal example would be the Islamic State of Iraq & Syria (ISIS), they currently control most of the oil resources in Syria and a large portion of oil resources in Iraq, and they are using this resource to generate millions of dollars in revenue daily (Koplowitz, 2015). There is also the concern of questionable donors in the Middle East, an area that compromises of many oil rich countries and hence have significant people.

Countries such as Saudi Arabia, the United Arab Emirates, Qatar, and others all have individuals with significant oil wealth, wealth that is sometimes reported to go to nefarious places and organizations in the region. This however is not the intent of this thesis, we know that terrorist groups use oil to fund their activities. The research in this thesis uses a mix-methods approach with a greater emphasis at the macro-level to assess how terrorism influences price fluctuations when all other factors are considered.

Background of the Problem

Much of the suggested threat of terrorism causing reverberations in oil prices is due to the fear of a crisis in a region full of oil rich countries. Of today's current top 20 oil producing countries, 7 are located in the Middle East & North Africa region (Weisenthal, 2012), which is sadly a region that has become a hotbed for terrorism. There also is a widespread perception amongst the populations in Arab countries that the West is only thirsty for cheap oil and that is the primary reason for the West involvement in the region. To a minor level, this thesis explores such assertions in a quantitative way. To what degree it is true or false can be debated, but the prevailing public opinion in the Arab world is that it is true, and thus making the region more hostile for the oil industry, especially for oil companies of western origin.

This assessment is likely correct, as evidenced by the United States importing approximately 27% of its consumption in 2014, which the lowest total since 1985 but still a significant percentage. Of the United States' oil imports of the last 20 years, approximately over 40% of that total originated from OPEC countries, a group that is largely from the Middle East & North Africa (EIA, 2015). Canada may be Americans' primary source of oil, but it is a fact that the United States still imports a large quantity of Middle Eastern oil; therefore, on the

surface, an argument can be made that the fear aspect of terrorism affecting the oil market is legitimate.

The fear also has a historical background. In October 1973, the Organization of Arab Petroleum Exporting Countries (OAPEC) instituted an oil embargo that lasted until March of 1974. This was due to American support of Israel in the Yom Kippur War of 1973. The conflict ended in a stalemate but it embroiled the region pitting Israel against several Arab countries, almost all of which were part of OPEC and OAPEC at the time. Oil prices rose from $3 per barrel to almost $12 per barrel. It wasn't until after Israel withdrew some of its forces from the Suez Canal in Egypt that the embargo was lifted and the economic crisis subsided (Myre, 2013). It wasn't long however until a new oil crisis ensued. In 1979, Iran underwent an Islamic Revolution in which the old regime led by Reza Shah Pahlavi was overthrown by Islamic Revolutionaries in Iran, led by Ayatollah Khomeini. Iran, which was and is a major OPEC member, suspended or seized operations in much of its oil sector. Even once the new Iranian Government restarted operations, the oil exports were at a much lower volume. The result was OPEC increasing oil prices. The crisis was further strained with the outbreak of the Iran-Iraq War in 1980. In addition US President Jimmy Carter announced the decontrol of oil prices. Eventually the energy crisis was resolved but for about a year long lines at gas stations and gasoline rationing became commonplace in America (Verleger, 1979).

Turmoil continued in 1991 with the outbreak of the Gulf War pitting a coalition led by the United States against Iraq and its infamous former leader Saddam Hussein. While oil is not the official reason for going to war, it certainly played a significant role in Operation Desert Shield, which protected Saudi Arabia and its precious oil fields from Saddam's forces, and Operation Desert Storm, which resulted in pushing out Iraqi troops from Kuwait.

As these examples show, there is historical evidence of Middle Eastern turmoil affecting the oil sector. The fear of a rogue "oil-state" in which extremist elements destabilize the oil sector is a constant concern. While the "Arab Spring" that began in 2011 initially was filled with hope for a free and open Middle East, the results thus far appear to be a failure and a situation that most would say is worse. With turmoil in the Middle East & North Africa at a fever pitch, there does not appear to be any decline in fear of instability in the oil sector.

Statement of the Problem

The nexus between terrorism and the oil market remains underexplored in quantitative studies. There have been studies analyzing the relationship between conflict and oil prices, but in this case, this thesis seeks to only examine its role on incidences of terrorism. This lack of information I believe leads to false conclusions about connections between terrorism and oil and could lead to false media narratives and uninformed policy maker decisions. Policymakers in the national security sector tend to look at problems from a worst case standpoint, this thesis should either alleviate or validate concerns over the impact terrorism has on the global oil market.

Purpose of the Study

The study's purpose is to explore the hypothesis that the independent variable –global terrorism since 1992– has an effect on the dependent variable, oil rents. As this problem statement explains, the two primary variables for this study are domestic and transnational terrorist attacks since 1992 and the corresponding oil rents for the same timeframe. For clarity's sake, according to the World Bank, "Oil rents are the difference between the value of crude oil production at world prices and total costs of production." Oil rents are measured as a percentage of a country's GDP. As a consequence of measuring the effect on rents, I will be

able to then accurately assess the effect on oil prices on a year-to-year basis. Energy security has become such a high level concern for policymakers that I believe it is pertinent to study quantitatively the impact terrorism may or may not have on the oil market (World Bank, 2015).

Research Questions

The topic for this thesis is to determine if global terrorism affects oil rents, and as a consequence what is the effect on global oil prices. In this thesis I will answer: Does global terrorism affect oil rents, and if so to what direction and to what degree of effect? As a secondary research question, I will also ask: Does terrorism in the Middle East and North Africa (MENA) region have any effect on corresponding oil rents, and if so to what degree and in what direction?

Definition of Terms

Terrorism

The main independent variable used in this thesis in this thesis is terrorism defined by START as: "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation" (GTD, 2015). This describes incidents that are inputted in the Global Terrorism Database (GTD), the terrorism data used in the quantitative portion of this thesis. It should be noted that for the primary research question all terrorism globally will be used when conducting the study. The secondary sub-question will only use terrorism attack data from the Middle East & North Africa (MENA) region. For clarity purposes, all terrorist attack data will use the definition from above.

Oil Rents

The definition for oil rents is according the World Bank, the difference in value between oil production at world prices and the total cost of production", and is measured as a percentage of a country's GDP. According to the New Statesman (2012), for Saudi Arabia the "volatility of worldwide oil prices results in large fluctuations in the percentage of GDP because of the economy's reliance upon the petroleum sector" (para. 1). Another way of describing oil rents is oil profits on a country basis. While not a perfect measure, this allows researchers to use oil rents as a method for evaluating oil prices on a year-by-year basis. As yearly oil prices increase, so will oil rents, although this is adjusted for each country's prices. In addition, oil prices have several different pricing systems and vary by oil quality, thus finding a uniform yearly price difficult to account for each country. Due to time constraints I needed to use data on a year-by-year basis, and I needed accurate aggregated oil market data for each country and year; therefore, oil rents was the best possible proxy for this study.

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Nature of the Study

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The general framework is that there is a basic theory that terrorism affects oil rents, and in light of today's post 9/11 world, many people believe terrorism in the Middle East & North Africa (MENA) region in particular affects the oil market. For the purpose of this thesis, my general theory and hypothesis is that terrorism has a positive effect on oil rents. What this means is that based on this theoretical framework and hypothesis, as the total number of terrorism attacks increase so should oil rents, and vice versa when the total number of terror attacks decrease I should see a decrease in the price of oil. As part of my sub-questions I will also be testing the theory that terrorism in the MENA region results in an increase in corresponding oil rents.

The data for the dependent variables, *domestic* and *transnational terrorism*, was derived from the Global Terrorism Database (GTD), composed by the National Consortium for the Study of Terrorism and Responses to Terrorism (START). The independent variable, *oil rents*, was obtained from the World Bank. For the primary research question all available global terrorism attack data from 1992 to 2014 was used, and for the secondary research question I used all available Middle East & North Africa (MENA) terrorist attack data from 1992 to 2014. I also used available oil rent data dating from 1992 to 2014. It should be noted that due to the structure of the GDT, 1993 terrorism data is not included in the study.

Relevance and Significance of the Study

There are limited studies available discussing the impact terrorism has on the oil market. Due to conflicts in the Middle East over the last few decades people believe oil plays a large role in US counterterrorism actions, but there have been no quantitative studies as to if and or how terrorism actually affects the oil market. This quantitative study will hopefully answer this question and either validate or disprove some of the narratives that have been written and spoken about with regards to the oil and terrorism relationship.

Assumptions and Limitations

The primary limitation of the quantitative study in this thesis is it does not take into account the maximum number external factors that can affect the oil market. Situations such as the global economic crisis in 2008, extreme weather disasters, and restrictive legislation can all have a significant effect on the price of oil. Terrorism related control variables will be implemented into the study, but a large-scale macro-environmental level analysis will be conducted and it is too difficult to control for every large world event that can affect the oil market.

The main delimitation of the study is a self-imposed timeframe. I used 1992 as my primary benchmark up until the end of 2014. This time period will cover the post-Gulf War era in 1992 through the 1990s and into this post 9/11 era, providing a solid 23-year timeframe to analyze. This timeframe does not include the year 1993 due to the structure of the Global Terrorism Database. Further research and data collection for more years would be advisable, but this is the best operationalized data available at present time. Another limitation is the availability of accurate data at a country-level basis. Some countries have less oil rent data available compared to other countries in the data set, and some do not have any oil rents data at all.

