Oil, Blood, and Strategy

How Petroleum Influences Interstate Conflict*

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Abstract

It is widely believed that countries fight over oil. Precisely because oil wars are a threat to the stability of the global economy, however, petroleum importers and exporters have a common interest in preventing such contests from taking place. We present a set of formal models detailing a strategic perspective on petroleum and interstate conflict. In contrast to the popular view of oil as a catalyst for war, we argue that powerful petroleum importers protect petrostates. Augmented security and greater foreign policy autonomy in turn generate moral hazard, leading oil exporters to engage in increased aggression abroad. We find no evidence that petrostates are more likely to be attacked. Instead, exporters experience fewer wars, while more often initiating low-level disputes with non-petroleum exporters. Petrostates are also less likely to experience rivalries with the hegemon and other major powers, despite having significant policy differences.

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The most important difference between North Korea and Iraq is that economically we had no choice in Iraq. The country swims on a sea of oil.

US Deputy Defense Secretary, Paul Wolfowitz, 2003.

Oil has literally made foreign and security policy for decades.

US Energy Secretary, Bill Richardson, 1999.[1]

1 Introduction

It is easy to imagine a connection between a country's status as a petroleum exporter and heightened interstate conflict. From the man on the street, to policymakers like those quoted above, to the work of scholars like Michael Klare (2001; 2005; 2008) and Pulitzer prize winning author Daniel Yergin (1992), oil forms a critical component of intuitive explanations about the causes of war in the modern world. Like blood diamonds that are said to fuel African civil wars, many consider blood oil to be a major determinant of international aggression (Kaldor, et al. 2007). Oil is so critical to the wellbeing of the industrialized world that ensuring a stable supply drives US foreign and defense policy. Indeed, the stability of the global economic system is itself tied to oil, making the steady flow of petroleum vital to the national interests of most developed nations (Stokes 2007).

Yet, what seems to be an obvious connection between oil and war is less obvious upon reflection. A logic of motives is not synonymous with a logic of outcomes. On the one hand, the blood oil thesis tells us that petroleum is a prize over which nations will fight. On the other hand, the strategic importance of petroleum suggests that powerful oil importing nations like the United States have an interest in deterring any attempt by suppliers to consolidate reserves and to prevent other actions that might destabilize or otherwise interrupt the global market in petroleum. Precisely because blood oil paints such a virulent picture of the consequences if states fight over oil, energy security must involve efforts to prevent the predictions of blood oil from coming to pass. Liberal theory also argues that states that depend on one another for vital assets can prefer trade to costly contests, since both producers and consumers benefit from stable markets (c.f., Polachek and McDonald 1992). Those who argue that interdependence leads to peace emphasize the inefficiency of conflict, perhaps discounting the fact that oil is a strategic commodity exhibiting inelastic demand.

[1] Cited in Kaldor, et al. (2007). The authors make a strong case for the causal relationship between oil and war.

There are at least two ways that the blood oil thesis may be refined. First, nations can acquire petroleum through global markets. While incidents such as the Persian Gulf War (1990-1991) galvanize opinion, trade theory emphasizes that nations need not fight over basic commodities. It is much more common to simply trade oil across international borders for mutual benefit, rather than fight over it. The use of costly force need not follow from the presence of perceived benefit alone. We seldom imagine nations willing to fight over the vehicles that run on fossil fuels, though automobile and aircraft sales are highly profitable and competition in these markets is intense.

Second, widespread recognition of the consequences of blood oil appear to have led to the adoption of significant (if sometimes tacit) countermeasures. Proceeds from petroleum production finance lavish defense systems intended to protect the property rights of status quo exporters. Powerful oil-importing nations also devote considerable attention and resources to maintaining stability across established supply networks. Given the ability of major importers to intervene decisively in conflicts deemed vital to national interests, petroleum predation is arguably deterred. Conversely, while oil exporters are protected by a norm of territorial integrity (Fazal 2007), by a security umbrella of major importing nations, and by their own considerable military capabilities, it does not always follow that petrostates can be prevented from acting aggressively themselves. The power and protection afforded by their critical economic status creates a moral hazard in which exporters can be expected to behave more aggressively abroad, if not against other oil producers.

Despite tremendous interest in, and speculation about, a link between oil and conflict, systematic research on the subject has been slow to materialize. Scholars have often assumed a linkage between oil and conflict, or conducted studies in which wars were explained in light of the presence of petroleum (i.e., selecting on the dependent variable). We offer a set of formal models designed to isolate key implications of the complex set of actors and incentives associated with blood oil. Using standard data in a directed dyads research design, we find no evidence that oil exporters are more often the target of militarized disputes. Instead, oil exporters appear slightly more likely to initiate low-level disputes against non-oil exporters, while actually experiencing fewer wars. The United States and other major powers are less likely to enter into a rivalry with an oil exporter. This is striking given important policy differences between major powers and many oil exporters.

2 Perspectives on the Political Economy of Petroleum

There are three basic approaches connecting petroleum with interstate conflict. We briefly review each approach, before moving on to model the relevant processes linking oil to war or peace.

2.1 Blood Oil

Countries are bound to covet assets that are valuable, tradable, conquerable, durable, and intrinsic to a given territory. Historically, states seem most prone to fight over tangible goods such as territory (Hensel 2001; Huth 1999). Blood oil adherents argue that geopolitics has been resurrected by the emergence of economics as the primary arena for global competition (Klare 2001, 2005). Conflict over access to, or control of, fossil fuels is bound to lead to resource wars. Some claim that the world has reached "peak oil" production. As available sources of petroleum decline, nations may be compelled to fight in order to capture dwindling reserves (Kaldor et al. 2007; Klare 2005).

Neighbors of oil states should be particularly susceptible to the temptation to plunder oil wealth. Major powers may also seek to bully oil exporters into accommodating their, and their allies, petroleum dependencies. Other nations, even other petrostates, seek valuable assets that literally come with the territory. Oil exporters should thus be more tempting targets than states where oil is limited or unavailable. Iraq's role in the first and second Gulf Wars illustrates this claim, as do the various internationalized African civil wars, such as in Angola and the Congo, and Russian policies in Central Asia. Recent jockeying for position to exploit oil deposits in the Arctic suggest that the effects of blood oil may extend into regions with as yet untapped natural resources (Brett 2007).

Some point to the evolution of US security strategy, particularly in terms of the redeployment of bases from old Cold War sites to oil-rich regions in Central Asia and Africa. Forces that had been stationed in Europe and North Asia are now being redeployed to Uzbekistan, Kyrgyzstan, Algeria, Morocco, Mali, Senegal, and Nigeria, among others, apparently reflecting the new geopolitical game over oil (Cooley 2008; Klare 2004). These scholars also note the rapid rise of China and India as economic powers, and their assertive foreign policies *vis-à-vis* resource abundant regions in Africa and Latin America. While this neo-Malthusian perspective expects great power competition over oil to be contentious, it does not specify why nations would quarrel with oil exporters *per se*.

