Commodity Price Shocks and Interstate Conflict: Evidence from Analysis of Oil Production from 1993-2014

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ABSTRACT

For many states, the production of commodities is a significant source of income, and exogenous shocks certainly have an impact on its foreign relations. Literature suggests that there is an effect that income shocks have on civil conflict. In this paper I explore how commodity price shocks may have an effect on interstate conflict using data from 1993 to 2014. It is clear that changes in energy markets have significant ramifications for international relations; however, there are few studies that provide empirical evidence and rigorous statistical analyses. First I test the effect of oil price shocks on interstate conflict, and second, I see whether there is a difference in economies that rely on oil relative to those that do not. I test four different outcomes of interstate conflict to show that a rise in the price of oil increases interstate conflict, and that threats of and shows of force are the main drivers of this increase. I also test two different mechanisms, diversionary tactics and military capabilities, and the empirical evidence opposes the diversionary explanation as a mechanism, while the evidence regarding military capabilities driving conflict is inconclusive. The understanding of the idea that positive price shocks have a positive effect on interstate conflict and vice versa furthers the empirical bridge in the gap in literature on the relationship between commodity price shocks and conflict at the interstate level.

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1. INTRODUCTION

The primary question that this paper addresses is whether or not there is an effect that commodity price shocks have on interstate conflict, specifically the use of or threat of force by states against other states, and if so, how much of an effect there is. In a more causal way, the question is "what is the effect of commodity price shocks on interstate conflict?" This study examines this question using an interstate conflict dataset from the Correlates of War project (Palmer, McManus, D'Orazio, Kenwick, Karstens, Bloch, Dietrich, Kahn, Ritter, and Soules 2020) among other datasets regarding prices, national-level statistics, and production of crude oil.

The dynamic system of international commodity trade is a formidable force in the global economy that has vastly increased in importance with the rise of globalization; likewise, this trend has created unprecedented opportunities all around the world, yet, this has coincided with a rise in volatility in the sphere of international relations where many of those opportunities have been created (even if there has been political pushback against the globalization of trade over the past few years). The rise of commodities in international trade has created an interconnected web of economies; this has also created a situation where states rely on these commodities, whether as industrial inputs or raw exports, as part of their economic growth strategy. This is especially true for emerging markets engaged in global supply chains and states chasing the vast economic gains from trade. Or simply, states may simply look to exploit their natural resource endowments for economic gain. This is a trend that is set to continue; Daniel Yergin discusses the "globalization of energy demand" — he writes that "currently, oil use in the developed world averages 14 barrels per person per year. In the developing world, it is only 3 barrels per person. How will the world cope when billions of people go from 3 barrels to 6

barrels per person?" (Yergin 2011, 4). In dealing with this rising demand, states may become entangled in engagements abroad, complicating foreign relations.

Price shocks have the ability to destabilize foreign relations. In the event of a negative price shock to a given commodity, in this case, oil, a state dependent on its revenues may be subjected to a recession (or they may anticipate one). In the event of a recession, a faltering economy may lead to a loss of support for a given state's regime (which could possibly lead to civil unrest and incumbents may even be turned out of power), which may cause leadership within that given state to be incentivized to use force abroad as a diversionary tactic to increase support via a so-called "rally 'round the flag" effect. Economic growth is a key to driving living standards, and for many states, this growth comes from revenues from commodities, but there is little literature regarding the effect that commodity price shocks have on conflict beyond the intrastate level. Similarly, given the rise in new demand due to global economic growth and the proliferation of new technologies and of international trade (which has created some interesting yet unlikely partnerships, such as the one between Japan and Iran), this is something that will impact the future as well in regard to foreign relations. I hope to build upon literature at the intersection of economics and international relations.

Wars and conflicts over commodities, in this case oil, are also not a new concept: in 1990, Saddam Hussein accused Kuwait of siphoning off Iraqi oil, and accused Persian Gulf states of collaborating to hold down the price of oil to damage Iraqi interests and to protect Western ones; after attempts of negotiation between Iraq and several Persian Gulf states broke down, Iraq invaded Kuwait. On the other hand, the coalition members of Operation Desert Shield (which would later become Operation Desert Storm) who intervened and restored Kuwait as a sovereign state were not countering

the Iraqi invasion necessarily for the purpose of liberating Kuwait, but rather to deter Iraq from attacking Saudi Arabia, which borders Kuwait, and vastly expanding its share of the world's oil reserves (McDougall 2020). Similarly, there have been recent tensions in Saudi-Iran (Brew 2020) and Greek-Turkish relations (Biresselioğlu 2019), not to mention other disputes over regions such as the South China Sea (Fravel 2011), over resource-rich regions. This study examines whether or not there is an effect that price shocks on these sorts of commodities have on interstate conflict, and if so, whether the effect is strong or weak, and the mechanisms by which commodity price shocks cause interstate conflict.

The identification problem that my paper suffers from is the lack of ability to correspond price shocks to the occurrence of interstate conflict — it is difficult to hold constant other variables when determining the effect of oil price shocks on interstate conflict. Potential sources of bias that prevent us from estimating the causal effect of oil price shocks on interstate conflict may be other variables that cause international conflict such as civil conflict, inter-ethnic conflict, economy, religion, among other various factors, etc.; in regard to confounders, factors such as region (natural resources may be located in a similar region, and at the same time neighbors have a greater tendency to be hostile toward one another as opposed to governments sitting on opposite sides of the globe), territorial disputes, economic growth, and government institutions. These issues are empirical roadblocks which prevent us from being able to accurately measure the exact effect of commodity price shocks on interstate conflict.

In regard to the treatment, I look at two measures that capture oil's importance in the domestic economy and interact them with the international oil price: i.) the level of oil production in 1993 and

ii.) share of oil revenues in GDP in 1993. Using price data on Brent Crude, from Bloomberg ("Monthly Price of Brent Crude, 1993-2014" 2021), and oil production data from the U.S. Energy Information Administration ("Annual Petroleum and Other Liquids Production" 2021), and GDP from the World Bank Development Indicators (The World Bank 2020), we can create these two variables. It should be noted that for the price of Brent Crude, I collapsed a monthly price dataset into an annual price dataset, in which each year is represented as a mean of the monthly prices (the last market price of Brent Crude on the last trading day of a given month) in a given year. This study assumes that the price of oil is exogenous and that issues related to measurement, estimates, etc. are consistent across time and institutions which report the data.