Organization of the Study

This study will be presented in the following manner: This next chapter contains the literature review which examines the extant literature on the role of terrorism and its influence on the oil market and the economy. A theoretical framework will also be presented detailing this thesis contribution to the field, followed by a case study analysis providing support for the theoretical framework. Chapter three describes the empirical approach, specifically the statistical analysis used in this study and the overall limitations. The fourth chapter will include the results of the quantitative methods conducted for this thesis. Finally, chapter five will summarize the results from the study, note the implications of this study, and provide recommendations for further research.

LITERATURE REVIEW

Introduction to the Literature Review

There are numerous articles and studies about terrorism and its effect on other aspects of life, and many news articles about the geopolitical relationship between oil and terrorism or conflict in general. Quite simply, oil resources is a source of power, so any threat such as terrorism that can affect the security of such power source is going to be quite controversial and discussed about often. Some researchers and analysts even believe it was a primary reason for the US invasion of Iraq in 2003.

Terrorism is seen as affecting all walks of life, either directly, such as targeting key infrastructure, or indirectly. In other words, terrorism can have a domino effect where it leads to changes across the spectrum of society. An example of this is during the tragic days following September 11th, 2001. On the first day of trading on the New York Stock Exchange (NYSE) post-9/11, the market fell 684 points and is one of the drops in exchange history (Davis, 2011). There also are more complex effects, such as political leaders engaging in combat to protect energy facilities as a result of terrorism or the threat of terrorism. This can be seen in the actions by the US in Iraq.

What this study hopes to assess is the true validity of terrorism's effect on oil rents, and as a result prices, and to determine the direction of the effect if there is one. Analysts in the past have predicted changes in oil prices following terrorist activity, what this study hopes to do is determine whether those assessments are warranted or mostly coincidence. First though, I will discuss and analyze the known literature today discussing terrorism's impact on the oil market. In order to have a more robust literature review, I will be using studies that assess conflict in general as it relates to the oil market, in addition to terrorism. In addition, a case

study analysis was included in this chapter. This case study is meant to provide additional background information for the theoretical framework in this chapter.

Review of the Research Literature

Impact of 9/11 on the US Economy

It is vital to assess how terrorism affects life in general. Terrorism causes a lot of shock and fear, and it is important to study how and if those emotional reactions carry over to the economy (Hoffman, 2006). Diving further into general life, Jackson (2008) conducted a study on the impact terrorism has on the US economy. Specifically, the purpose of Jackson's (2008) paper is to examine several facets the US economy and the effects the 9/11 attacks may or may not have had. The facets she studies are: the impact on the US stock market, the impact on US economic growth, the impact on the consumer confidence in the form of spending, the impact on foreign direct investment in the United States, and the impact on fiscal policy and budgetary resources. She proposes three camps of forecasting that existed prior to 9/11 on what effect such a catastrophic attack would have on the US economy. The first camp said such an attack would worsen the economy and case a recession. The second camp predicted that the national economy would largely remain on the same path it was before an attack, and the third camp predicted benefits as a result of increased spending on security and technology. The author argues at the beginning of her paper that while there were costs to the US economy, some benefits may have accrued and that certainly the US economy was not crippled. Her overarching argument is that the US economy is resilient even when faced with a crisis like 9/11, and that this paper demonstrates that (Jackson, 2008).

The first factor Jackson (2008) analyzes is the impact of 9/11 on the US Stock Market. To do that she analyzes the percent-change in the Dow Jones Industrial Average. In the paper

is a chart with several large-scale terrorist attacks throughout history and the after-effects on the Dow Jones (Jackson, 2008, p. 3). The results indicate that the US stock market is remarkably resilient to terrorist attacks. Of the 10 large-scale attacks assessed, 7 cases indicated no significant negative change. In the case of the 9/11 attacks, there was a -7.13% change on the first day of trading, -14.26% change on the fifth day of trading, and -12.76% change after 252 trading days. The 9/11 case was one of the 3 cases where there was a negative effect. That said, economists were already predicting a recession prior to 9/11, thus making it difficult to accurately assess the true impact the attacks had on the US stock market (Jackson, 2008, p. 4). The paper then analyzes the impact of 9/11 on US economic growth. The results indicate the 9/11 attacks had a miniscule impact on US economic growth, and even then that small impact was short-term only. In 2000, the growth rate was approximately 4%, and this growth rate had remained 3-4% since the early 1990s. In 2001, the growth rate dipped to 1%, although it should be noted that the US economy was already having issues, thus diluting the clarity on the true impact of 9/11. Despite the dip in growth, the US growth rate climbed to 3% by 2003 and 4% by 2004 (Jackson, 2008, p. 9).

Overall, the US economic growth has remained steady in the 3-4% range since the fall of the Soviet Union and the end of the Cold War. One factor the paper discusses as a slow-down factor is rising oil prices, which have gradually increased since 1999. One possibility the paper brings up is that while 9/11 did not technically contribute to the rise of oil prices, it did cause a response that may have contributed to the rising costs. The response being the US Invasion of Afghanistan and more importantly the US Invasion of Iraq. More than likely however it is a conglomeration of issues, such as increased Asian oil consumption, weak oil

infrastructure in key oil regions such as Nigeria and Venezuela, and weather catastrophes such as Hurricane Katrina in 2005 (Jackson, 2008, p. 10-11).

The next factor assess is the impact of 9/11 on consumer confidence in regards to spending. It is difficult to assess due to the predicted recession prior to 9/11, thus gauging of how much consumer confidence was affected by 9/11 difficult. That said, consumer confidence did decrease, from 4.7% in 2000 to 2.5% in 2001. It did slightly rebound to 2.7% in 2002 and rose to 3.6% in 2004, which was the post-9/11 peak as of 2006 (Jackson, 2008, p. 13). Immediately following the attacks, confidence levels dropped 2-digit levels between September 2001-February 2002, and then confidence rose to 3-digit levels several months later. In other words, there was a steep drop initially but consumer confidence did recover. As the numbers show, consumer confidence did not restore to pre-9/11 levels even 4 years after the attacks (Jackson, 2008, p. 13-15).

The impact 9/11 had on direct foreign investment in the United State was also discussed. The numbers indicate the US did quite well, with minimal effects of 9/11 on foreign investment in the US. Between the years 2000-2001, there was a slight percent decrease of -1.25% in foreign direct investment, however, that quickly rose to a 5.1% increase by 2003 and by 2004 it rose to a 9% increase (Jackson, 2008, p. 15). In this section, it is discussed that previous studies indicate that foreign investors are driven by profit regardless of any terrorism concerns, as evidenced by US foreign direct investment in the Middle East region post-9/11. In other words, if the profit potential is high, investors will not be deterred by terrorism (Jackson, 2008, p. 15-16).

The final factor analyzed by Jackson was the impact 9/11 had on US fiscal policy and budgetary resources. With no such surprise, 9/11 did have a significant effect on this factor.

Following the fall of the Soviet Union, the US military began to decrease its expenditures, but that quickly reversed in 2001. It rose from a pre-9/11 level of $301.697 billion in 2000 to $546.018 billion in 2006 (Jackson, 2008, p. 18). In addition, as part of the response to 9/11, an entirely news US governmental department was created, what is now known as the US Department of Homeland Security (DHS). This added $37.7 billion to the first post-9/11 federal budget (Jackson, 2008, p. 17-19).

In general, the evidence supports the author's conclusions that the 9/11 attacks themselves had a limited effect on the US economy, and even some benefits in some instances. Where the effect came to fruition is the secondary effect caused by the launching of wars in Afghanistan and then Iraq. As the author mentions, it is difficult to truly assess the impact 9/11 had on the US economy due to pre-existing factors prior to 9/11, such as an economy that was already headed towards a recession. The numbers indicate a short-term effect as a result of 9/11, but in hindsight those that predicted such an attack would cause an economic catastrophe were proven wrong. That said-long-term secondary effects such as wars in Afghanistan and Iraq will continue to effect the US economy for years, considering US forces are still involved in Afghanistan almost 15 years after they first arrived in October 2001.

Effects of Terrorism and War on Oil Prices-Stock Index Relationship

More related to the thesis topic of terrorism and oil, Kollias et al (2013) provided an examination of the nexus between terrorism & conflict and the oil prices-stock index. Their overall objective was to measure the effects geopolitical shocks, such as war and terrorism, may have on the oil price-stock market relationship.

The article first conducts a brief literature review of the relationship between stock markets and oil prices. The relationship has two main theories of consideration: one is that

high oil prices put a drag on the economy by increasing costs across the board and hence hinder corporate earnings, thus dragging down corporate stock; the other theory is that high oil prices indicate a booming economy and that high oil prices indicate strong business performance. The conclusions are that there is no universal theory or understanding of this relationship. Some studies reflected a negative relationship between increased oil prices and the stock market, others indicated a positive relationship, and others concluded no significant relationship. This lack of clarity led to the authors to formulate a new equation that accounts for major geopolitical events such as wars and terrorist attacks (Kollias et al. 2013, p.744).

The authors argue that geopolitical events, especially war and terrorism, can have a profound effect on market behavior, although they acknowledge that the length of time of this effect and the depth of the effect can vary. In the discussion it is noted the difference between the two types of events. Wars are usually predictable to some degree and have signs of forewarning, thus allowing markets to adjust and account for the expected geopolitical event. Contrasted, terrorism is a one-off event that cannot be predicted by the market. The literature discussed however indicates a short-term fall but a quick rebound for markets following a terrorist attack (Kollias et al., 2013, p.744-745).