The consequences of blood oil may also be felt indirectly, through differences between domestic politics in oil exporting regimes and other nations. A debate continues over whether resource dependence in general, and petroleum wealth in particular, makes nations less prone to democratize (Ross 1999, 2001, 2004). If democracies are more peaceful, at least with each other (Oneal and Russett 1999; Russett and Oneal 2001), and if oil states are less inclined to democratize, then oil exporters should be less likely to practice peace. It does not follow, however, that oil exporters are any more dispute prone than other autocracies, or even than democracies, for that matter.

Conflict could also come from the need to compensate domestic constituencies. Bueno de Mesquita, et al. (2003) argue that leaders beholden to small winning coalitions seek to retain key supporters through private patronage. Regimes that incentivize plunder are arguably the most likely to seek to expropriate oil riches. Blood oil further implies that pairs of petrostates should prove particularly disputatious, since each nation covets the same resources and markets, while both are subject to the resource curse. Exporters thus experience a form of security dilemma in which leaders cannot credibly commit to refrain from acting opportunistically (Herz 1950; Jervis 1978).

Though expectations regarding the distribution of conflict are imprecise, blood oil clearly views petroleum as fueling disputes that are particularly intense. Rather than mostly involving minor clashes, the "blood" in blood oil suggests that resource disputes should be disproportionately lethal.

2.2 Liberal Oil

Liberal theory has long identified commerce as a pacifying force in world affairs (c.f., Montesquieu 1989[1748]; Paine 1986[1776]; Kant 1957[1795]; Cobden 1903[1867]; Angell 1909; Rosecrance 1985; Doyle 1986). More recently, empirical scholarship has sought to bolster the connection between trade and peace (c.f., Polachek 1980; Russett and Oneal 2001; Weede 2005), though criticism remains (Beck et al. 1998, Barbieri 2003). Nations are said to be less likely to fight one another if they share in common valuable commercial relationships, either because of opportunity costs, as these relationships may be forfeit in a war (Oneal and Russett 1997; Levy 2003), because commercial ties allow signaling and credible communication (Morrow 1999; Gartzke 2007), or because commerce changes the preferences or identity of key actors in society (Schumpeter 1917; Mousseau 2000, 2009).

The significance of the oil trade to both exporters and importers lends itself to the liberal argument. Ignoring the implications of liberal oil is an important mistake for the blood oil perspective, as we have already implied. However, there are at least three factors also suggesting important limitations or conditions on the liberal perspective. First, as liberal theory itself points out, the argument is weakest where trade is asymmetric. The fact that trade in petroleum is predominantly one-way means that importers are dependent on exporters for a needed commodity, while exporters are simply importing capital, a good available from many nations. Indeed, trade asymmetry has led to important tensions between petrostates and their major clients in the past, tensions that the nations involved have worked diligently, if not completely successfully, to resolve. As the liberal perspective anticipates, we expect the impact of liberal theory to be diminished by this asymmetry.

Second, nations can simply conquer oil. One of the ambiguities in applying liberal theory to commodities — and of the opportunity cost perspective in particular — is that this type of trade actually implies an additional rationale for war. Valuable commercial relationships are an impediment to fighting only if fighting cannot obtain the goods that are the subject of trade. Liberal theory effectively assumes that traded goods are agricultural or manufactured products, in which there are significant inputs of labor and intellectual capital. Scholars have actually emphasized the enhanced opportunity costs of fighting over complex manufactured goods in a globalized age (Rosecrance 1996; Brooks 2005). However, the converse argument applies to commodities that are geographically fixed, and where there is little value-added involved in finished products, such as oil.

Finally, liberal oil is agnostic about what might be called "valence factors" affecting how states interact over oil. In particular, the inelasticity of demand for petroleum leads to strategic incentives to stabilize supply, even at some cost in terms of nominal prices. Nations that are unwilling to fight to conquer oil may nevertheless be willing to fight to prevent other nations from accessing or consolidating petroleum reserves. The absence of trust activity (i.e. the assumption of many producers) is a critical assumption of classical liberal theory that is seldom relaxed in transitioning to analysis of the international arena, where no central authority exists to prevent the anticompetitive practices by interested parties. Thus, while importers and exporters may not fight *with each other* over oil, each may find themselves drawn into petroleum conflicts involving third parties.

2.3 Strategic Oil

On the one hand, exporters possess a lucrative asset that can be used for great wealth or influence. On the other hand, exporters face powerful or covetous counterparts, ready to usurp their property rights when and if circumstances permit. While some nations may perceive the benefit in conquering petroleum supplies, buyers threatened by oligopolies face countervailing incentives to prevent the capture and concentration of oil reserves. The need to diversify sources of supply, along with the preponderance of military and political power among major importers provides substantial and credible checks on the centrifugal forces characterized by blood oil. A key objective of the foreign policies of oil importers is the maintenance of a competitive global system for pricing and distributing petroleum. The US-led coalition opposing Iraq in 1991 made clear what had long been assumed, that powerful oil-importers would not tolerate attempts to consolidate known reserves.

The tremendous disparity in military power between importers and exporters begs a basic question. Why don't powerful consumer states simply confiscate the oil? If some states refrain from appropriating petroleum, it may be because it is cheaper to pay for fossil fuels than take them by force (Angell 1936; Gartzke and Rohner 2009). The answer lies in the relative price of commerce and conquest; occupying and administering regions where petroleum is abundant appears to be more expensive than delegating control to local leaders (Palmer and Morgan 2006). By "outsourcing" local politics, importers avoid the need to administer distant territories and reluctant populations.

This "strategic" view generates to several observable implications. First, as long as oil is not too expensive, powerful importers prefer local control. Once oil prices rise too high, however, the calculus of pay or take can shift and importing states may find that they prefer conquest to commerce. Arguments about peak oil can be construed as debates about whether or when importers prefer direct administration of petroleum-rich territories. Blood oil could thus be considered a special case of the strategic oil perspective in which the calculus has shifted in favor of appropriation.

Second, if powerful oil importers are not inclined to appropriate oil reserves at present, this does not mean that they are indifferent to predation by other countries. Poor or middle-income countries with lower labor costs might be willing to act aggressively to capture oil wealth. It is in the interest of neither importers nor exporters to allow this type of predation. Conflict could interfere

with distribution, or precipitously raise prices. The inelasticity of demand for fuel ensures that even a rumor of instability generates price volatility. There is also the demonstration effect. Were importers to allow predation, the event might signal other nations that aggression was permissible.

Third, patronage comes at a price. If oil exporters are safe from predation by other nations, they are also prevented from preying on one another. The umbrella protecting oil exporters also inhibits exporters from acting aggressively toward other petrostates. Leaders that violate the norm against consolidating oil wealth face the wrath of powerful oil importers. Conquest of Kuwait gave Saddam Hussein considerable pricing power on world oil markets by reducing available suppliers. The United States as hegemon has been careful to maintain competition among exporters. Venezuela, for example, only makes up 11% of US petroleum imports, whereas the US accounts for almost 60% of Venezuela's export market. Similar relationships exist for other exporters. Exporters themselves have an interest in limiting conflict, as the membership in the US Gulf War coalition makes clear.