In regard to the outcome variables, interstate conflict, this study examines several outcome variables; the number of events, the number of threats, shows of force, territorial occupations, all in terms of per million capita. I measure this using data from the Correlates of War Project on interstate conflict from 1993-2014 and collapsing it to the country-year level, and in the process, counting the number of individual incidents in which the country-year was involved in violent conflict or threatened the use of violence, the number of threats for a given country-year, the number of threats a country-year issues, the number of shows of force a given country-year engages in, territorial occupations a country-year engages in, and creating a per million capita variable denoting each outcome. Counting the number of incidents is effective in telling us whether or not a given country-year was engaged in the use or threat of violence; however, one issue may be the lack of information on what defines each event. Similarly, while we can use fatalities as a measure of conflict intensity; however, this study does not do so due to the fact that in many cases the precise number of

fatalities is often unknown and the Correlates of War dataset uses a variable denoting ranges of the number of fatalities rather than giving an exact figure. It should be noted that this dataset does not designate participants as initiators of conflict, but rather participants in those events and that each record within the dataset is at the event-participant level.

This study observes states in a given year (dubbed as "country-years") as its unit of analysis. To test the effect of oil price shocks on interstate conflict for a given "country-year," for the first empirical strategy, I test the effect of oil production in 1993 interacted with the logarithm of the oil price on interstate conflict. In regard to the second empirical strategy that this study employs, an alternative measure of the importance of oil to a state is oil production relative to total economic productivity, so I also test the effect of a state's reliance on oil by testing the ratio of oil production in 1993 to the GDP in 1993 and this is interacted with the logarithm of the price of oil. This model includes country and year fixed effects, and regional linear time trends. The results using these two models find that rises in the price of oil have significant positive effects on interstate conflict. I also test two mechanisms by which price shocks affect interstate conflict, diversions and material military capabilities. I find that the evidence does not support the diversionary theory and that military capabilities may be a mechanism.

2. CONTEXT AND LITERATURE REVIEW

Dube and Vargas (2014) describe the effect of commodity price shocks, specifically oil and coffee, on civil conflict in Colombia — in this paper they use a regression nearly identical to the one used in this study. In this case, they perform a rigorous statistical analysis on the relationship between the price of commodities and civil conflict to find that a fall in the price of coffee increases violence

differentially in regions that cultivate coffee more intensively, whereas a rise in the price of oil, among other less labor-intensive goods, results in an increase in violence. They find that a rise in the price of coffee disincentivizes people from participating in armed activity due to a decrease in opportunity cost for doing so through rising incomes in coffee production, yet, a rise in the price of oil increases civil conflict by increasing the incentives to contest the production of oil (the relatively less labor-intensive operation is usually performed by governments) through armed conflict. My paper builds on the literature of this paper by taking the same method used by Dube and Vargas and applying it to the interstate level. At the interstate level, an experiment with two different treatment variables – first, the 1993 oil output interacted with the logarithm of the price of oil, and second, the logarithm of the price of oil interacted with 1993 oil output divided by 1993 GDP – can be performed; in a sense, rather than looking at production of oil at the municipal level within a state such as Colombia, this study uses oil production at the state level with the international system, and rather than examining civil conflict, this study takes the same idea and applies it in the sense of interstate conflict.

Bazzi and Blattman (2014) derive a similar experiment from Dube and Vargas, with commodity export shocks as their focus, and rather than examining civil conflict they examine conflict generally, using several measures of conflict, including civil wars, the onset of wars, coups, etc.; Bazzi and Blattman, in their analysis, find that their study contradicts the theory that rising commodity prices incentivizes state capture, but supports the theory that rising commodity revenues give states greater counter-insurgency abilities and reduce individual incentives to participate in armed conflicts. My study is very similar to this one; however, my study examines the theory that price shocks which

lead to recessions in commodity-dependent states increases their propensity to engage in interstate conflict as a diversionary tactic as a matter of survival.

In regard to recessions leading to interstate conflict, Tir (2010) gives empirical support to the process of government unpopularity leading to governments initiating territorial conflicts. Tir uses proxy indicators on leader (un)popularity from the Cross-National Time-Series Archive (incidents of protests, strikes and riots, which is summed up) and Penn World Tables (for economic growth) datasets for the independent variables (which are also lagged to ensure that unpopularity is followed by conflict) and a dyadic dataset on territorial conflicts (in which an initiator country and a target country are identified) from the Correlates of War project for the dependent variables. Using a logistic regression, the study finds that unpopular leaders do indeed initiate diversionary territorial conflicts — one of the models Tir uses also demonstrates that economic underperformance does yield a significant positive effect on fatal militarized interstate disputes at the 10% level (Tir 2010). My study examines recessions caused by commodity price shocks as a mechanism for interstate conflict; recessions, as a proxy for unpopularity, theoretically lead to leaders becoming more likely to initiate conflicts abroad. However, while Tir's study uses a dyadic dataset to see who initiates which conflicts, my study only observes events that states are involved in, and examines participation in events of interstate conflict, rather than initiation of conflict. My study intends to build on this by linking the factor of commodity price shocks to those recessions which lead to those conflicts abroad.

Ross (2013, 178-87), in *The Oil Curse*, examines the resource curse (which posits that resource-rich states tend to have worse outcomes in terms of economy, war, etc.) in regard to the context of oil. Ross describes the correlation between petroleum income and the likelihood of civil

war, with the independent variable being the logarithm of oil income per capita, and the dependent variable being the onset of civil war (which is dichotomous; Ross uses a logistic regression to estimate the likelihood of war). Ross finds that oil income is positively correlated to the onset of civil war and statistically significant at the 1% level, which suggests that oil income does indeed increase civil war. While his work details the relationship between oil production and the onset of civil war, those same methods have not yet been applied to at the scale of interstate conflict, which my study intends to do: apply the resource curse to the level of the international system. Similarly, with this study we can see whether or not the "oil curse" that Ross describes exhibits effects not just within a country's borders, but also beyond in the international sphere.