The main factors the authors attempt to capture in their study are the two wars in Iraq in 1991 and 2003, and major terrorist incidents. As mentioned previously, the goal is to see how these type of geopolitical events affect the volatility of stock and oil price returns and their covariance. They argue that given the prior literature, the correlation between oil prices and the stock market is not stable over time. Hence, the goal was to determine whether the covariance is affected by events like a terrorist attack or events like the wars in Iraq, which are long-term in nature. To conduct this empirical quantitative study the authors used non-linear

BEKK-GARCH models, a model that allows a person to examine cross-sectional relationships, particularly regarding economics (Kollias et al., 2013, p. 745). It should be noted that the authors split the terrorist attacks into two categories when inputting them into the model. The first group included terrorist attacks that took place in western countries, such as the London 7/7 Bombings and the Madrid 2005 Bombings, or that targeted specific western targets elsewhere, such as the 1998 bombings of US embassies in Kenya and Tanzania. The second event grouping consisted of major terrorist attacks in non-Western countries against general targets, such as the 2002 Bali Bombings or the 2008 Mumbai attacks. The authors label the western oriented attacks as *centre* and non-western oriented attacks as *periphery.* In total each grouping of terrorist attacks had 7 events. For oil prices, the authors used the Europe Brent Spot Price and Cushing system and the Oklahoma WTI Spot Price system; and for the stock indices the authors used the DAX, CAC-40, FTSE-100, and the S&P500 (Kollias et al., 2013, p.745-746).

The study's findings show that the most significant decrease in covariation occurred around 1991, the same timeframe as the first Gulf War. This is likely due to a sudden increase in oil prices at that time due to the Iraqi invasion of Kuwait, thus affecting the –demand-supply chain (Kollias et al., 2013, p.746). To break it down further, the study broke down the two wars in Iraq into the pre-war/planning phase in the buildup to armed conflict and then the actual armed conflict. What was found was that by the time fighting began, markets had already adjusted for the impending conflict. In other words, the markets were only really affected by the buildup to the wars, once conflict began by then everything was adjusted (Kollias et al., 2013, p.747). The terrorist attack results differed from those findings. What was found was that the four major stock market indices were split in their reaction. The S&P500 and the FTSE-

100 both remained neutral and their oil relationship remained the same. However, the CAC040 and the DAX were both affected, and as a consequence their oil relationship was affected, particularly when it involved *centre* terrorist attacks, or attacks against western oriented targets. This split between the two stock market price systems indicate according to the authors the difference in effective reaction by financial supervising authorities and the potential impact they can have on absorbing the shock of a one-off shock like a terrorist attack (Kollias et al., 2013, p.751).

Overall the findings involving the two Iraq wars make theoretical sense. Logically, the build-up to war would likely lend itself to some hysteria, but like in any crisis people adjust and account for the new geopolitical climate. The oil factor also is logical due to the importance of the Persian Gulf region in the oil industry and the affects a large-scale war and hostile geopolitical climate can have. What was a little more difficult to assess was the findings of terrorist attacks. The finding that *centre* terrorist attacks would affect the markets was unsurprising, but it was surprising that two of the four stock market indices showed no effect. I expected all four markets to show at least some effect, at least regarding *centre* terrorist attacks. The lack of effect involving *periphery* terrorist attacks was not surprising due to prior research indicating foreign investors are not usually deterred by terrorist attacks elsewhere, as foreign investment in the Middle East indicates. As a whole, these findings indicate the ability for markets to adjust for geopolitical change in the long-term. On the surface major changes were expected across the board and those findings do not conclude such an expectation.

Oil Prices and Interstate Conflict

The study framework for the quantitative study in this thesis is based on this piece of literature. In this study, Hendrix (2015), examines the relationship between oil prices and

interstate conflict and what effect oil prices have on interstate conflicts. While this differs from the purpose of this thesis, this piece of literature provides a guideline for any future terrorism and energy related quantitative studies.

The first section of the article is a discussion of the known literature involving and linking oil to interstate conflict. On aspect discussed was the impact oil wealth has on interstate conflict, and what was found in Colgan (2010) who found that petrostates engaged in militarizes interstate conflicts 50% more frequently than its non-petro states counterparts since the end of the second world war. For clarification purposes the term *petrostates* means any state whose oil exports account for more than 10% of its total GDP. It is noted, however, that most of these military disputes rarely escalated into full-scale wars. Another linkage discussed is oil wealth and military expenditure. At the time of this article, since 2000 six of the top ten countries in military expenditures were also petrostates. This factor can lead to security issues due to petrostates' neighbors feeling threatened, even if the military measures are explicitly defensive (Hendrix, 2015, p.3).

On the other hand, there is also the theory that oil wealth causes states to feel less threatened by consequences and subsequently more prone to conflict. One reason for that self-sense of security is that at the time of this article, all members of the UN Security Council except Russia were major oil exporters, and as a result have a vested interest in maintaining stability in oil producing regions to prevent a major price spike. As a result of this interest in preventing oil producing states from being threatened militarily, some theorize that this may embolden oil-rich states and cause them to be more casual in their use of military force. There also is the factor that oil wealth can result in greater political power and as a result more freedom for an aggressive foreign policy agenda. 2010 and 2013 studies by Jeff Colgan found

that revolutionary governments with oil wealth were more likely to initiate militarized interstate conflicts (Hendrix, 2015, p.4).

One subject area that is lacking according to Hendrix (2015) is whether petrostates behave differently depending on oil prices. In other words, studies are lacking when oil prices are the independent variable compared instead of petrostates' actions or armed conflict in general. The author mentions that factors discussed previously; such as moral hazard dynamics, military expenditures, and strategic importance-should all be affected to some degree by the effects of oil prices. The reasoning behind is that energy issues are a highly salient issue, and as a result it is an issue that states will commit resources and interests towards that issue of such high importance. It is argued that high oil prices increase the attractiveness of conquest of oil-rich states due to the discounted value of ownership of such natural resources, and the theory that petrostates will behave more erratic or lesser morally when oil prices are high (Hendrix, 2015, p.4-6).

The author notes that "a rejection of the null with respect to H_1 could be consistent with multiple causal mechanisms. He notes that petrostates as a result of high prices may be a more vulnerable target for conquest, and vice versa high prices could embolden such petrostates to be more aggressive themselves during times of high prices. Hence, further hypotheses beyond H_1 are needed (Hendrix, 2015, p.6). The reason for specifying the variable as a petrostate or an oil-exporting state in the hypotheses is research that concludes that while there is a historical correlation between oil prices and military action by petrostates, there is no statistically significant correlation suggesting the same for non-petrostates (Hendrix, 2015, p.6-7).

The study combines a monadic analysis of the effects of oil exporter status on militarized interstate conflicts with a directed-dyadic analysis of the initiation of a militarized

interstate conflict (Hendrix, 2015, p.7). For the monadic analysis, the dependent variable is the country year-by-year count of militarized interstate conflicts. These conflicts range from minor border incursions to outright skirmishes that result in casualties. The independent variable is the price of oil per barrel in constant 2008 dollars (Hendrix, 2015, p.8). In addition, several other variables to test for conditions were inputted, including a dummy coding for *petrostate* and a dummy coding for *revolutionary leader* (Hendrix, 2015, p.8). Along with these other variables, controls for population size and GDP per capita were also included in the model, as well as controls for major power status, democracy, and peace years. Due to the numerical count value of the dependent variable, a negative binomial regression and Poisson regression were used to analyze the model. As a side note, in the directed-dyadic reanalysis of the monadic analytical model, controls included indicators of authoritarian regimes, military capabilities, major or minor power status, and peace years. Since the outcome of the analysis is binary, a logistics regression was used (Hendrix, 2015, p.8-9).

The first finding in the results supports H_1, which means that higher oil prices are positively associated with an increased frequency of militarized interstate conflicts in petrostates (Hendrix, 2015, p.10). In contrast, no such association was found in non-petrostates, thus supporting H_4. In addition, the findings reveal that petrostates are 30% more likely to engage in a militarized interstate conflict when the price of oil per barrel is $60 compared to when the price per barrel is $20 (Hendrix, 2015, p.10). The major finding overall is the premise of the importance of the price of oil. While the results indicate this has no effect on non-petrostates, these findings reveal that for petrostates the higher the price of oil, the more conflict-prone those states are likely to be. The caveat to this is the finding for revolutionary petrostates, who are shown to be the most conflict-prone across the board of the findings

(Hendrix, 2015, p.11). For clarity, revolutionary-led means that the leadership rose to power by means of force and with mass demonstrations and protests that assisted in the leader's ascension into power. It should also be clarified that this finding is based on the directed-dyadic model results, which is a reanalysis of the monadic model. In total, the directed-dyadic results confirmed H_2 and disproved in H_3. As mentioned before, the monadic results support H_1 and H_4 (Hendrix, 2015, p.11-12).