Fourth, oil may embolden exporters to be more assertive in foreign affairs. To the degree that importers prefer commerce to conquest or regime replacement, oil can be used to fend off resistance and allow an exporter greater discretion in pursuing its objectives. Oil exporters seem drawn to radical foreign policies. Conventional wisdom has it that this is due to domestic politics. The resource curse may obstruct the evolution of moderate regimes (Ross 1999, 2001, 2004). Alternately, petroleum may facilitate the desire of radical regimes to exert themselves on the international stage (Colgan 2010). Yet, the simplest and most direct weapon available to revolutionary oil exporters is the manipulation of petroleum exports, something that seldom happens.[2] A very different possibility is that oil exporters are simply given greater discretion by powerful states, and that this more often results in the appearance of greater radicalism. The cost involved in constraining petrostates may prove more problematic than simply turning the other cheek. Radical regimes protected by the dependence of the developed world on imported oil are in turn able to express greater (latent) dissatisfaction with the status quo. The moral hazard created by their status as petroleum exporters encourages the pursuit of revisionist policies, but they are also careful not to upset the lucrative oil trade, or to compel foreign intervention. Venezuelan leader Hugo Chavez

[2]Stability is a strategic objective. "During the past 25 years, Saudi oil policy has generally helped helped to prevent price spikes and to hold prices down when big increases have occurred anyway" (Gause 2000, page 80).

has mounted a veritable blizzard of fiery rhetoric against the United States while sustaining the all-important petroleum relationship. At the same time, Chavez has been allowed to foment limited hostile policies against U.S. allies in South America, apparently without meaningful repercussions.

While importers face problems stemming from dependence on foreign petroleum, petrostates are also dependent on powerful importers for global markets and external security. This symbiotic relationship is likely to remain as long as powerful importers prefer buying oil to appropriating it through force. At the same time, while the market in petroleum reflects compatible interests among importers and exporters, there remain tensions that manifest as conflicts against non-oil states. Consider that despite proclamations by successive US administrations about the centrality of energy resources to US national security (Nixon and Carter doctrines), US foreign policy continues to walk a tightrope between placating oil-wealthy Arab states and supporting oil-poor Israel. Arab states walk a similar tightrope, unwilling either to sell oil to Israel or to prevent US oil re-exports.

Some critics deplore the current compromise, blaming for example US difficulties in the Middle East, not on the centrality of oil, but on a pro-Israeli foreign policy (Mearsheimer and Walt 2006). The United States should make friends with Arab states, thereby ensuring a steady and problem-free supply of oil. But commerce and congeniality are different things; political tensions can coincide with commerce provided tensions are not too great. Former Prime Minister Tony Blair admitted as much in defending the British role in Iraq, "there is no way whatever if oil were the issue that it would not be infinitely simpler to cut a deal with Saddam." (quoted in Stokes 2007, 246).

Notable for corrupt or incompetent governments, petrostates may be tempted to externalize problems (Jensen and Wantchekon 2004; Weinthal and Luong 2006). Exporters in the Middle East and North Africa play the Israel card, while similar dynamics operate in Azerbaijan (Kaldor 2007). Misbehavior is tolerated because the nations capable of punishing aggressors are themselves heavy consumers of imported oil. Importers are loath to act against relatively minor infractions, except where the targets of aggression are also petrostates. For their part, oil exporters use the moral hazard to infringe on the interests of powerful patrons, while remaining conscious that importers can intervene against excessive indiscretions. These conditions thus reflect what Snyder (1991) has called the "stability-instability paradox," with more low-intensity and less high-intensity conflict.

3 Modeling Oil Wars

There are four elements to our theory. First, states that could attack and conquer oil-rich countries must not want to, preferring for the most part trade in petroleum to plunder. Second, states that might want to conquer petrostates must not be able to, either because they are weak, or because petrostates receive protection from allies or informal security partners. Third, greater security and autonomy should mean that the leadership of oil states exhibit foreign policy preferences that are more often at odds with the preferences of their security patrons. Put somewhat more pedantically, petrostates are more likely to get away with being "rogue nations." Finally, rather than being attacked, petrostates are more prone to initiate conflicts, though not with other petrostates.

A careful, rigorous analytical approach has obvious value, given the complexity of the theory. Our goal in preparing the models presented below was simply to help make sense of the theory. Nevertheless, the effort also provides some informative surprises. No formal model can do everything. Needless to say, our efforts are limited by another kind of resource constraint. We present three closely related games to capture different aspects of the relationships between a fixed (territorial) asset, trade in that asset, redistribution, domestic and international preference heterogeneity, the moral hazard, and other factors. Equilibria and players' optimal strategies appear in the appendix.

3.1 Oil and External Adversaries (and Allies)

Let us start with the claim that petrostates are much less vulnerable to foreign aggression than implied by the blood oil thesis. Suppose that just three countries exist in the world, a petroleum exporter (E), an importer (M), and a third power capable of acting as an aggressor (F). Suppose further that the importer and exporter trade petroleum. Without fully specifying the conditions of trade, imagine that E exports quantity q of petroleum to M. The sale price per unit is p, with M's valuation (i.e., its reservation price per unit) at v. We can imagine that E's marginal value for petroleum is σ. One can speculate about this reservation price, but for simplicity, we normalize σ to zero. Suppose as well that there are enough producers and consumers that p approximates the market price for petroleum. Thus, in peacetime, E exports pq worth of oil to M. M receives benefit $vq - pq = (v - p) * q$ from this transaction, while E receives benefit $pq - \sigma q$, or just pq.

In most industries, profits lead to competition. Unfortunately, viable methods for manufacturing carbon-based fuels are currently quite limited. Nations that want to export petroleum must possess oil-rich territory. Given this association between territory and natural resources, nations could presumably fight over oil. Imagine that F can attack M at cost w_F. With probability ρ, E staves off conquest. With probability $1-\rho$, F prevails and the petroleum assets are transferred to F.

Both exporters and importers stand to lose from oil wars, creating a natural security alignment. Conflicts in petroleum regions impede the flow of oil to consumers. Given the inelasticity of demand for petroleum, even temporary interruptions are financially harmful. Even the possibility of interruptions can prove damaging, as speculation in spot and futures markets means that the economic impact of an interruption in the flow of petroleum is realized by the mere fear that such an interruption might come to pass. We model the security implications of economic damage caused by oil conflicts. Importers desiring price stability may be willing to deter attacks on exporters.

Second, successful prosecution of an oil war could affect the number of petroleum suppliers. The strategic problem for importers is contained to the issue of short-term interruptions if a non-petroleum exporting state attacks a petroleum exporting state. If, however, the aggressor is already an oil exporter, then successful conquest reduces the number of exporters. Aggression then creates a less competitive petroleum market in which suppliers may be able to charge oligopolistic prices. Petroleum is particularly susceptible to this problem. Thus, we also model the security implications of pricing power/market share. Th model allows for any mix of consolidation or redistribution.