Yergin (2011) writes that "increasingly, energy trade traverses national borders. Moreover, energy security is not just about countering the wide variety of threats; it is also about the relations among nations, how they interact with each other, and how energy impacts their overall national security." Similarly, he writes that the underlying drive for these resources, is about energy needs for economic growth. While there is no doubt that there exists a relationship between a state's energy security, its economy and its foreign relations, this is a field in which there is a lack of quantitative studies with rigorous statistical analysis that details how these commodities have an effect on the international system. While this study is specific in discussing oil, I believe that the statistical analysis in this study will provide some insight that will further the field of international relations in this regard.

Yergin (2011) also discusses the history and ramifications of climate change – as states negotiate and hammer out the details of treaties to reduce carbon emissions and states attempt to reduce their reliance on certain energy commodities, there will most certainly be a change in oil markets, especially

in the form of lower demand – while the result of these changes, whether due to regulatory factors, changes in markets, or even climate change itself, is yet to be known, there can certainly be security implications. If this study can better understand the effect that lower oil prices, in this case, due to lower demand, have on international relations, then in some sense this study will further the understanding of the implications of changes such as regulations, cooperation, and competition due to climate change.

In a report from the Hague Centre for Strategic Studies called "International Fossil Fuel Relations: Cause of Conflict Rather Than Source of Stability" the authors write the following:

> "The combination of [current] trends will further precipitate the logic of the security dilemma in the calculus of states in their relations vis-à-vis other states. Consumer states will continue to strive and secure energy supplies, while producer states will continue to be able to use their fossil fuel reserves as a stick (or a carrot) depending on their national needs and circumstances. Dependencies in this system increase rather than decrease the odds of interstate conflict" (Sweijs, De Ridder, De Jong, Oosterveld, Frinking, Auping, Coelho, Bylappa, and Ilko 2014, 43).

The report discusses several ongoing implications to the international security environment caused by energy trends, such as territorial conflicts in the South China Sea and Russia's use of energy as a "coercive instrument" – this report does not include any sort of quantitative statistical analysis. My study seeks to better understand those types of risks through rigorous statistical analysis.

So, there is a lack of literature regarding the effect that commodity prices shocks have on conflict at the interstate scale. Similarly, when it comes to issues at the interstate scale, there is a lack of quantitative literature that employs a range of statistical tools to understand the effect of these sort of price shocks. This study intends to bridge the empirical gap in literature regarding the relationship between commodity price shocks and interstate conflict.

3. THEORETICAL ARGUMENT AND HYPOTHESIS

The core argument of this thesis is that the commodity price shocks affect the incidence of interstate conflict. A regime may seek distractions from domestic issues (especially those which could destabilize the regime) when a negative commodity price shock causes a recession, leading to a decline in popularity which would incentivize a regime to rally their populations through diversions by pursuing aggressive action abroad. Conversely, a boom in the price of oil may lead to a regime becoming more popular, and thus the incentives to pursue engagements abroad through aggressive action are reduced. The hypothesis is that a change in the price of oil will mean a change in oil revenues which will have an effect on a state's involvement in the use of or the threat of the use of force. In the case that there is, we can predict that there is an effect that commodity price shocks have on international conflict via a change in the political calculus, specifically that recessions will prompt leaders to be incentivized to take action in interstate disputes to divert attention away from domestic issues. This is the theoretical basis for a diversionary argument as described by Tir, although my study focuses on the involvement of states in militarized interstate conflicts in general rather than in militarized territorial disputes. Changes in the price of raw materials, in this case oil, will have an effect on a national economy which in turn will prompt a policy response from its government (or a lack of a response in the case that there is no effect).

Another competing explanation for this could be that when states capture resource rents, they have a greater ability to finance their armed forces and military campaigns and thus larger oil revenues would give them an incentive to use their armed forces abroad. According to this explanation, when

the price of oil increases, so do the revenues of oil producers, assuming that they do not decrease the level of production. When states can generate more revenues, whether this increase in the ability to finance militaries is due to oil production being a state-owned enterprise or due to taxation (and thus state capture) of resource rents (or some combination of the two), they have a greater ability to finance their armed forces. This may cause leadership to shift their political calculus — this could be because perceptions that greater military spending, and thus a stronger military, mitigates risks of engaging in interstate conflict. Changes in the price of raw materials, in this case oil, will have an effect on a state's ability to finance its armed forces, and thus has an effect on interstate conflict.

This study tests the two theories laid out above, in the case that there is a positive effect that commodity prices have on interstate conflict, and the variables used to test these are laid out below in the mechanism tests.

Alternative competing explanations may be that there is a change in a state's appetite for risk-prone behavior due to shifting incentives. In the case that there is a positive relationship between the price of oil and the propensity of interstate conflict, explanations may stem from the idea that regimes may be incentivized to capture resource rents beyond their control in the *status quo*. Because the state often has a role and stake in oil production (and therefore its revenues), a regime with control over commodity rents may either seek to take external action such as taking advantage of an opportunity (for example, a higher oil price may prompt a state to secure certain sea lanes where oil exports pass through) to further capture rents. Or, there may also be a change in a state's appetite for risk-prone behavior when a positive shock in the price of oil may prompt a state to take action abroad,

perhaps in a territorial dispute involving oil where two or more states may seek to exploit natural resource-rich regions to further revenues.

Another plausible explanation could be that in the case that there is empirical evidence of the resource curse having a negative effect on democracy, a positive price shock should cause worse outcomes for democracy; worse outcomes for democracy may mean that resource-rich states do not experience democratic peace, even if democratic peace posits that democracies can pursue armed conflict with non-democracies (Mousseau 2009). This explanation posits that positive price shocks cause interstate conflict by exacerbating the resource curse via poor democratic outcomes.

Increasing commodity prices may also increase the propensity of civil conflict and thus decrease the propensity of interstate conflict in the case that civil conflict has a negative effect on interstate conflict. Dube and Vargas find that a rise in the price of oil increases the incentives for individuals to contest government oil production through conflict. In the case where positive commodity price shocks increase the propensity of civil conflict, a rise in the price of oil may weaken an oil-dependent state's ability to pursue conflicts abroad due to the fact that the resources that would go toward pursuing external action otherwise are being used to maintain order and to contain civil conflict domestically. This would mean that there is a negative relationship between the price of oil and the propensity of interstate conflict; the need to contain civil conflict may be an explanation in this case where there is a negative relationship.