Hendrix does offer one alternative explanation for these findings, and that explanation is that conflict behavior, particularly in petrostates, drives up oil prices and thus the relationship is simultaneous or even reverse causality. However, Hendrix points out that if conflict behavior was driving up oil prices, positive correlations would be seen between the various operationalizations of conflict behavior and oil prices at time t. No such positive correlations are seen, no coefficients of the conflict measurements are statistically significant. In other words, there is no statistical evidence that oil prices are driven by conflict behavior at both the global level and the aggregate petrostate level. Some other statistical findings are also noted, such as that states with large quantities of oil wealth tend to be less democratic and often perform worse in respect of human rights (Hendrix, 2015, p.15-18).

Overall this study makes a lot of conventional sense in a geopolitical and realpolitik way of thinking. As many would say, "Money is power", and by being a petrostate that state holds significant power in the global geopolitical landscape. Petrostate leaders understand the power they hold and both the benefits and problems this type of wealth holds. Not coincidentally, leaders of petrostates will also obviously do anything and everything possible to protect their state's valuable natural resource. The major difference of this study compared to the proposed study in this thesis is that Hendrix's study solely assessed state actors and

interstate conflicts. The findings of Hendrix found indicated no evidence of oil prices driving interstate conflict behavior, however, the goal in this thesis is to assess whether terrorism has any effect on oil rents and therefore oil prices. That said, this article provides a quality framework for assessing relationships between oil prices and other geopolitical variables (Hendrix, 2015, p.18).

Review of the Methodological Literature

Young and Findley (2011) review of some of the problems in terrorism research, especially concerning definitional issues. The authors evaluate terrorism research from several of the top political science journals, with the purpose of assessing the potential pitfalls of the research. One primary issues discovered is the lack of a uniform definition of terrorism and the potential for research discrepancies amongst the general framework of terrorism research. Another pitfall discussed is the varying definitions of the different types of terrorism. This is much more difficult to fix due to the subjective nature of defining the causalities of a terrorist attack. The authors' recommendation is that when conducting research study involving types of terrorism, be explicit and delve into the typologies and causalities of the data. The authors then used a set of core variables and conducted an empirical analysis of some of these pitfalls to determine the effect these pitfalls may have in quantitative research. One finding involving the definition of terrorism is that the variables predicting an attack on civilians are also similar in predicting an attack on military personnel in a non-combat role, which suggests in empirical studies the lack of a definition of terrorism may not be as critical. Contrastingly, the empirical analysis showed that variation of terrorism typologies is a critical component, especially involving empirical research discussing transnational and domestic terrorism. Overall, this

article provides a quality forewarning for conducting terrorism research of any kind, and at least raises awareness for researchers when assessing their empirical model (Ross, 2004).

Ross (2004) discusses both qualitative methods for studying terrorism and quantitative methods. Ross describes different ways a researcher could conduct an empirical analysis of terrorism, however, he did neglect including the specific type of empirical analytic models needed for in-depth research. That said, he provides researchers a general framework of how to conduct empirical analysis of terrorism topics (Young & Findley, 2011).

Hepworth (2013) used terrorism data from the GTD for attacks carried out by Al-Qaeda and its affiliates from 2002-2007. The author used a subjective coding for success or non-success for each attack, and also only used bombings in the study. Hepworth then discusses the descriptive statistics and then delves into a discussion of his negative binomial regression analysis of Al-Qaeda attacks. The major findings of this regression was that Al-Qaeda suicide attacks resulted in more casualties than non-suicide attacks, and that Al-Qaeda attacks on civilian targets resulted in more casualties than against non-civilian targets. While this is not oil related, this study is an example of a quantitative study for the purposes of studying terrorism and producing analysis that could be useful for policymakers (Hepworth, 2013).

Theoretical Framework

The general theoretical framework is to assess the effects terrorism may have on oil rents, and as a consequence oil prices. The general theory is that terrorism does indeed have an effect on the oil market, and my primary hypothesis is that it will increase oil rents, both for domestic and transnational terrorism, thus proving H_{1A} and H_{1B} correct. The primary research supporting the basic framework of this study is Hendrix's study on the relationship of oil prices and interstate conflict. The theory that terrorism will increase oil rents, and as a result increase

oil prices, is based on the case study in this chapter as evidenced by the events of June 2014. That said, the existing literature is scant so this study is exploratory with limited theoretical backing. As the operationalization below shows, H_{1A} and H_{1B} are the primary hypotheses, and I will be attempting to disprove H_{2A}, H_{2B}, and H_3.

- $H_{1A:}$ Global domestic terrorism increases oil rents.
- H_{1B}: Global transnational terrorism increases oil rents.
- H_{2A}: Global domestic terrorism decreases oil rents.
- H_{2B}: Global transnational terrorism decreases oil rents
- H_3: Both global domestic and transnational terrorism have no effect on oil rents.

The secondary research question involves only the MENA region and its corresponding oil rents. Due to the theory outline above, I will be attempting to prove H_{4A} and H_{4B} correct; while trying to disprove H_{5A}, H_{5B}, and H_6. The secondary hypotheses are as follows:

- H_{4A}: MENA domestic terrorism increases MENA oil rents.
- H_{4B}: MENA transnational terrorism increases MENA oil rents.
- H_{5A}: MENA domestic terrorism decreases MENA oil rents.
- H_{5B}: MENA transnational terrorism decreases MENA oil rents.
- H_6: Both MENA domestic and transnational terrorism have no effect on MENA oil rents.

Theoretical Case Study

The following section will briefly discuss a pertinent case study that would be applicable to the quantitative framework discussed above. The case I will be analyzing is the rise of the Islamic State of Iraq and Syria (ISIS) and the subsequent oil price hike in June 2014. For a general background however, it is first important to provide a brief history of ISIS and how they have risen to power in Iraq and Syria.

On a general level, the group known as ISIS today is actually the revived and evolved form of Al-Qaeda in Iraq (AQI), which had gone into hibernation following the death of its

leader and founder, Abu Musab al-Zarqawi. This group then transitioned into what became known as the Islamic State of Iraq, and then finally transitioned in 2013 into what is now known as ISIS and various other names. The group had originally operated in the insurgency against US and coalition forces; however, with the outbreak of the Syrian Civil War in 2011, focus soon shifted. In 2013, ISIS began operations in Syria, originally in coordination with the Al-Nusra Front and other similar opposition groups. Differences flared up and in April 2013, ISIS and the Al-Nusra Front separated ties and have since become enemies. Throughout 2013 and early 2014, ISIS made large gains and took control of the Syrian city of Raqqa as well as Fallujah and Ramadi in Iraq (Ghosh, 2014). Around the same time, in January 2014, ISIS officially declared its "caliphate", which constitutes territory from Syria to Iraq (Ghosh, 2014).

The major breakthrough for ISIS came on June 10th, 2014, when the group marched into Iraq's second largest city, Mosul, and took control. Their occupation of Mosul continues to this day, and battles are ongoing for Iraqi forces to take back ISIS territory. The group has since established affiliates in Libya and elsewhere in North Africa, in addition to being connected to terrorist attacks in Europe in late 2015 and early 2016. When discussing oil, however, it's important to discuss and analyze the events in June 2014 and the potential impact ISIS may have had and possibly a forewarning of their potential impact in the future (Ghosh, 2014).

As mentioned before, on June 10th, 2014, ISIS rolled into Mosul largely unchallenged and soon after the international community rushed into a frenzy. A major reason for that is the threat ISIS poses to Iraqi oil. Today, Iraq is the 6th largest oil producer in the world, and is the second largest oil producer in the MENA region behind only Saudi Arabia. Thus, following

the ISIS onslaught into Iraq in 2014, energy security experts became gravely concerned (EIA, 2016).

In mid-June 2014, price per barrel for crude oil rose to $107, for the first time since September 2013. At the pump, gas futures prices rose by 1.7% in mid-June 2014. For months prior ISIS insurgents had straddled the Iraqi border and had made territorial gains into Iraq, culminating with the capture of Mosul on June 10th, 2014 (Thompson, 2014). Attacks by ISIS and other insurgents had already shut off exports from Iraq's northern oil fields, and the fear at that time was the results if ISIS pushed into southern Iraq where the heart of the Iraqi oil industry is located. In addition, Libya had further fallen into a state of chaos and most of its oil exports have been shut off. (Phillips, 2014) (Thompson, 2014)

The lesson in this, however, is the price hike in June 2014 was mostly due to speculation and fear. According to estimates, only about 10% of Iraq's oil exports pass through the northern area, thus representing a minimal direct impact and risk by ISIS. However, what did have a large impact was the fear and resulting speculation that caused the oil prices to rise. In my assessment, energy security experts had a right to be fearful, ISIS had marched right into the second largest city of Iraq with minimal resistance and the Iraqi military was in disarray. ISIS taking control of the Shi'ite dominated region of southern Iraq would have been a far tougher challenge, however, that does not means there would not be an imminent threat towards the oil sector in southern Iraq (Phillips, 2014).

This supports the theoretical framework of the potential impact terrorism can have on oil prices. The general goal of terrorism is fear, and in June 2014 there is no doubt the takeover of Mosul by ISIS brought genuine fear globally, a fear that resulted in oil prices increasing. That said, the fear proved to be temporary. Had ISIS taken over southern Iraq there is no doubt

there would have been a large impact on the global oil industry, but fortunately that did not happen and there are no signs presently of that occurring. In recent months oil prices have actually decreased significantly, even falling to below $2.00 per gallon in the US in recent months. Reasons for the decrease in prices vary, they include an increase in US oil production, the Iran Nuclear deal and Iran's subsequent entry into the market, and a variety of other culminating factors. That said, the events in June 2014 show the effect terrorism can have when located near important oil producers.