The sequence of play is simple.[3] F first decides on whether it will attack E, (a: $a=1$ "yes," $a=0$ "no"). E's actions are not strategic and so need not be modeled directly. Instead, M moves next, first deciding whether to come to the aid of E, and then deciding on the optimal war effort (h, $h \geq 0$). If M intervenes ($i=1$), then F must fight the combined capabilities of E and M. In this case, the probability of victory for the E–M coalition (ϕ) is at least weakly greater than the probability if E fights alone ($\phi \geq \rho$). Let the probability of coalitional victory equal the following:

$$\phi = 1 - \left(\frac{1-\rho}{1+\alpha * h} \right) \tag{1}$$

[3]The model is similar to a standard deterrence model (c.f., Kilgour and Zagare 1991), with petroleum creating overlaying, variable incentives for actors to cooperate or compete, especially in terms of pricing power/market share.

where α is an (exogenous) strictly positive real number reflecting the capabilities of M relative to F and other variables and parameters are as previously defined. The function is bounded by ρ if $h = 0$, and by probability 1 (asymptotically) as M's war effort (h) becomes extremely large.

In addition to war effort, a contest may also cause M to lose some of its petroleum imports. Since (vq) characterizes M's value for petroleum, let $z * (vq)$, where $0 \leq z \leq 1$, represent any loss associated with an interruption in petroleum shipments. M's wartime costs are thus as follows:

$$w = h + z * (v * q) \tag{2}$$

$$b = z * (v * q) \tag{3}$$

where w is M's cost for fighting and b is M's cost for not participating in an ongoing contest.

There is another cost that results not during war, but after, if F is successful. At market prices, M retains a portion of the surplus equal to $(v - p) * q$. If, however, war consolidates available oil reserves, F can then charge some higher price for petroleum. This new price is a direct transfer from M to F. Let g, $0 \leq g \leq 1$ equal a fraction representing this transfer. If F succeeds in conquering E's oilfields, then F receives not only E's original portion of the surplus (i.e., vq), but also an additional increment equal to $(((v - p) * q) * g)$. M then receives $((v - p_e) * q) * (1 - g)$. Oligopolistic pricing thus creates a second motive for oil war. We present M and F's utility functions below:

$$\begin{aligned} U_M \quad = \quad & a * (i * (\phi * ((v - p) * q) + (1 - \phi) * (((v - p) * q) * (1 - g)) - w) \\ & + (1 - i) * (\rho * ((v - p) * q) + (1 - \rho) * (((v - p) * q) * (1 - g)) - b)) \\ & + (1 - a) * ((v - p) * q) \end{aligned} \tag{4}$$

$$\begin{aligned} U_F \quad = \quad & a * (i * (\phi * (0) + (1 - \phi) * ((((v - p) * q) * g) + (p * q) + n) - w_F * (1 + \lambda * h)) \\ & + (1 - i) * (\rho * (0) + (1 - \rho) * ((((v - p) * q) * g) + (p * q) + n) - w_F)) \\ & + (1 - a) * (0) \end{aligned} \tag{5}$$

F's utility function contains one final element. War costs for the potential attacker should vary

with the presence or absence of a powerful coalition partner. If F's costs for fighting E are w_F, then these costs must be at least weakly higher against the E-M coalition. In fighting a coalition, F must endure $w_F * (1 + \lambda * h)$, where λ is a positive real number scaling the lethality of M's forces. The more capable M, and the more effort it devotes to fighting, the higher are F's war costs.

We can now substitute equations 1-3 and the endogenous value for w_F into equations 4 and 5. Solving the game is simple.[4] Backwards inducting with full information, M first chooses an optimal amount of war effort (h). Taking the partial derivative of M's payoffs if it chooses to fight, setting the resulting equation equal to zero ($\frac{\partial U_M^{i=1}}{\partial h} = 0$), and solving for h, yields the optimal value:

$$h^\star = \frac{-\alpha + \sqrt{\alpha^3 gq\,(\rho - 1) * (p - v)}}{\alpha^2} \tag{6}$$

Substituting equation 6 into the modified version of equation 4 with explicit values for ϕ, w and b, and solving for M's intervention decision, we again take the partial derivative of U_M (this time for the whole utility function), but with respect to i (i.e., $\frac{\partial U_M}{\partial i}$). Setting the result equal to zero and solving for M's optimal intervention strategy, we find the following critical value for ρ:

$$\hat{\rho}_M = \frac{1 + \alpha gpq - \alpha gqv}{\alpha gpeq - \alpha gqv} \tag{7}$$

If the probability that E will prevail without M intervening is relatively high (i.e. $\rho > \hat{\rho}$), then M does not intervene. If instead the probability of resisting F without assistance is low, then M forms a coalition with E. It will help to plot M's optimal war effort. Figure 1 depicts the relationship between the quantity of trade (q), redistribution (g), and M's optimal war effort ($h^\star$).[5] As is clear from the figure, M is not interested in intervening when no trade is involved, and commensurately when F would be unable to alter market pricing. M becomes motivated to intervene as the volume of trade and the potential for F to engage in anticompetitive pricing rises.

Let us now look at F's choice of whether to attack. As before, F's optimal choice can be identified by taking the partial derivative of U_F with respect to F's choice variable (a). If M can

[4] More elaborate games are possible. For example, endogenous bargaining would prevent some portion of the contests predicted in our models (c.f., Fearon 1995; Powell 1999; Wagner 2000). However, while our models may overestimate the impact of key causal variables, there is no reason to expect bargaining to radically alter our predictions.

[5] Figure 1 assumes the following parameter values: $v = 1$, $p = 0.5$, $w_F = 0.5$, $\alpha = 15$, $\rho = 0.25$.

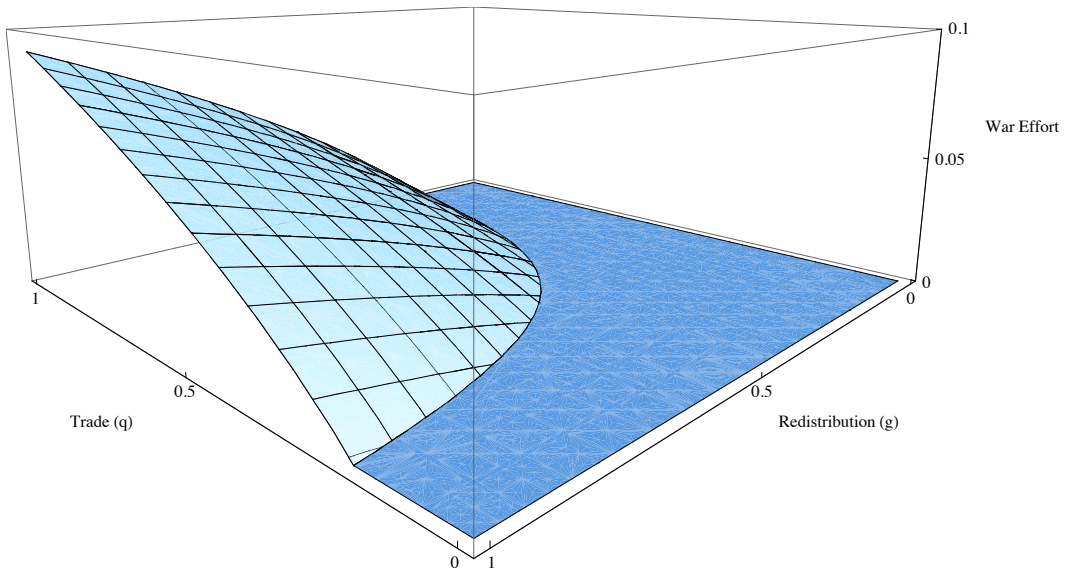

Figure 1: The relationship between trade, market power, and intervention war effort

be expected not to intervene, then setting $\frac{\partial U_F^{i=0}}{\partial a} = 0$, we can solve for another critical value of ρ:

$$\hat{\rho}_{F,i=0} = \frac{n + pe\,(q - gq) + gqv - w_F}{n + q\,(pe - gpe + gv)} \tag{8}$$

Here, values *lower* than $\hat{\rho}_{i=0}$ imply a conflict (E is less likely to win). Figure 2 plots these values. The smooth exponential curve reflects the increasing appeal of the target in terms of market size.[6] Interestingly, there is not much effect of market power on F's attack decision. Elasticities of demand are not as important as trade volumes (and pricing) in the calculations of a potential aggressor.