4. DATA, METHODOLOGY, AND EMPIRICAL STRATEGY

4.1 Independent variables

In this study, I looked at individual states, their respective regions, in a given year. In this study, variation is coming from the global price of oil, measured by Brent Crude, one of the two most widely-used benchmarks for the global price of a barrel of oil (the other being West Texas Intermediate, often referred to as WTI). The reason this study uses Brent Crude, oil extracted in the North Sea in Europe, as opposed to other benchmarks for the price of oil is because Brent Crude, despite representing a relatively small share of the global oil market, is used to price 60% of all oil on international markets (B.F. 2018). In regard to the relationship between commodity price shocks and interstate conflict, I am interested in looking at the difference in the outcomes for states that produce lower and greater amounts of oil. In this study, I assume that the price of oil on the global market is exogenous[1].

In regard to examining the importance of oil for a given state in a given year, I interact the logarithm of the price of oil with the level of oil production in 1993, measured in hundreds of thousands of barrels per day — this data is compiled from the U.S. Energy Information Administration[2] (EIA). An alternative measure of the importance of oil for a state is the share of oil production relative to the total economic productivity — in the regressions that this study runs, I

[1] There may be a few issues; states produce other energy-related commodities such as liquefied natural gas (LNG) and other hydrocarbon products or they may only be involved in the refinery process of production, and shifting to one of these may have an effect on interstate conflict. Other issues related to crude oil may be that there are several blends of crude oil with different chemical makeups and features; varieties may be categorized as "heavy," "light," "sweet," and "sour," which may be refined into different products, undergo different processes, priced with a different benchmark, etc. (Britannica 2020). I assume that these issues have a negligible impact on the treatment variables.

[2] The EIA's compilation of production data comes independently from other states, and several states may have different methods, reporting, definitions, or even political incentives to manipulate data, so this may lead to the data not presenting the reality of oil production. This study assumes that these issues have a negligible impact on the treatment variables.

interact each state's 1993 production level divided by the 1993 GDP with the logarithm of the price of oil. The reason why this study only uses the level of production and GDP in 1993 is because the change in the price is the treatment that this study examines, and thus uses the production level prior to treatment.

4.2 Dependent Variables

In regard to the the variable of states using force against the actors of another state, I am using a dataset from the Correlates of War covering incidents within militarized interstate disputes from 1993-2014 at the incident-participant level, in which there is a record for every participant in each incident in which a state used force or threatened to do so. This study's outcome variables include the number of incidents, threats, shows of force, and territorial occupations, in terms of per million capita (in the main set of outcomes this study examines these types of events as a fraction of a given state's population in millions, and the data comes from the World Bank Development Indicators).

Issues involving this dataset may be that in regard to threats of force by states, there may be some cases in which the definition of threats of the use of force is ambiguous, diplomatic language may imply a threat, or bluffing may be in play when a state issues an ultimatum stating that it intends to use force in the event that another state does not act accordingly with the threatening state's threat. This study assumes that these issues have a negligible effect on the outcome variables.

4.3 Final Dataset and Potential Sources of Bias

To create the final dataset, I merged the price dataset from Bloomberg with the production dataset with their corresponding years, and subsequently generated a variable which denoted each state's crude oil production in 1993. I then generated a "country-year" variable, and merged this dataset with the development indicators dataset from the World Bank, yielding a dataset that would be merged with the dataset from the Correlates of War project on interstate conflict events at the participant-event level, which itself would be collapsed to the "country-year" level, counting the number of incidents that each state in a given year was involved in. The final merge creates a dataset in which all states in the system are accounted for and includes the variables needed to generate the relevant variables necessary to execute the research design.

My paper attempts to resolve the lack of ability to determine whether there is a difference in the propensity of interstate conflict for high-level producers of commodity revenues and low-level producers of commodities. Potential sources of bias that prevent us from estimating the causal effect of oil price shocks on interstate conflict may be other variables that cause international conflict such as inter-ethnic conflict, other economic factors, religion, among other various factors, etc.; in regard to confounders, factors such as region (natural resources may be located in a similar region, and at the same time neighbors have a greater tendency to be hostile toward one another as opposed to governments sitting on opposite sides of the globe), territorial disputes, economic growth, and government institutions. These issues are empirical roadblocks which prevent us from being able to measure the exact effect of commodity price shocks on interstate conflict.

4.4 Model 1: Logarithm of the Price of Oil Interacted with 1993 Production

The first regression model that this study examines is the case of the level of production in 1993 interacted with the logarithm of the price of oil. For this, I estimate the following regression:

$$Y_{itr} = \alpha + \beta(Oil_{1993ir} \times OP_t) + \gamma Z_{itr} + X_{itr}\varphi + \varepsilon_{itr}$$

Where Y_{itr} refers to the outcomes of interstate conflict for a given *i,t,r* (where *i* represents a given state, *t* a given year, and *r* that given state's region), α is average outcome for non-producers of oil, in this case, the occurrence of interstate conflict, $\beta(Oil_{1993ir} \times OP_t)$ is the differential effect of the oil price on interstate conflict (for given *natural log* of global oil price interacted with the level of oil production prior to treatment in 1993) for a given *i,t,r*, $X_{itr}\varphi$ represents linear continent time trends for a given *i,t,r*, γZ_{itr} represents other fixed effects (in this study I use the level of armed forces and polity score to further constrain endogenous bias) for a given *i,t,r,* and ε_{itr} is the error.

4.5 Model 2: Logarithm of the Price of Oil Interacted with 1993 Production Divided by 1993 GDP

In a similar fashion, in regard to the second case in which the logarithm of the price of oil is interacted with the level of production in 1993 divided by the GDP in 1993, we use the following equation to estimate the effect:

$$Y_{itr} = \alpha + \beta(OilShare_{1993ir} \times OP_t) + \gamma Z_{itr} + X_{itr}\varphi + \varepsilon_{itr}$$

Where the respective variables are the same as in the first equation; however the difference in this case, is $\beta(\text{OilShare}_{1993ir} \times \text{OP}_t)$ which represents the differential effect of the oil price on interstate conflict for a given *i,t,r* where OilShare_{1993ir} represents the level of oil production in hundreds of thousands of barrels per day in 1993 divided by the state's 1993 GDP interacted with the logarithm of the price.