Chapter 2 Summary

In this chapter a variety of topics are discussed, with the purpose of formulating the theory behind the empirical study in this thesis. As Hendrix proved, there is a correlation between oil prices and conflict in petrostates. The literature also supports the premise that terrorism has an effect on the stock market, although the long-term impact can be debated. What is lacking however, based on the available literature, is a direct empirical study of the effect terrorism has on oil prices. An anecdotal case study was discussed and analyzed that supports the theory that terrorism causes an increase in oil prices, but that was a single qualitative example. This thesis will hopefully answer this debate. Despite the case study evidence, there are some weaknesses that the literature exposed. The 9/11 attacks arguably did not have a large long-term impact on the US economy, but the subsequent wars in Afghanistan and Iraq did have a long-term impact economically. This this demonstrates the power of terrorism and the fear it generates, but those large-scale conflict have many confounding variables that can affect markets worldwide. The following sections will discuss the empirical study and determine whether the data supports the theory that terrorism causes an increase in oil rents, and to determine if terrorism has any effect at all on oil rents.

METHODOLOGY

Introduction

The following chapter outlines the methodology used in this thesis to assess the relationship between terrorism and oil rents. The scope of the study covers the period from 1992 to 2014. The study is a mix-methods with a predominant quantitative analysis of the outlined research questions. As mentioned previously, the quantity of quantitative studies on terrorism pales in comparison to the number of qualitative methodological studies on the topic. Furthermore, the majority of terrorism research has been weakened by theoretical generalizations based upon a lack of proven empirical evidence. Statistical information regarding terrorism is difficult to collect and can be incomplete, especially in the open source sector. That said, the majority of quantitative studies on terrorism were based on information collected via news reporting of a conglomeration of such information in publicly available databases. As I will discuss later, I will be using such a terrorism database.

In the next chapter I discuss the quantitative research design, how the period and cases was selected; as well as the sample size, methods of analysis, limitations, and any ethical concerns. The purpose is to provide the technical framework as to how I will be answering my research question of "How does global terrorism affect oil rents?" Although this is not experimental research or research involving human or animal subjects, following a proper framework is still needed.

Research Design

As previously mentioned, the general approach for this study is largely quantitative research. Although qualitative case study research involving oil and terrorism can be conducted, quantitative research was determined to be the best due to the high volume of data

and the nature of the research question. The research question also involves numeric data, thus making quantitative research the best option. Unlike studies with limited regional focus, large cross-sectional statistical approaches permit a broad picture of the relationship between multiple explanatory variables and allows for the evaluation of generalizable and replicable findings (Mahoney & Goertz, 2006). This thesis uses cross-sectional time series data of 147 countries from 1992 to 2014, as detailed in Annex A. For the MENA only section of the study, 17 MENA countries were assessed, for the same timeframe but this data set only included specified Arabic-speaking MENA countries. The time frame 1992-2014 was selected for two reasons. The first relates to data availability. This is the most comprehensive data available that corresponds between the two primary variables. Second, the literature suggests that recent acts of terrorism have mostly impacted oil prices during this period. The data panel is also unbalanced as a few countries have missing observations, specifically among the control variables. The analysis procedure that will be used is a linear regression, panel corrected standard errors (PCSE) statistical model. This is a statistical analytic model that allows a researcher to conduct a linear regression across a cross-sectional time series model. This was used due to the dependent variable (*oil rents*) being a percentage value and thus not suitable for a count model typically found in quantitative terrorism studies.

Instrumentation

The type of data collected is terrorist attack numbers broken down by month since January 1992, although I will be aggregating it on a yearly basis. It is completely quantitative data based on raw attack total numbers, segregated into domestic and transnational terrorism data. For clarification purposes, this terrorist attack data includes both successful and attempted attacks during this time-span. The separation between domestic terrorism and transnational

terrorism is that domestic terrorism consist of attacks within a country perpetrated by a citizen or native group. The data for oil rents is a yearly average of the difference between the value of crude oil at global prices and the cost of production, measured as a percentage of a country's GDP. Due to the economy's reliance on the oil sector, it will provide me the utility for assessing terrorism's effect or non-effect on oil prices.

In regards to the secondary Middle East & North Africa (MENA) data set, it should be noted that 17 MENA countries were included, consisting of all primarily Arabic speaking countries across the region except Somalia. I did not include Somalia due to this state being an anomaly for quantitative terrorism research (Hendrix & Salehyan, 2012, p.42). The country has been in a constant state of conflict since the 1991 collapse of the Mohamed Siad Barre regime and is considered today to be a failed state with no true central government (Hogg, 2008). Thus, so as to not skew the data for assessing the MENA region, Somalia was excluded from the data set. Due to not being Arabic speaking countries, Israel and Iran were not included in the data set despite their geographic location.

To analyze the relationship between the two variables a statistical software was used called STATA. It enables users to conduct large-scale statistical analysis and the ability to conduct multiple regressions. This software was used to conduct the regression and assess if there was a correlation, and if so to what level. The data collection instruments will be primarily open source internet sources or databases. For terrorist attack data the Global Terrorism Database is one of if not the most robust and reliable open source terrorism databases in the world. The oil rent data was collected via open source archives from the World Bank. Both are quantitative datasets that are considered reliable and corroborated. The instrument used to

assess the data, the STATA 14 statistical software, is considered to be one of the best software programs available for quantitative statistical research.

In regards to the specific type of quantitative research design, statistical analysis was used. Specifically, Poisson count model regression to model the nexus between the two main independent and dependent variables, oil prices and terrorist attacks. The purpose was to then assess if there is any correlation, and if so in what way are the two variables correlated. The scale of the correlation value is -1 to +1, with 0 meaning no correlation (Laerd, 2015).

The reasoning for using this type of quantitative research design is this method was determined to be the best for determining and answering the question of how terrorism influence global oil rents. For clarification purposes, the variable that is being studied, the global market price of oil, is the dependent variable. The input or the cause, known as the independent variable. Further control variables may be added but at this time there are none. As mentioned before, the research design is a quantitative correlation analysis of if and how the independent variable of terrorist attacks affects the dependent variable, the global market price of oil. The purpose was to determine if there is correlation, if so in what way does it affect the global market price, and to what degree is the effect.

Data Analysis Procedures

The data set was paneled in Microsoft Excel, consisting of the independent variables *domestic terrorism* and *transnational terrorism* along with the other variables. The unit of analysis is at the country level and the data presents 147 countries in the primary data set on a yearly basis. The dependent variable, *oil rents*, was operationalized for each year available for every country from 1992-2014. In total, seven control variables were used for the model, including: *population, per urban population, civil liberties, democracy, unemployment, GDP*

growth, and *religious fractionalization*. These are all common control variables found in the quantitative terrorism and conflict literature, thus making these variables the ideal control variables for this study.

As mentioned in the research design section, the type of analytic model used is a linear regression, panel corrected standard error (PCSE) model, conducted using the STATA software program, a tool for conducting statistical analysis. Normally in terrorism research a negative binomial or Poisson regression model is used, due to the need often for a count model regression when conducting terrorism research; however, because the dependent variable, *oil rents*, is measured as a percentage, a count model is not the ideal model to use. As a result, a linear regression panel corrected standard error (PCSE) model was used to conduct the data analysis of the data set, both for the overall data set and the MENA only data set. In addition, due to the use of the PCSE model, no variance inflation factors (VIF) test was needed to test the inflation of the coefficients.

Limitations of the Research Design

This study is limited due to the use of secondary information, gathered from sources on terrorist attack data and oil rent data. The sources were derived from trustworthy sites, but the potential for bias or inconsistent collection still exists. Finally, restrictions in the availability in data limits additional robust checks for the study. Countries had varying amounts of data available for the variables in the data set, and in some cases there was so little data that the country had to be cut to properly operationalize the data set for further analysis.

External Validity

This study has a moderate level of external validity. The methodology can especially be applied to other quantitative studies concerning conflict and other geopolitical factors as it

relates to the oil market. Therefore, the methodology is also externally valid for quantitative studies concerning various other geopolitical factors and their effect on the oil market.

Ethical Issues

This study was conducted via secondary sources and did not require the use of human. In addition, the researcher is not connected to or employed by the oil industry nor the National Consortium for the Study of Terrorism and Responses to Terrorism (START). The researcher's family is also not employed by either group; therefore, there are no ethical issues or conflict of interest that could be of concern.

Chapter 3 Summary

As this chapter has shown, the research design of this study is a quantitative research study using a cross-sectional time series research design. The independent variables are domestic and transnational terrorist attacks since 1992 and the dependent variable is yearly oil rent data for that timespan. This time period was selected due to the avoidance of the energy crisis of the 1970s and the end from the Cold War Era. Despite global conflicts there has not been a significant energy crisis in the selected timespan of 1992-2014.

The purpose of using this research design was to determine if there is any causal correlation between terrorism and oil rents. This data was collected using open source resources, and it was analyzed using the STATA 14 statistical analysis software. The analytic model used was a linear regression, panel corrected standard error model, which was the best analytic model for this data set. Due to not using any human or animal subjects there are no major ethical concerns for the study. The researcher also has no conflicts of interest that could potentially bias this study.