Finally, we review F's decision to fight against E and M. Taking the partial derivative of U_F with respect to a, setting the result equal to zero and solving for a critical value of ρ, we get:

$$\begin{aligned}\hat{\rho}_{F,i=1} \;=\; & \Big(\big(\alpha^2 gq\,(p-v)\,w_F^2 + g\lambda^2 q\,(p-v)\,w_F^2 + \alpha\,\big(n^2 + 2nq\,(p - gp + gv + g\lambda p w_F - g\lambda v w_F) \\ & + q\,\Big(p^2 q\,(1 + g\,(\lambda w_F - 1))^2 + gv\,\Big(2\lambda w_F^2 + gqv\,(\lambda w_F - 1)^2\Big) - 2gp\,\big(\lambda w_F^2 + qv\,(\lambda w_F - 1) \\ & (1 + g\,(\lambda w_F - 1))\big)\big)\big)\big) \,/\, \Big(\alpha\,(n + q\,(p - gp + gv + g\lambda p w_F - g\lambda v w_F))^2\Big)\Big)\end{aligned} \tag{9}$$

[6] Figure 2 assumes the following parameter values for the model: $v = 1$, $p = 0.5$, $w_F = 0.5$, $n = 0,5$.

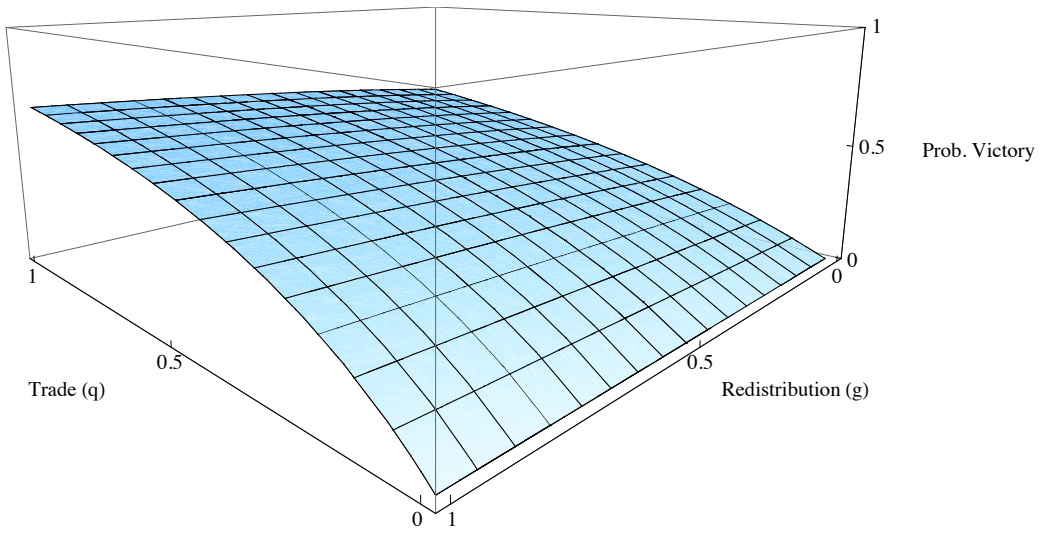

Figure 2: The relationship between trade, market power, and conflict (without M)

The results of equation 9 are plotted in Figure 3.[7] The figure shows the effect of trade quantity (q) and redistribution of the surplus due to pricing power (g) on the probability that F attacks. The surface constitutes the F's indifference, where low values of ρ imply F is more likely to win.

Figure 3 offers at least two valuable insights about the relationship between petroleum and conflict. First, the incentives for F and M tend to cancel. While predation becomes more appealing with the volume of trade (Figure 2), the incentives to protect increase as well (Figure 1). The exact relationship between trade volume, pricing power and conflict thresholds depends on ancillary parameter values, but given rising costs, F's incentives to attack should be flat or negative in q.

This effect is depicted in Figure 4, which offers a two-dimensional view of eqiulibria for the game. The x axis measures trade volume (q), while the y axis codes threshold victory probabilities (ρ). There are three indifference curves representing thresholds between equilibria. From left-to-right on the x axis, the first line (dotted and dashed) is F's indifference between attacking ($a = 1$) and not attacking ($a = 0$), when M will not intervene. The solid line is M's indifference between intervening ($i = 1$) and not intervening ($i = 0$) in a contest. Finally, the horizontal dashed line that never touches the x axis is F's indifference between attacking and not attacking the E-M coalition.

[7] Figure 3 assumes the following parameter values: $v = 1$, $p = 0.5$, $w_F = 0.5$, $\alpha = 15$, $\lambda = 0.2$, $n = 0, 5$.

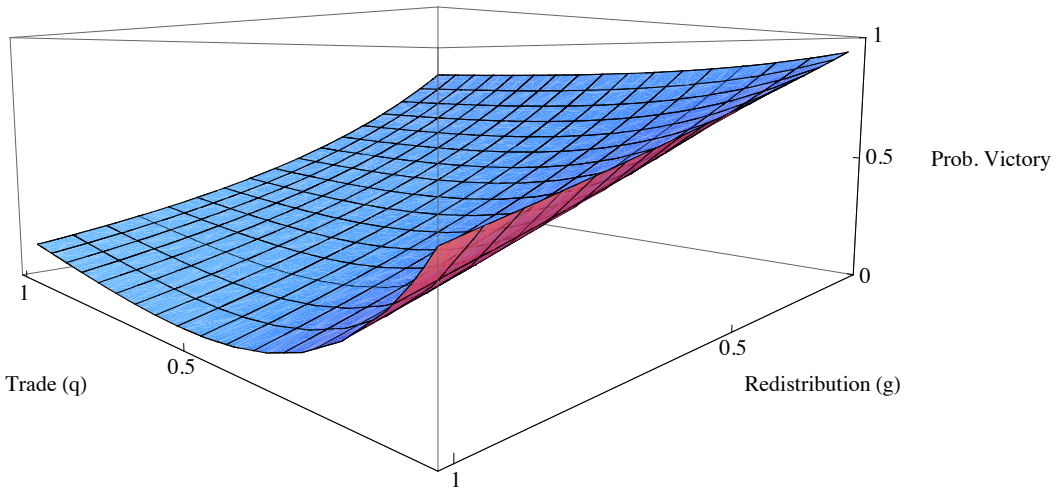

Figure 3: The relationship between trade, market power, and conflict (with M)

Unshaded regions of the graph represent "peace," while shaded regions are where F attacks. With little trade and a high probability that E will win without assistance (upper lefthand corner of the graph), F does not fight and M does not need to intervene. If E is unlikely to prevail, and M will not intervene (as in the beige shaded region in the lower lefthand corner), then F attacks. With more trade and a high probability that E will win (the upper righthand corner of the graph), F again does not attack. At slightly lower probabilities of victory for E, below the solid curve, M is willing to fight, but does not need to, as F is unwilling to attack even without facing the coalition. Still lower in the graph, below the dotted and dashed line for F's indifference, the "shadow" of M's capabilities actually deter F, which would have attacked *except* for M's willingness to intervene. Finally, in the blue shaded region below the dashed indifference curve (lower righthand corner), F's expected utility for plunder is so great that a contest ensues against the E-M coalition.