Using the two models outlined above, this study examines the relationship between commodity price shocks and interstate conflict.

4.6 Mechanisms

This study, in addition to performing regression analysis using the two models detailed above, tests the mechanisms by which commodity price shocks induce a change in interstate conflict. In this case, I test three different variables: GDP growth, military expenditures as a share of GDP, and military expenditures per capita. This study tests these variables in order to test the two competing theories (the latter two tests the military capabilities theory) that explain why negative commodity price shocks may have a negative effect on the level of interstate conflict: negative price shocks lead to poor economic performance and unpopularity leading to regime leadership to use diversionary tactics to rally populations around them, and negative price shocks decrease the state's material ability to pursue aggressive action abroad. In order to test the three variables, I first tested whether price shocks had any effect on the mechanisms that I tested using the following regression model:

$$Y_{itr} = \alpha + \beta(\text{IndVar})_{itr} + \gamma Z_{itr} + X_{itr}\varphi + \varepsilon_{itr}$$

Where Y_{itr} refers to the outcomes of the mechanisms for a given *i,t,r* (where *i* represents a given state, *t* a given year, and *r* that given state's region), α is average outcome for non-producers of oil, $\beta(\text{IndVar})_{itr}$ represents the differential effect of the *oil price on the mechanism* (where IndVar represents the interactions outlined in the two main regression models), $X_{itr}\varphi$ represents linear continent time trends for a given *i,t,r* (when applicable), γZ_{itr} represents other fixed effects (in this study I use fixed effects across states and time) and ε_{itr} is the error.

To test the relationship between the mechanisms on the dependent variables, I used a similar regression model to estimate the effect:

$$Y_{itr} = \alpha + \beta(\text{MECH})_{itr} + \gamma Z_{itr} + X_{itr}\varphi + \varepsilon_{itr}$$

Where Y_{itr} refers to the outcome variables for interstate conflict for a given *i,t,r* (where *i* represents a given state, *t* a given year, and *r* that given state's region), α is average outcome for states that experienced zero economic growth in a given year (for the GDP growth mechanism variable) or states with zero military expenditures (for the two military expenditures mechanisms), $\beta(\text{MECH})_{itr}$ represents the differential effect of the *mechanism (MECH) on interstate conflict*, $X_{itr}\varphi$ represents linear continent time trends for a given *i,t,r* (when applicable), and γZ_{itr}, $X_{itr}\varphi$, ε_{itr} are the same as the ones in the regression for the effect of the independent variables on the mechanisms.

5. RESULTS

By executing this specific research design, we can better our understanding of the relationship between commodity price shocks and interstate conflict. In this case, I used two regression models. The first model performed regressions on oil production in 1993 interacted with the logarithm of the price of oil against events in which states use or threaten to use force per million capita. The second model performed regressions on 1993 production divided by 1993 GDP interacted with the logarithm of the price of oil against events in which states use or threaten to use force per million capita. Based on our main tables, the hypothesis stated earlier can be confirmed. Commodity price shocks *do* indeed have an effect on interstate conflict, and positive price shocks have a positive effect on interstate conflict, and negative price shocks have a negative effect on interstate conflict.

Our main results are shown below in Table 1. In Columns 1 and 2, the main result is shown, and the first regression model with the 1993 production interacted with the logarithm of the price of oil yields a significant positive result, which is approximately 14% of the mean of the events per million capita variable, at the 5% level in Column 1. And in Column 2, a positive but insignificant result is yielded by the second model with the 1993 production relative to 1993 GDP interacted with the logarithm of the price of oil. The evidence suggests that a rise in the price of oil has a positive effect on interstate conflict.

In Columns 3 and 4, the relationship with threats is observed. Column 3 shows that in the first model with the logarithm of the price of oil interacted with 1993 oil production, there is a positive but insignificant relationship; Column 4 shows that the second model with the logarithm of the oil price interacted with 1993 production relative to 1993 GDP yields a positive result at the 10% significance level; the effect observed here is approximately 260% of the mean of the threats per million capita

variable. This suggests that rises in the price of oil have a positive effect on the number of threats per million capita and that threats are partially driving the rise in events per million capita in the case of positive price shocks as described in Columns 1 and 2.

In Columns 5 and 6, the relationship with shows of force is observed. Column 5 shows that in the first model with the logarithm of the price of oil interacted with 1993 oil production, there is a positive effect that the price has on shows of force that is significant at the 10% level; the effect observed is approximately 12% of the mean of the outcome. Column 6 shows a positive but insignificant effect from a rise in the price of oil. The evidence from two columns suggest that like threats, a rise in the price of oil has a positive effect on the number of shows of force per million capita and that shows of force are partially driving the positive effect that rises in the price of oil have on events per million capita as described in Columns 1 and 2.

In Columns 7 and 8, the relationship with territorial occupations is observed. Neither of the models that were used in this study yielded significant results. However, in the first model using the logarithm of the price of oil interacted with 1993 oil production, there is a negative effect that positive price shocks have on territorial occupations, while in the second model using the logarithm of the price of oil interacted with 1993 oil production relative to 1993 GDP, there is a positive effect that price shocks have on territorial occupations. This suggests that price shocks do not have an effect either way on the propensity of territorial occupations, and that it is not a driver of the positive relationship between the price and events per million capita as described in Columns 1 and 2.

So, rises in the price of oil have a positive effect on interstate conflict and the main drivers of this relationship are threats and shows of force; however, the evidence suggests that there is no effect that changes in the price of oil have on territorial occupations.