RESULTS

Introduction

This chapter is an overview of the results of the quantitative research study as described in the preceding chapters. I will discuss in detail the results of each model and its response to the hypotheses outlined previously. As I will explain, overall the research model was a success, the model ran the data well and I was able to properly quantitatively assess my theory on terrorism's effect on the oil market.

The key finding of the results is that terrorism does have an effect on oil prices, it is a linear relationship where terrorism increases oil rents, and as a result it increases oil prices. This holds true both globally and in the MENA region. The relationship is not extremely strong but it is statistically significant. That said, the research model was successful and could be used in future studies concerning related topics.

Data and Analysis

The first priority is discussing the findings as it relates to the hypotheses outlines earlier from my general theory that terrorism increases oil rents, and as a consequence increases oil prices. As the quantitative results discussed in this chapter indicate, my primary hypothesis that terrorism increases oil rents was proven correct, although with some caveats in that only the global domestic terrorism model was proven statistically significant. The global transnational terrorism model had a positive coefficient but did not have a high enough confidence interval to be statistically significant. Thus, H_{1A} was proven correct while H_{1B}, H_{2A}, H_{2B}, and H_3 were rejected.

- H_{1A}: Global domestic terrorism increases oil rents. (Proven)
- H_{1B}: Global transnational terrorism increases oil rents. (Rejected)
- H_{2A}: Global domestic terrorism decreases oil rents. (Rejected)

- H_{2B}: Global transnational terrorism decreases oil rents. (Rejected)
- H_3: Both global domestic and transnational terrorism have no effect on oil rents. (Rejected)

The theory also holds true with regards to the MENA region. Domestic terrorism in the MENA terrorism increases oil rents in the MENA region, and transnational terrorism in the MENA region was statistically significant with its relationship to oil rents in the region; therefore, H_{4A} was proven correct while H_{4B}, H_{5A}, H_{5B}, and H_6 were rejected.

- H_{4A}: MENA domestic terrorism increases MENA oil rents. (Proven)
- H_{4B}: MENA transnational terrorism increases MENA oil rents. (Rejected)
- H_{5A}: MENA domestic terrorism decreases MENA oil rents. (Rejected)
- H_{5B}: MENA transnational terrorism decreases MENA oil rents. (Rejected)
- H_6: Both MENA domestic and transnational terrorism have no effect on MENA oil rents. (Rejected)

The operationalized data is broken into two subsets of the independent variable, domestic terrorism and transnational terrorism. As a result, I ran both subsets for my global assessment and the MENA region only assessment. Outlined in Table 1 are the two models for the independent variable, *domestic terrorism*. Pertaining to global domestic terrorism, the results indicate it is statistically significant that global domestic terrorism increases oil rents, and as a result increases oil prices and H_{1A} is proven to be correct. This model, Model 1, had a moderate P-Value of 0.002, or a 95% P-values confidence interval. The coefficient was weaker, with a 0.025612 value, although with the noncollinearity of terrorism data that is fairly normal.

Table 1. Domestic Terrorism PCSE Models (1992-2014)

Global Oil Rents	Model 1 – Global Domestic Terrorism Model		Model 2 – MENA Domestic Terrorism Model	
	Coeff.	S.E.	Coeff.	S.E.
Domestic Terrorism	.025612**	.00831**	.10302***	.02716***
Population	-5.36e-09***	8.74e-10***	3.24e-07***	3.66e-08***
Per_UrbanPop	.18875***	.00753***	.85545***	.05390***
Civil Liberties	1.2117***	.1592***	7.7346***	.65383***
Democracy	-.7658***	.0589***	-1.2203***	.2849996***
Unemployment	-.01146**	.01929	.6276***	.196908***
GDP Growth	.194916***	.06713***	.20293	.15129
Religious_Fractionalization	2.94001**	.2708***	17.6947***	2.6991***
N	2,648		253	

Note: Statistical significance is indicated at the following levels: *** p<0.01, ** p<0.05, * p<0.1

As outlined in Annex B, the Global Domestic Terrorism Model's R-Squared value of 0.3110, or 31 %, is normally weak but with terrorism data it is not abnormal. According to Model 1 under Table 1, the strongest control variable according to the findings was *religious fractionalization*, which had a P-Value Confidence Interval of 95%, and a coefficient of 2.94001. This finding is congruent with all terrorism related research and is considered a highly effective control variable for quantitative research in terrorism. Also it should be noted that in total there were 2,468 observations of domestic terrorism, which as the results will show is far greater than transnational terrorism events observed. As notated in Annex B, there are 113 sample gaps, which is far less than what is in Model 3, the Global Transnational Terrorism Model.

As outlined in Model 3 under Table 2, the relationship between global transnational terrorism and oil rents is statistically not significant, although by a small margin. The confidence interval is approximately 85% (Annex C), and the coefficient is 0.01308. As mentioned before, the amount of transnational terrorist attacks is far less compared to domestic

terrorist attacks, and as a result there are over 1,000 less observations in the sample. In addition, as outlined in Annex C, the sample shows 342 sample gaps, far more than the global domestic terrorism sample. One key difference of note compared to the global domestic terrorism model is the *religious fractionalization* control variable. As Model 3 under Table 2 shows and in Annex C, the religious fractionalization variable is statistically not significant. This control variable only has about a 17% confidence interval in Model 3, far different than the 99.9% confidence interval in the Global Domestic Terrorism Model (Model 1, Annex B).

Also in Table 1 are the results for the MENA domestic terrorism model. This is the MENA Domestic Terrorism Model, located under sub-heading Model 2. As the results indicate, H_{4A} is supported with a 99.9% confidence P-Value rating (Annex D). Hence, domestic terrorism in the MENA region is shown to statistically increase oil rents in the region. The coefficient was also stronger than the global domestic terrorism model, with a coefficient of 0.10302. Between the two models for domestic terrorism, Model 2, as outlined in Annex D, had the highest R-Squared value with a value of 0.5999 or 59.9%. In addition, in total there were 253 observations with only 10 sample errors (Annex D). The strongest control variable was *religious fractionalization*, with a strong coefficient of 17.6947 and a confidence interval of 99.9%. Another strong control variable was *civil liberties*, with a coefficient of 7.7346 and a confidence interval of 99.9%.

Table 2. Transnational Terrorism PCSE Models (1992-2014)

Oil Rents	Model 3 – Global Transnational Terrorism Model		Model 4 – MENA Transnational Terrorism Model	
	Coeff.	S.E.	Coeff.	S.E.
Transnational Terrorism	.01308	.00907	.03031	.05785
Population	-3.47e-09***	4.28e-10***	3.74e-07***	3.87e-08***
Per_UrbanPop	.180701***	.01357***	.92016***	.04944***
Civil Liberties	1.83842***	.22229***	13.2805***	1.5090***
Democracy	-.58081***	.08229***	.39252	.32347
Unemployment	-.04211	.03395	.31804**	.14523**
GDP Growth	.16301*	.93097*	.22775	.18337
Religious_Fractionalization	.19176	1.1655	.24346	9.6052
N	1,497		135	

Note: Statistical significance is indicated at the following levels. *** p<0.01, ** p<0.05, * p<0.1

As the results in Table 2 show, MENA transnational terrorism has no statistically significant effect on oil rents in the MENA region, thus rejecting H_{5B}. The results under Model 4 indicate a -0.3031 coefficient, but that is with a P-Value of 0.600, also known as a 40% confidence interval and therefore is not statistically significant (Annex E). The major reason for these results is the lack of data. As seen in Annex E, there were only 135 observations of MENA transnational terrorist attacks in the sample and 31 sample errors. The R-Squared value for Model 4 was strong, with a 0.6232, or 63% (Annex E). The strongest control variable was *civil liberties*, with a coefficient of 13.2805 and a confidence interval of 99.9%. However, unlike the MENA Domestic Terrorism Model (Model 2), in Model 4 the *religious fractionalization* control variable only had a 3.7% confidence interval, thus making the variable in this model not statistically significant.

As the results show, the general premise behind my theory was proven to be correct. Global domestic terrorism increases oil rents at a small but statistically significant level. Therefore, as a consequence global domestic terrorism does increase oil prices on a yearly

level. Global transnational terrorism did have a positive coefficient but the results were not at a statistically significant level, although only to a small degree. This finding is likely a result of lower quantities of transnational terrorism observations along with a significantly higher quantity of sample gaps, all factors that would affect the statistical significance of the model. This global finding was then extended to the MENA region, which I theorized that terrorism in this region would increase the oil rents there. Again, the theory held true in that domestic terrorism in the MENA region increased oil rents in the MENA region, and as a result increases oil prices. Like the global transnational model, the results for MENA transnational terrorism were statistically insignificant, but at a much higher level. As a result H_{1A} and H_{4A} were proven successful; H_{1B}, H_{2A}, H_{2B}, H_3, H_{4B}, H_{5A}, H_{5B}, and H_6.

Overall, the reason for these results is the lower quantities of transnational terrorism. Many countries in the sample had zero incidents of it occurring. Keep in mind that the way this is measured many incidents the public would think of as a foreign threat are not coded in such a way. This attack was not in the data sample, but the attacks in San Bernardino in December 2015 are often thought of as foreign attacks by ISIS, however, in reality these were US residents with no official membership in ISIS and this attack would be classified as domestic terrorism. In the case of ISIS today, coding what is a domestic attack and a transnational attack is difficult for a group that holds territory in multiple countries.