The relationship between oil wealth and interstate conflict depends on many factors both inside and outside of the model. However, the basic tendency is for strategic interaction to decouple the value of plunderable assets from the probability that E is attacked. As aggression becomes more appealing to F, M heightens its war effort. Given higher costs, an oil war may even be less likely.

Hypothesis 1 *Oil exporting countries are no more likely to be the targets of militarized disputes than are non-oil exporting countries (and may well be less likely to be targets as war costs increase).*

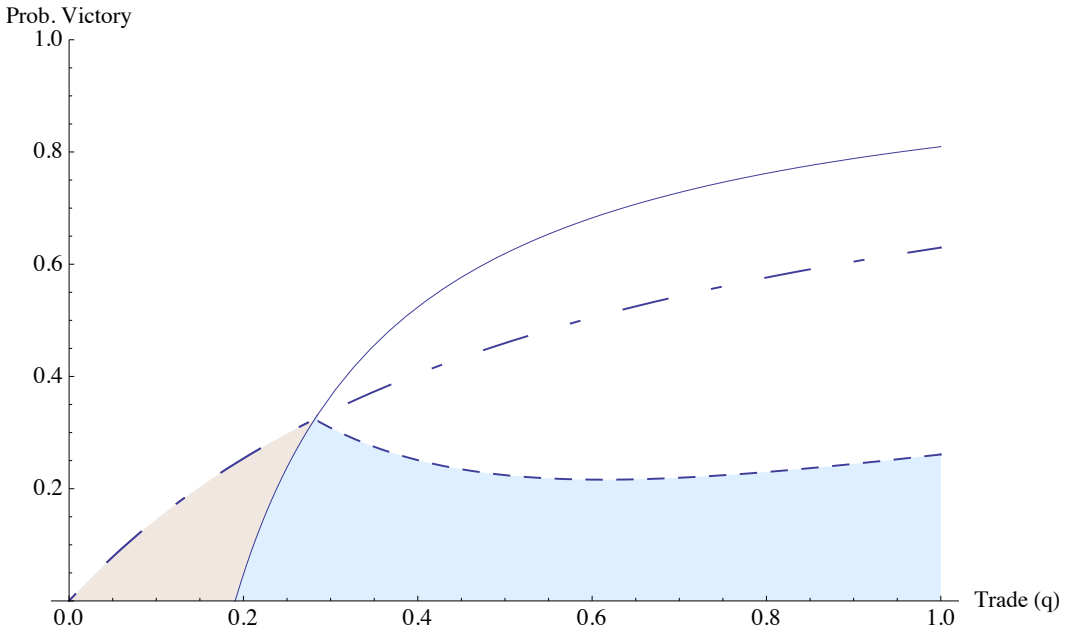

Figure 4: The relationship between trade, and different conflict thresholds ($g = 0.7$)

The second effect readily discernible from Figure 3 is the relatively large impact of market share/pricing power on conflict. While the incentives to attack do not rise disproportionately with consolidation, the incentives to defend do increase. Again, the slope is subject to assumptions about parameter values. Real world conditions will differ in innumerable ways. Still, the model suggests that if consolidating oil supplies is likely to significantly increase the pricing power of a potential attacker, then powerful oil importers have an incentive to intervene. These relationships are in turn most likely to affect countries that are in a position to consolidate known or suspected petroleum reserves. Major oil exporters would benefit tremendously by increasing market power. Thus, petrostates are most likely to fight over oil *in the absence of deterrence or intervention by powerful importing nations*. While the model cannot determine definitively the net effect of these countervailing forces, reasonable parameter values suggest that the incentives for oil exporters to attack one another are again at least counteracted by importers' efforts to deter or resist aggression. Further, disincentives to fight should increase with the prospective magnitude of possible contests.

Hypothesis 2 *Oil exporting states are no more likely to initiate militarized disputes against other oil exporting countries than are non-oil exporting countries to initiate disputes against oil exporters.*

3.2 Oil and Internal Challengers (and Foreign Clients)

The model detailed above offers the counterintuitive prediction that foreign powers, and in particular petrostates, are no more (and possibly less) aggressive toward oil exporters. Precisely because petroleum is valuable, importers have an incentive to protect global markets, and to resist attempts to consolidate reserves. Yet, this leads to a basic question of incentive-compatibility; if major importers are willing to intervene with force, why wouldn't they simply take the oil for themselves?

Providing an answer to this question requires a slightly different model setup. We retain state M, but drop F for the time being. In place of E, we introduce two domestic actors. First, there is an incumbent leader (e), who receives the proceeds from oil sales to M ($p_e q$). We introduce the subscript "e" on the oil price to allow for the possibility that e receives above- or below-market prices for her oil. From oil revenues, e must pay governing costs (n_e) to administer the nation. We also assume that e adopts a foreign policy for E that conforms to the player's ideal point (x_e).

The second domestic actor in E is a potential challenger (c). The challenger would like to replace e as incumbent, receiving oil revenues $p_c q$, while paying n_c to govern, and setting foreign policy at c's ideal (x_c). We assume a foreign policy space of unit interval which contains all actor's preferences. Let the ideal points of actors M, e and c be ordered as follows: $0 \leq x_c \leq x_e \leq 1$. For computational convenience, we assume quadratic loss utilities for outcomes on the issue space.