TABLE 1. Incidents (in per million capita)

	(1)	(2)	(3)	(4)	(5)	(6)
Interstate Conflict Dependent Variables:	Events	Events	Threats	Threats	Shows of force	Shows of force
Oil Output ('93) X Log Oil Price	0.0354**		0.0093		0.0070*	
	(0.0172)		(0.0084)		(0.0057)	
Oil Share ('93) X Log Oil Price		0.4039		0.1386*		0.0070
		(0.2658)		(0.1167)		(0.1092)
Observations	3934	3604	3934	3604	3934	3604
R-squared	0.266	0.268	0.109	0.110	0.189	0.189
Mean of dependent variable	0.2548	0.2579	0.0494	0.0518	0.0587	0.0610
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Continent Linear Time Trend	No	No	No	No	No	No

	(7)	(8)
Interstate Conflict Dependent Variables:	Territorial Occupation	Territorial Occupation
Oil Output ('93) X Log Oil Price	-0.0003	
	(0.0003)	
Oil Share ('93) X Log Oil Price		0.0000
		(0.0024)
Observations	3934	3604
R-squared	0.084	0.084
Mean of dependent variable	0.0009	0.0010
State Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Continent Linear Time Trend	No	No

Notes: Significance level: *** 1% ** 5% * 10%.

In regard to the mechanisms, this study tested two potential mechanisms based on the theoretical understanding outlined previously: diversions (using GDP growth) and material military

capability (where both military expenditures per capita and military expenditures as a share of GDP are tested). The results that the regressions yielded are detailed below in Tables 2 and 3. In terms of GDP growth, there was no statistically significant effect that the regression testing the relationship between the independent variable and the mechanisms yielded. However, the result is positive and this may suggest that there is a weak effect that price shocks have on growth, and negative price shocks may push growth in the negative direction. When GDP growth is tested to examine its effect on interstate conflict, there is a positive effect at the 10% level in regard to the events per million capita variable, but not the other outcomes; the effect observed in Table 3 Column 1 is approximately 3.6% of the mean of the outcome of events per million capita. Because positive price shocks increase the propensity of interstate conflict, the evidence contradicts the theory that positive price shocks decrease the incentive for leaders to engage in diversionary conflicts and *vice versa*. It is also important to note that the reason GDP growth can be tested in this case in the case of the oil share's effect on growth is that GDP is being held constant at the figure's value in 1993 when observing the differential effect of price shocks.

For the military expenditures as a share of GDP mechanism, there is a negative relationship that is significant at the 1% level that the oil share has on material military capabilities, but when the interaction between the logarithm of the price of oil and 1993 production alone is tested, this yields a negative yet insignificant result. The observed effect in Column 4 of Table 2 is approximately 90% of the mean in the negative direction. This may be surprising considering that a boom in the price of commodities should give states a greater ability to fight in conflicts abroad. However, this could also mean that when states experience a positive price shock in a given year, they index their military expenditures at a slower rate than their respective GDP growth rate, so it appears that positive price

shocks decrease a state's material ability to fight in conflicts abroad, while the reality may be that GDP growth is stronger than military expenditure growth. In regard to the mechanism test between military expenditures as a share of GDP, there are weak yet positive results. No result of significance is yielded by testing the effect of military expenditures as a share of GDP on the outcomes. The evidence suggests that there may be a positive but weak effect that military spending and thus capabilities has on interstate conflict. Future research may take the factor of including GDP in the variable into account. So, this may or may not be a mechanism by which oil price shocks have a relationship with interstate conflict.

In regard to military expenditures per capita, there is a strong and significant effect that the price of oil has on military expenditures per capita (the oil output variable yields an effect that is significant at the 1% level while the oil share variable yields an effect that is significant at the 10% level). The observed effect in Column 5 of Table 2 is about a quarter of the mean of the military expenditures per capita variable. Meanwhile, the observed effect in Column 6 of Table 2 is about 120% of the mean of the outcome. This suggests that price shocks do induce greater military capabilities per capita. Perhaps the reason that military expenditures *per capita* as opposed to *as a share of GDP* has a positive result may be because positive price shocks induce a case in which states can indeed index the size of their militaries in terms of expenditures at a greater rate than their population growth rate. Nevertheless, while there is a strong connection between the independent variables and military expenditures per capita, in the second test, I observe inconclusive results, which suggests that there may or may not be an effect.

TABLE 2. Mechanism Tests (Independent to Mechanism)

Mechanisms *Dependent Variables:*	(1) GDP Growth	(2) GDP Growth	(3) Military Expenditures as a share of GDP	(4) Military Expenditures as a share of GDP	(5) Military Expenditures per capita	(6) Military Expenditures per capita
Oil Output ('93) X Log Oil Price	0.1247		-0.0250		5093.5846***	
	(0.1342)		(0.0666)		(1118.2882)	
Oil Share ('93) X Log Oil Price		0.8922		-1.9932***		2.70e+04*
		(2.2940)		(0.9881)		(1.58e+04)
Observations	3779	3559	3156	2972	3132	2967
R-squared	0.203	0.200	0.722	0.807	0.938	0.928
Mean of dependent variable	4.0104	3.8422	2.1688	2.1842	2.1e+04	2.2e+04
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Continent Linear Time Trend	No	No	No	No	No	No

Notes: Significance level: *** 1% ** 5% * 10%.

TABLE 3. Mechanism Tests (Mechanism to outcome)

Mechanisms *Dependent Variables:*	(1) Events per million capita	(2) Threats per million capita	(3) Shows of Force per million capita	(4) Territorial Occupations per million capita
GDP Growth	0.0092*	0.0027	0.0019	-0.0000
	(0.0050)	(0.0024)	(0.0014)	(0.0001)
Military Expenditure as a share of GDP	0.0509	0.0017	0.0100	0.0006
	(0.0365)	(0.0040)	(0.0103)	(0.0004)
Military Expenditure per capita	0.0000	-0.0000	0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Observations	3187	3187	3187	3187
R-squared	0.328	0.119	0.214	0.210
Mean of dependent variable	0.2552	0.0385	0.0603	0.0014
State Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Continent Linear Time Trend	No	No	No	No

Notes: Significance level: *** 1% ** 5% * 10%.

I also conducted a robustness test by including a "continent" linear time trend, in which the standard errors were clustered at the region level (the regions are further described and detailed in Table D in the appendix). The results of these tests are detailed in the appendix, in Tables B, C-1, and C-2.