Chapter 4 Summary

As this chapter shows, the results of both independent variable models indicate support for the theory that terrorism increases oil rents, and as a result increases oil prices. The results do have caveats in that this theory is only statistically significant for domestic terrorism, however, when you consider the vast majority of terrorism cases are domestic terrorism I

believe my general theory can be applied. The coefficient is not a large increase but in terrorism studies the data is often noncollinear and as a result the coefficient is not abnormal compared to other similar types of quantitative models.

One interest aspect of the findings was the strength of the MENA Domestic Terrorism Model, shown in Table 1 under Model 2. The results indicate MENA domestic terrorism increases oil rents in the MENA region. The interesting aspect is this model's coefficient and R-Squared value is higher than the Global Domestic Terrorism Model (Model 1), thus indicating a stronger finding supporting the theory that terrorism increases oil prices. The only weakness to this model is that the MENA domestic terrorism sample is small with only 253 observations and 17 countries in the sample.

CONCLUSION

Introduction

Energy security in this country has been at the forefront of people's minds for a long time. It gained steam with the energy crises of the 1970s and the actions by several Arab states and Iran. Along the same timeframe, Islamic extremism began to gain popularity in the oil rich region of the Middle East and North Africa. Many believe this fear led to Operation Desert Storm and the removal of Iraqi forces from Kuwait, along with Operation Desert Shield which was meant to prevent Iraqi forces from invading Saudi Arabia. Not coincidentally Kuwait and Saudi Arabia are both key oil producers globally.

Then the tragic events of 9/11 occurred, along with widespread fear of Islamic terrorism hijacking oil facilities across the Middle East. While that feared doomsday has fortunately not occurred, as the results show terrorism does slightly increase oil rents, and as a consequence oil prices. This has long been speculated about but I wanted to quantitatively assess that fear and determine if it is warranted. This quantitative finding is supported by the case study analysis in Chapter 2, when the ISIS onslaught in June 2014 caused global oil prices to rise. That said, more robust studies need to be conducted in the future to determine the exact strength of this finding. Increasing the timeline, filling in gaps in the sample variables, and expanding on this study would all be advised. Collection may be difficult, but providing further empirical evidence on this topic would be a great asset for policymakers making energy related decisions.

Summary of the Study

The quantitative study as outlined in this thesis is a quantitative cross-section time series analysis of the relationship between terrorism and oil. The terrorism data, consisting of both *domestic terrorism* and *transnational terrorism* variables, are the independent variables.

This data spans from 1992-2014, excluding 1993, and is the most recent operationalized data available. The independent variable in this study is oil rents, which is difference in value of oil production at global prices and the total production costs. This is the best measure at assessing yearly oil prices at a country-level. Along with the independent and dependent variables, 7 control variables were inputted into the data set. These control variables were derived from previous terrorism research studies that indicate these were strong control variables to use. For the secondary hypotheses, the data sample was refined to include only the 17 Arabic-speaking MENA countries, excluding Somalia. The purpose of the secondary hypotheses was to assess the theory at a regional level and the quantity of terrorism data available compared to other regions.

In most terrorism studies, researchers use a count model such as a negative binomial regression or a Poisson regression, however, due to oil rents being a percentage value a linear regression panel corrected standard error (PCSE) model was used. This PCSE model was then run for both independent variables, *domestic terrorism* and *transnational terrorism*, for both the global data sample and the MENA only sample; therefore, I was able to assess the results both at a global and a regional level and determined the consistency of the results. These results were supported further by the case study analysis in Chapter 2, thus providing further robustness for the quantitative portion of this thesis.

Discussion of the Findings

The findings support the theory outlined in Chapter 2, terrorism increases oil rents. In addition, the quantitative findings support the case study analysis in Chapter 2, thus providing further robustness for the quantitative study. It should be noted that only the domestic terrorism models were statistically significant, but the Global Transnational Terrorism Model (Model 3,

Annex C) was reasonably close to being statistically significant with about an 85 % confidence interval. These findings are consistent with the regional analysis of the MENA domestic and transnational terrorism models, seen in Annex D and Annex E, further strengthening the findings on the global scale. One interesting note is that due to a higher coefficient and a higher R-Squared value, the results of the MENA Domestic Terrorism Model is actually stronger compared to the results of the Global Domestic Terrorism Model. The weakness of the transnational terrorism models was the lack of data in the sample pertaining to transnational terrorism, which therefore hindered the statistical significance of the transnational terrorism models.

The stronger results of the MENA models are unsurprising. Prior literature indicates strong economies in the developed world have been very capable of responding to terrorism and limiting its impact on the economy. Due to a variety of historical factors, the vast majority of the countries in the MENA data are considered at best developing countries along with several failed states. Of the 17 MENA countries in the data set, 5 are classified as having a high level of alert in the 2015 Fragile State Index, formerly known as the Failed State Index. (FFP, 2015) It is due to these factors that this study's theory being stronger in the MENA regional compared to globally is not a surprise. Certainly the rates of terrorism are higher in this region compared to others, but the capability of governments and companies in this region to respond and adjust for oil implications is much weaker compared to developed countries.

Implications for Practice

Further research is recommended to expand on the theory outlines in this thesis, however, there are some implications for policymakers in this study. As the findings indicate, domestic terrorism is shown to increase oil rents, and as a result oil prices increase. For

countries with few domestic terrorist attacks this likely is not a significant factor, but for those that do the implications could be large in the long-term. For fragile countries a rise in oil prices could lead to further issues or exacerbate existing ones, eventually causing a greater problem.

Terrorism in the US is a rare phenomenon, but that does not mean attacks elsewhere do not implicate the US or US interests abroad. For example most western-owned oil companies have facilities and stakes in Iraq, even a few in northern Iraq near ISIS territory. US policymakers must understand the threat of terrorism there and its implications on the oil market, as the theory in this thesis supports. Particularly concerning would be what was theorized could happen in June 2014, when ISIS was driving deep into Iraq and many feared the group could push towards Iraq's southern oil fields (Phillips, 2014). Such an event would almost surely cause oil prices to skyrocket. It's a similar reason as to why security for the Suez Canal is so vital, a large-attack and damage to the Suez Canal would likely cause a large disruption in the world oil supply and cause prices to skyrocket. Terrorism is difficult to predict, but understanding its implications on the oil market can better prepare decision-makers at formulating contingency plans for such doomsday scenarios.

Along with government policymakers, this study will hopefully assist in the decision-making of oil company executives, particularly those who have investments and facilities in areas with a high threat of terrorism. That said, as the case of Iraq proves, oil companies do not appear to be concerned about operating in high threat areas. Nonetheless, this study and future research on this topic can hopefully can assist these companies in their decision-making.

Recommendations for Further Research

The top priority for future research would be acquiring more data and extending the time period, in addition to finding the most recent data available after 2014. The data set could

only be operationalized dating back to 1992 for both oil rents and terrorism data. The GTD also excludes 1993 from their data set, due to challenges in reconstructing the accurate data from that year (GTD, 2015). If possible, using other sources to obtain country-level terrorism data for 1993 would also assist in increasing the robustness of the study. In addition, this study had some gaps in its oil rents data and control variables that I recommend be filled as much as possible in future research.

Another recommendation is using month-by-month data of terrorism attacks and the average country-level oil price at a per-month basis. I found such data for the United States, but I was not able to find an aggregated data set globally or even a large sample of countries worldwide or regionally. I believe it would take in-depth research on a country-by-country level gathering the data for every month or every quarter. Terrorism data would also need to be adjusted on a month-by-month basis as well. That said, terrorism data in general is often in too small amount to obtain a statistically significant finding. Due to that, I would recommend limiting this study to countries with higher rates of terrorism, which would ideally provide enough data to obtain a statistically significant finding.

One final recommendation for future research is including oil production or quantity of oil imports as a variable into the study, as a means to quantitatively gauge the degree oil prices increase as a result of fear speculation and how much the price increase is due to damage or delays in the oil supply. As the case study with ISIS in June 2014 illustrates, fear speculation can lead to short-term price increases that can have a significant short-term effect. Because of the short-term nature, I would recommend using sample countries with large amounts of terrorism data and ideally countries that have significant oil resources, which would provide the most robust results.

Conclusions

Long has oil and terrorism been connected by the mainstream media, but I noticed a lack of empirical research into its connection beyond theoretical news articles. The US Invasion of Iraq in 2003 only strengthened this generalized theory, but again, no significant empirical evidence is available. Hence, this thesis was meant to begin the venture towards quantitatively assessing the generalized theory that terrorism disrupts the oil market. Based on the ISIS case study, I formulated the theory that terrorism increases oil prices. A similar structural framework of Hendrix (2015) was used to test this theory due to the research design similarities. Due to the operationalized data available, the variable *oil rents* was used to assess oil prices, and the terrorism data set is broken down into *domestic terrorism* and *transnational terrorism* variables. This breakdown of terrorism data is seen across most quantitative terrorism studies.

Overall, the results across both the global and MENA models indicate domestic terrorism does increase oil rents, and therefore increases oil prices. Both transnational terrorism models were found to be statistically insignificant, but that is not abnormal across many quantitative terrorism studies due to the lack of data points. Future research should focus in on filling the gaps in the sample data set, which would increase the robustness of the study. It would also be advisable to combine this with an oil production variable as a means to determine how much the price increase in domestic terrorism is due to a decrease in production or imports. This would then provide findings that could possibly determine how much of oil price increases is due to speculation of terrorism, like that seen in June 2014 with oil speculation surrounding the advance of ISIS across Iraq. Despite these findings, it is difficult for policymakers to account for terrorism's impact on the oil market. That said, it is my hope that

policymakers would heed the caution in these results and take safeguards in protecting their country's oil facilities, along with the vital oil facilities overseas that have a tremendous impact on the global oil market.