The major petroleum importing nation, M, faces the following alternatives. First, M can choose to take petroleum from E through force. Let this decision be represented by the binary choice variable t, where $t = 1$ denotes an attack and conquest of E by M, and where $t = 0$ means that M does not to conquer E.[8] If M conquers E, M obtains its entire valuation for the imported oil (vq). However, M must pay war (w) and also governing costs (n_m). A second option for M is to replace e with her opponent, the challenger c. If M chooses to "decapitate" E (i.e, $d = 1$), M must again pay war costs (w), but can avoid governing costs. As leader, c will charge M $p_c q$ for oil. Finally, M can choose to retain the status quo ($t = 0$, $d = 0$), purchasing oil at ($p_e q$) from e. In addition to oil pricing, M also has preferences over the foreign policies of the incumbent and

[8] We could assign conquest with some positive probability, but this complicates presentation and solution of the model without altering basic insights. In effect, we are simply normalizing M's probability of victory to one.

challenger in E. Given this information, we can specify utility functions for M, e and c as follows:

$$\begin{aligned} U_M &= t*(1-w-n_M+(vq))+d*\Big(\Big((1-x_c)^2\Big)-w+((v-p_c)*q)\Big) \\ &\quad +(1-t-d)*\Big(\Big((1-x_e)^2\Big)+((v-p_e)*q)\Big) \end{aligned} \tag{10}$$

$$U_e = t*(0)+d*(0)+(1-t-d)*(1+(p_eq)-n_e) \tag{11}$$

$$U_c = t*(0)+d*(1+(p_cq)-n_c)+(1-t-d)*(0) \tag{12}$$

M must choose between conquest, decapitation, or the status quo. Players e and c obviously prefer to be in office. It is difficult to specify the relative valuation for being out of office, either as the opposition, or because M has colonized E. We normalize the value of being out of office at zero.[9] As specified in the previous model, M's war costs are a combination of fighting costs and the costs of temporarily disrupting access to oil (traded or plundered), as detailed in equation 2.

Governing is expensive. Assume a non-strategic player (ω) must be satisfied and/or repressed by the ruler of E, where ω could be a rebel group or citizens that must be pacified to facilitate petroleum production. Without pre-supposing other details of governing costs, we apply two restrictions. First, domestic governance is strictly cheaper than foreign occupation ($n_m > n_e$, $n_m > n_c$). Justifications for this include geographic (Boulding 1962) or political (Alesina and Spolaore 1997, 2005) distance. Second, domestic governing costs are less than profits from the oil trade ($p_eq > n_e$ and $p_cq > n_c$). Profits for foreign occupiers may or many not be lower than governing costs.

The government must either distribute some of its oil wealth to its citizens, or repress the population to keep ω in check. The greater the value of proceeds from petroleum sales, the more a leader must pay to bribe or repress. We represent this quantity as γ, $0 \geq \gamma \geq 1$, a fraction of the oil wealth available to the society. We are agnostic about whether this resource — $(\gamma*(vq))$ in the case of a foreign occupation, or $(\gamma*(pq))$, with appropriate subscripts, for domestic rule — is used to finance public sector programs, to bribe key supporters, or to hire thugs and purchase riot gear.

[9] e and c strictly prefer ruling, but neither can influence their status, so each is effectively non-strategic in this game. We can relax assumptions to allow e and c to set prices, etc., but this does not change our basic findings.

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The government also pays some price for a foreign policy that diverges from the preferences of the population. Let ω's median preference be characterized as x_ω, $(x_c \leq x_\omega \leq x_e)$. Though other orderings are plausible, there is little additional insight from placing x_ω outside the Pareto set formed by the ideal points of incumbent and challenger. We also find this ordering particularly informative. If, for example, x_ω is equidistant between x_c and x_e, then ω is indifferent between the foreign policies of incumbent and challenger. Equations covering costs are detailed below:

$$n_m = r_m * \Big((x_\omega)^2 + \gamma * (vq)\Big) \tag{13}$$

$$n_e = r_e * \Big((x_e - x_\omega)^2 + \gamma * (p_e q)\Big) \tag{14}$$

$$n_c = r_c * \Big((x_\omega - x_c)^2 + \gamma * (p_c q)\Big) \tag{15}$$

where r (with the appropriate subscript) is a parameter for an actor's (in)efficiency of governing.

Substituting equation 13 into equation 10, we can solve for M's optimal choice. First, we compare conquest with the status quo. Second, we evaluate decapitation against retaining the incumbent. Taking the first derivative of U_M with respect to t and setting the result equal to zero $(\frac{\partial U_M}{\partial t} = 0)$, we solve for M's indifference between conquest and trade in terms of war costs (h):

$$\hat{h}_{t=1} = pq - \gamma q r_M v + 2x_e - x_e^2 - r_M x_\omega^2 - qvz \tag{16}$$

Figure 5 plots $\hat{h}_{t=1}$ in terms of the volume of trade and the incumbent's ideal policy (x_e).[10] Values below the surface in the figure imply that M invades E, while values above the surface mean that M buys its oil from e. M is more willing to conquer as the ideal point of the incumbent increases. Note, however, that M is less likely to colonize as the volume of trade increases. Rather than enticing M, increasing oil dependence actually reduces M's incentives to govern directly.

M is less likely to conquer as the quantity of trade increases in the model. This suggests that conflict need not follow from the mere presence of trade in natural resources. However, M also has

[10]Figure 5 assumes the following parameter values: $z = 0.1$, $v = 1$, $x_\omega = 0.75$, $p = 0.5$, $r_M = 1.1$, $\gamma = 0.4$.

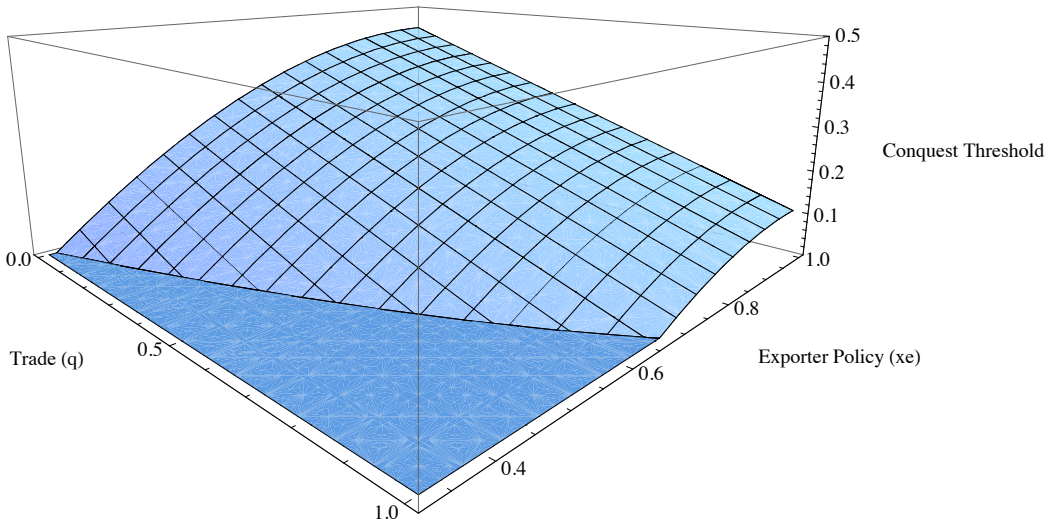

Figure 5: The relationship between trade, exporter foreign policy and conquest

the option of replacing e with a moderate challenger. To identify when M resorts to decapitation, we take the partial derivative of U_M with respect to d. Setting $\frac{U_M}{\partial d} = 0$ and solving for h, we obtain:

$$\hat{h}_{d=1} = -2x_c + x_c^2 + 2x_e - x_e^2 - qvz \tag{17}$$

We plot $\hat{h}_{d=1}$ in Figure 6.[11] More oil again reduces the willingness of M to supplant e with c, provided that the short-term dislocation of oil supplies is sufficiently large. Preference divergence between M and e again increases the probability of violence. However, the effect again diminishes with the volume of petroleum traded. Note that M is comparing the incumbent's policy to a relatively appealing alternative, since we set the challenger's ideal point closer to M's ideal point than to either e or ω's preferences ($x_c = 0.33$). Much as in the real world, where powerful importing nations make do with leaders like Hugo Chavez and Muammar Gaddafi, M often prefers to retain a radical incumbent over a moderate challenger, given the economic benefits of the status quo.