6. CONCLUSION

This study examines the connection between commodity price shocks and interstate conflict. The regression models stated earlier in this paper examine the effect of oil price shocks first, through 1993 oil production and second, through 1993 oil production relative to total economic output on several variables indicating interstate conflict. The evidence suggests that an increase in the price of oil increases the number of conflicts per million capita, which suggests that a rise in the price of oil has a positive effect on interstate conflict. The corresponding positive effect on interstate conflict that price shocks have, according to this study, are mainly driven by threats and shows of force, rather than by territorial occupations. In regard to mechanisms, the evidence that this study presents does not support the diversionary theory which posits that positive commodity price shocks decrease the incentives for leaders to engage in foreign conflicts and thus the propensity of states reliant on oil engaging in interstate conflict. This does not support the theory that negative price shocks cause recessions which prompt leaders to engage in interstate conflicts as a diversionary tactic, and in the case of military capabilities, the results are inconclusive, perhaps because in my mechanism tests I tie military expenditures to GDP and population for the two mechanism variables.

An empirical issue that this study may encounter is the assumption regarding the exogeneity of oil prices. One or more states which may lead the international system in oil production may not be

price-takers, but rather price-makers; examples of this is the oil price war that the Russian Federation and Saudi Arabia were engaged in in 2020 (Kozhanov 2021) or the fact that OPEC members can take advantage of the oligopolistic nature of the global oil market collude to artificially manipulate the price of oil (Huppmann and Holz 2021). Another issue may be that the international trading market for oil may be susceptible to speculative attacks due to shifts in the international system, such as a breakdown in foreign relations prior, in which case this study would be either overestimating the effect that price shocks have on interstate conflict or there could be the issue of reverse causality in that case. Other actions of foreign policy, such as sanctions, export controls, tariffs, etc. could also have an effect on the price of oil. A prior conflict could lead to sanctions by a certain state against a given target which could lead to a price shock, and thus militarized interstate conflict; this could also be an issue that would need to be considered.

This study only takes into account the level of crude oil production in 1993 and assumes that this figure is constant for each state throughout the entire period of 1993-2014. While the reason only 1993 production is used is because the only variance in the treatment should come from a change in the price of oil. Similarly, such as in the case of the oil price exogeneity issue, states can also strategically manipulate their levels of production for a variety of reasons, whether this means that multiple states are colluding to increase prices by lowering production levels or this means that states may be engaged in a price war and they are increasing production to exert downward market pressure on the global price. In the case of holding production constant, a change in the level of production over the period may have something to do with interstate conflict, which could be an issue that is not being accounted for using the models detailed above.

Similarly, in regard to oil production as a share of GDP, this study only employs GDP in 1993; however, this number changes for states over the given period of 1993-2014, and the change in the size (and the composition, especially if oil production is held constant at 1993 figures in the model) and this may be an issue for some states in estimating the relationship between price shocks and interstate conflict in regard to oil output relative to total economic output, although the reason that this model holds GDP at the 1993 level is because the only source of variation should come from changes in the price according to the design of the experiment. While it would be difficult to swap pre-treatment GDP with another variable to take these issues into account without inducing unnecessary endogenous bias into the model, this is still an issue that could hinder the ability to accurately estimate effects of price shocks relative to total economic output.

Future research and inquiries could be related to other commodities, as well as mechanisms related to the fact that in most cases oil revenues are generated by state-owned enterprises, and perhaps this could be a driver for interstate conflict due to the fact that because these operations are conducted by governments, certain groups of people controlling resource rents may also be in charge of directing a state's armed forces, especially because the mechanism tests executed in this study did not show any definitive significant empirical evidence for any mechanism. Similarly, there may be a difference between supply shocks and demand shocks on interstate conflict. The same experiment outlined in this paper may also employ a different dataset in which only initiators of interstate conflict are taken into consideration; perhaps in the case of observing initiators there may be different results in regard to the diversionary mechanism tests. Another experiment that could be run is with states which do not

necessarily product oil, but rather use it as some industrial input; perhaps in this case we would also observe a different effect that price shocks have on interstate conflict.

APPENDIX

TABLE A. Descriptive Statistics of Main Variables

Variable	Mean	Std. Dev.	Min.	Max	N
Oil Production, prices, GDP					
Level of Crude Oil Production in 1993 (hundred thousands of barrels per day)	332.01	1071.70	0	8198.23	3978
Annual Oil Price (mean of last trading days of each month in a given year)	51.63	35.33	13.43	112.26	4028
Log of Annual Oil Price	3.68	0.74	2.60	4.72	4028
1993 GDP	1.46e+11	6.52e+11	9630763	6.86e+12	3824
Inverse of 1993 GDP (1/GDP)	5.24e-07	2.95e-06	5.32e-11	0.00	3824
'93 Production interacted with the log of oil price	1.23	4.04	0	38.70	3958
'93 Production interacted with the log of oil price, divided by '93 GDP	0.18	0 .44	0	2.79	3606
Mechanisms					
GDP Growth	3.95	6.53	-62.08	149.97	4041
Military Expenditures as a share of GDP	2.25	2.29	0	34.38	3232
Military Expenditures per capita	20734.12	36963.29	0	277108.5	3208
Interstate Conflict					
Number of Events, per million capita	0.25	1.73	0	52.34	4239
Number of Threats to Use Force, per million capita	0.05	0.79	0	36.05	4239
Number of Shows of Force, per million capita	0.06	0.54	0	20.73	4239
Number of Territorial Occupations, per million capita	0.00	0.02	0	0.91	4239
Number of Events	2.20	7.82	0	144	4313
Number of Threats to Use Force	0.41	2.20	0	74	4313
Number of Shows of Force	0.57	3.14	0	121	4313
Number of Territorial Occupations	0.02	0.17	0	4	4313
Events, dummy	0.28	0.45	0	1	4313
Threats to Use Force, dummy	0.10	0.31	0	1	4313
Shows of Forces, dummy	0.15	0.36	0	1	4313
Territorial Occupation, dummy	0.01	0.12	0	1	4313

Note: Figures are rounded to the second decimal when applicable.