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Annexes

Annex A

```
. sum

    Variable |        Obs        Mean    Std. Dev.        Min        Max
-------------+--------------------------------------------------------
        year |      3,269    2003.216    6.572682       1992       2014
     country |          0
       ccode |      3,269     654.078    1380.771          2      10006
       scode |          0
      region |          0
-------------+--------------------------------------------------------
    refugees |      3,269    84049.22    236061.9          0    4150723
 domesticte~m |      2,955    7.026396    35.61041          0        656
 transnatio~r |      1,775    7.159437    23.91086          0        453
 logpopulat~n |      3,266    16.25463    1.504083   10.52377   21.03389
  population |      3,266    4.31e+07    1.45e+08      37189   1.36e+09
-------------+--------------------------------------------------------
  pop_growth |      1,330    .6848696    1.093265  -3.820174   7.555156
 per_urbanpop |      3,269    56.19582    23.46631      6.288        100
 civil_libe~s |      3,208     3.63217    1.841045          1          7
   democracy |      2,966    3.240054    6.497297        -10         10
 unemployment |      3,099     8.70697       6.067          0       37.6
-------------+--------------------------------------------------------
  gdp_growth |      3,184    3.861564     6.10326  -62.07592   106.2798
   edu_index |      1,198    .6656871    .1618208   .1213889   .9120289
 literacy_r~e |        943    91.43591    15.38673   31.74112        100
 ethnic_fra~n |      3,224    .4583069     .265154       .002      .9302
 linguistic~n |      3,143     .408331    .288546      .0021      .9227
-------------+--------------------------------------------------------
 religious_~n |      3,242    .4195161    .2349364      .0023      .8603
     oilrents |      3,075    5.482493    12.19904          0   73.33453
```

Note: This is the cumulative table for the master data set.

Annex B

```
Number of gaps in sample:  113
(note: at least one disturbance covariance assumed 0, no common time periods
      between panels)

Linear regression, correlated panels corrected standard errors (PCSEs)

Group variable:    ccode                  Number of obs      =      2,648
Time variable:     year                   Number of groups   =        136
Panels:            correlated (unbalanced)  Obs per group:
Autocorrelation:   no autocorrelation                min =          4
Sigma computed by pairwise selection               avg =  19.470588
                                                   max =         21
Estimated covariances      =      9316    R-squared          =     0.3110
Estimated autocorrelations =         0    Wald chi2(7)       =    1296.96
Estimated coefficients     =         9    Prob > chi2        =     0.0000


-----------------------------------------------------------------------------
                            |            Panel-corrected
                   oilrents |    Coef.   Std. Err.     z    P>|z|   [95% Conf. Interval]
----------------------------+------------------------------------------------------------
         domesticterrorism |  .0256118   .0083071   3.08   0.002    .0093302    .0418934
                population |  -5.36e-09   8.74e-10  -6.14   0.000   -7.08e-09   -3.65e-09
               per_urbanpop |  .1887472   .0075341  25.05   0.000    .1739805    .2035139
            civil_liberties |   1.21169   .1591963   7.61   0.000    .8996714    1.523709
                  democracy |  -.7657734  .0588957 -13.00   0.000   -.8812068   -.6503399
              unemployment |  -.0114592  .0192893  -0.59   0.552   -.0492656    .0263471
                 gdp_growth |  .1949157   .0671315   2.90   0.004    .0633405     .326491
religious_fractionalization |  2.940012    .270754  10.86   0.000    2.409344     3.47068
                      _cons |  -8.581907  .8002664 -10.72   0.000    -10.1504   -7.013414
-----------------------------------------------------------------------------
```

Note: This is the PCSE model table for the master data set and the independent variable,
domestic terrorism.

Annex C

```
Number of gaps in sample:  342
(note: at least one disturbance covariance assumed 0, no common time periods
      between panels)

Linear regression, correlated panels corrected standard errors (PCSEs)

Group variable:    ccode                Number of obs      =       1,497
Time variable:     year                 Number of groups   =         132
Panels:            correlated (unbalanced)  Obs per group:
Autocorrelation:   no autocorrelation                       min =           1
Sigma computed by pairwise selection                        avg =   11.340909
                                                            max =          21
Estimated covariances       =       8778   R-squared        =      0.2805
Estimated autocorrelations  =          0   Wald chi2(7)     =      534.04
Estimated coefficients      =          9   Prob > chi2      =      0.0000
```

		Panel-corrected				
oilrents	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
transnationalterror	.0130771	.0090695	1.44	0.149	-.0046988	.030853
population	-3.47e-09	4.28e-10	-8.11	0.000	-4.31e-09	-2.63e-09
per_urbanpop	.1807014	.0135745	13.31	0.000	.1540959	.2073068
civil_liberties	1.838416	.2222888	8.27	0.000	1.402738	2.274094
democracy	-.5808123	.0822864	-7.06	0.000	-.7420906	-.419534
unemployment	-.042111	.0339485	-1.24	0.215	-.1086488	.0244268
gdp_growth	.1630052	.0941641	1.73	0.083	-.0215531	.3475634
religious_fractionalization	.1917589	.9309687	0.21	0.837	-1.632906	2.016424
_cons	-9.616249	1.165533	-8.25	0.000	-11.90065	-7.331846

Note: This is the PCSE model table for the master data set and the independent variable, *transnational terrorism.*

Annex D

```
Number of gaps in sample:  10
(note: at least one disturbance covariance assumed 0, no common time periods
      between panels)

Linear regression, correlated panels corrected standard errors (PCSEs)

Group variable:    ccode                    Number of obs      =         253
Time variable:     year                     Number of groups   =          16
Panels:            correlated (unbalanced)  Obs per group:
Autocorrelation:   no autocorrelation                          min =           4
Sigma computed by pairwise selection                          avg =     15.8125
                                                              max =          21
Estimated covariances      =      136        R-squared         =      0.5999
Estimated autocorrelations =        0        Wald chi2(8)      =      904.56
Estimated coefficients     =        9        Prob > chi2       =      0.0000

------------------------------------------------------------------------------
                        |                 Panel-corrected
              oilrents |    Coef.   Std. Err.      z    P>|z|    [95% Conf. Interval]
-----------------------+------------------------------------------------------
       domesticterrorism |  .1030164   .0271571    3.79   0.000    .0497895    .1562434
              population |  3.24e-07   3.66e-08    8.84   0.000    2.52e-07    3.96e-07
             per_urbanpop |  .8554475   .0539012   15.87   0.000    .7498031     .961092
            civil_liberties |  7.734608   .6538339   11.83   0.000    6.453117    9.016099
               democracy | -1.220307   .2849996   -4.28   0.000   -1.778896   -.6617182
             unemployment |  .6275797   .1969081    3.19   0.001     .241647    1.013512
               gdp_growth |   .202928   .1512901    1.34   0.180   -.0935951     .499451
  religious_fractionalization |  17.69469   2.699072    6.56   0.000     12.4046    22.98477
                    _cons | -106.4955   8.880949  -11.99   0.000   -123.9019    -89.0892
------------------------------------------------------------------------------
```

Note: This is the PCSE model table for the MENA data set and the independent variable, *domestic terrorism*.

Annex E

```
Number of gaps in sample:  31
(note: at least one disturbance covariance assumed 0, no common time periods
      between panels)

Linear regression, correlated panels corrected standard errors (PCSEs)

Group variable:    ccode                    Number of obs    =        135
Time variable:     year                     Number of groups =         15
Panels:            correlated (unbalanced)  Obs per group:
Autocorrelation:   no autocorrelation                        min =          2
Sigma computed by pairwise selection                         avg =          9
                                                             max =         21
Estimated covariances      =        120    R-squared        =     0.6232
Estimated autocorrelations =          0    Wald chi2(8)     =     385.56
Estimated coefficients     =          9    Prob > chi2      =     0.0000


-------------------------------------------------------------------------------
                           |             Panel-corrected
                  oilrents |    Coef.   Std. Err.     z    P>|z|   [95% Conf. Interval]
---------------------------+---------------------------------------------------
       transnationalterror | -.0303077  .0578486   -0.52   0.600  -.1436889   .0830735
                population |  3.74e-07  3.87e-08    9.67   0.000   2.98e-07   4.50e-07
              per_urbanpop |  .9201632  .0494386   18.61   0.000   .8232654   1.017061
            civil_liberties| 13.28052   1.509001    8.80   0.000  10.32293   16.23811
                 democracy |  .3925203  .3234663    1.21   0.225  -.241462   1.026503
              unemployment |  .3180358  .1452331    2.19   0.029   .033384    .6026875
                gdp_growth |  .2277464  .1833691    1.24   0.214  -.1316504   .5871433
  religious_fractionalization | .2434649  5.29742    0.05   0.963  -10.13929  10.62622
                     _cons | -127.7211  9.605227  -13.30   0.000  -146.547   -108.8952
-------------------------------------------------------------------------------
```

Note: This is the PCSE model table for the MENA data set and the independent variable, *transnational terrorism*.