TABLE B. Incidents (in per million capita) with Continent Linear Time Trend

	(1)	(2)	(3)	(4)	(5)	(6)
Interstate Conflict Dependent Variables:	Events	Events	Threats	Threats	Shows of force	Shows of force
Oil Output ('93) X Log Oil Price	0.0610*		0.0044		0.0183**	
	(0.0288)		(0.0051)		(0.0063)	
Oil Share ('93) X Log Oil Price		0.7071		0.0013		0.1365

		(0.6835)		(0.0328)		(0.1113)
Observations	3934	3604	3934	3604	3934	3604
R-squared	0.336	0.344	0.177	0.182	0.241	0.244
Mean of dependent variable	0.2548	0.2579	0.0494	0.0518	0.0587	0.0610
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Continent Linear Time Trend	Yes	Yes	Yes	Yes	Yes	Yes

	(7)	(8)
Interstate Conflict	Territorial	Territorial
Dependent Variables:	Occupation	Occupation
Oil Output ('93) X Log Oil Price	-0.0002*	
	(0.0001)	
Oil Share ('93) X Log Oil Price		0.0030
		(0.0022)
Observations	3934	3604
R-squared	0.118	0.124
Mean of dependent variable	0.0009	0.0010
State Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Continent Linear Time Trend	Yes	Yes

Notes: Significance level: *** 1% ** 5% * 10%.

TABLE C-1. Mechanism Tests (Independent to Mechanism) with Continent Linear Time Trend

	(1)	(2)	(3)	(4)	(5)	(6)
Mechanisms	GDP	GDP	Military Expenditures as	Military Expenditures as	Military Expenditures	Military Expenditures
Dependent Variables:	Growth	Growth	a share of GDP	a share of GDP	per capita	per capita
Oil Output ('93) X Log Oil Price	0.0856		0.0148		4842.1237***	
	(0.1013)		(0.0429)		(1137.6163)	
Oil Share ('93) X Log Oil Price		-0.0609		-1.3428**		2.34e+04***
		(1.1241)		(0.4731)		(1.10e+04)
Observations	3779	3559	3156	2972	3132	2967
R-squared	0.292	0.298	0.746	0.829	0.948	0.939
Mean of dependent variable	4.0104	3.8422	2.1688	2.1842	2.1e+04	2.2e+04
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Continent Linear Time Trend	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Significance level: *** 1% ** 5% * 10%.

TABLE C-2. Mechanism Tests (Mechanism to outcome) with Continent Linear Time Trend

	(1)	(2)	(3)	(4)

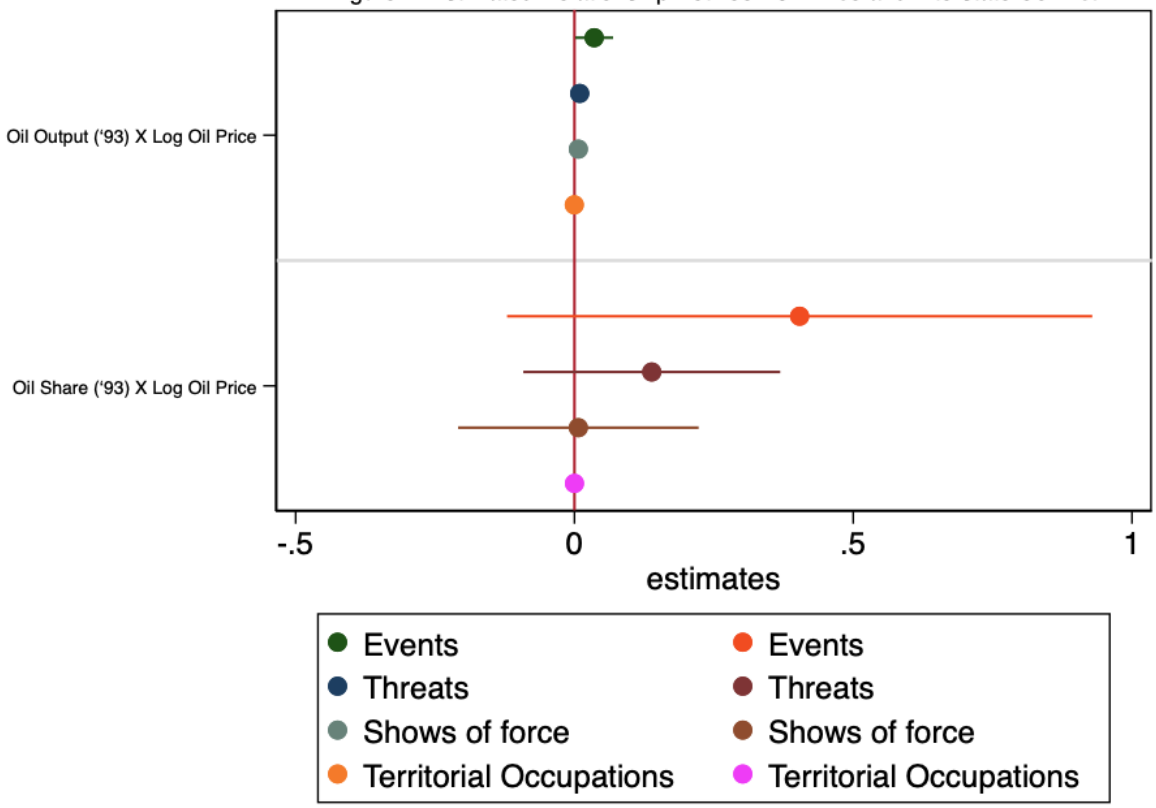
Mechanisms *Dependent Variables:*	Events per million capita	Threats per million capita	Shows of Force per million capita	Territorial Occupations per million capita
GDP Growth	0.0073	0.0022	0.0014	-0.0000
	(0.0071)	(0.0029)	(0.0018)	(0.0001)
Military Expenditure as a share of GDP	0.0194	0.0028	0.0037	0.0008
	(0.0314)	(0.0029)	(0.0075)	(0.0005)
Military Expenditure per capita	0.0000**	-0.0000	0.0000**	-0.0000*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Observations	3173	3173	3173	3173
R-squared	0.404	0.174	0.268	0.228
Mean of dependent variable	0.2558	0.0387	0.0606	0.0014
State Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Continent Linear Time Trend	Yes	Yes	Yes	Yes

Notes: Significance level: *** 1% ** 5% * 10%.

TABLE D. Continental Linear Time Trend Regions

Region	Frequency	Percent of Sample
Africa	1168	27.68
Americas	770	18.25
Asia	550	13.03
Europe	764	18.10
Middle East	330	7.82
Oceania	308	7.30
Post-Soviet	330	7.82
Total	4220	100.00

Figure 1. Estimated Relationship Between Oil Price and Interstate Conflict



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