M must also compare the value for direct rule versus its payoff for installing c. We can accomplish this by replacing M's intervention decision (b) with $1 - t$. The status quo payoff becomes zero and taking the partial derivative of U_M with respect to t gives marginal utility of decapitation

[11] Figure 6 assumes the following parameter values for the model: $v = 1$, $z = 0.5$, $x_c = 0.33$.

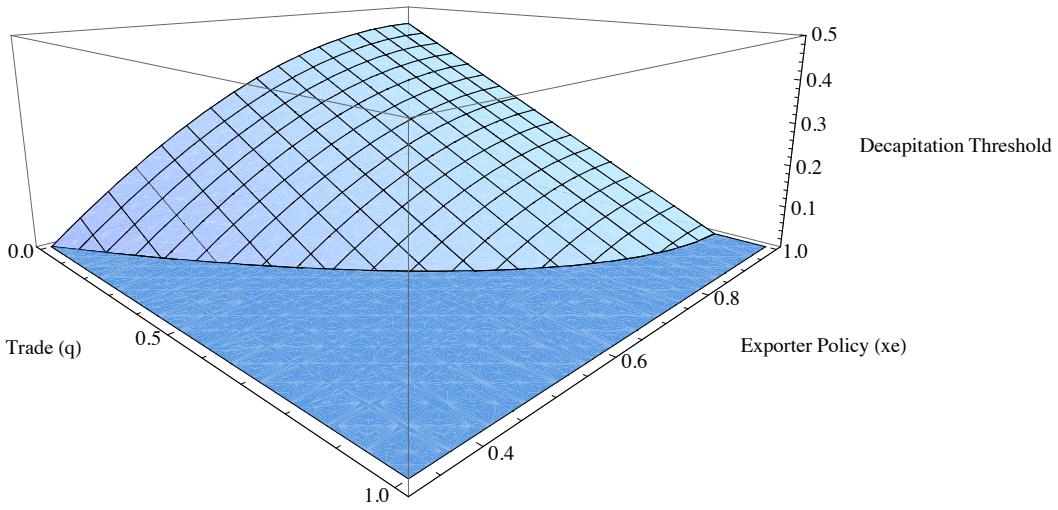

Figure 6: The relationship between trade, exporter foreign policy and decapitation

versus conquest. Setting $\frac{U_{M(1-t)}}{\partial t} = 0$ and solving for M's governing efficiency, r_M, we get:

$$\hat{r}_M = \frac{pq - (-2 + x_c)\, x_c}{\gamma q v + x_p^2} \tag{18}$$

War costs (h) do not differ over these options, since fighting occurs regardless. Instead, we focus on M's governing inefficiency (r_M). Figure 7 plots the effects of the quantity and salience of oil production on $\hat{r}_M$, the threshold for M to occupy and rule.[12] Governing efficiency becomes increasingly important with the size or political salience of the oil trade. Nationalism and other mechanisms that increase the proportion of oil revenues that must be detailed to governing make it more appealing for M to "outsource" local government, in part explaining decolonization. Counter to intuition, M becomes *less willing* to govern as the value or salience of petroleum increases.

The model thus provides a second image reversed account of why oil exporters tend to exhibit more radical foreign policies than non-petrostates (Gourevitch 1978). Researchers have mostly sought to explain the tendency of petrostates to "go rogue" in terms of the resource curse (Ross 1999, 2001), or the rise of revolutionary regimes (Colgan 2010). While plausible, the model highlights the need for a supply-side argument for why petrostates are allowed to espouse heterodox foreign polices.

[12]Figure 7 assumes that the model adopts the following parameter values: $v = 1$, $x_\omega = 0.75$, $p = 0.5$, $x_c = 0.33$.

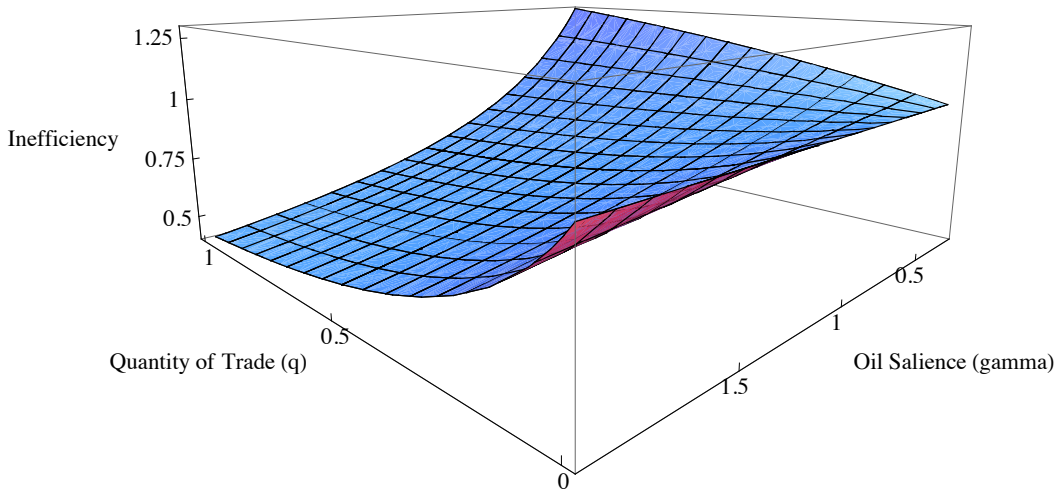

Figure 7: The relationship between trade, market power, and intervention war effort

Major policy incompatibilities are an obvious source of friction. Policy disagreements between major powers and indigenous leaders have precipitated numerous attempted assassinations, interventions or externally-abetted coups. From Nasser in Egypt, to Mossadeq in Iran, to Allende in Chile and Diem in Vietnam, it has not been healthy for incumbents to place themselves in opposition to the major powers. While petrostates also receive careful scrutiny from major powers, their leaders appear to be given a "pass" on heterodox policies, provided that the petroleum continues to flow.

Hypothesis 3 *Oil exporting countries have preferences that diverge from the preferences of major powers more than the preference divergence between major powers and non-oil exporting countries.*

3.3 Oil and Moral Hazard (Getting Away with Not Playing Nice with Others)

What form does the policy autonomy of petroleum exporters take? The final model explores the moral hazard created by oil and the policy heterodoxy of exporters. Major oil importers find it expedient to "insure" the property rights of petrostates. For the reasons presented above, importers would rather buy petroleum than steal it or usurp the political authority of local incumbents. Given physical security and greater policy autonomy, oil exporters more often act aggressively abroad.

Let us return to the importer (M), the incumbent exporter (e), and the non-strategic foreign power (F). It is useful to represent M as preferring F's ideal policy to x_e, $(0 \leq x_F \leq x_e \leq 1)$.

The incumbent can attack F ($a = 1$), or not ($a = 0$). If e attacks, with probability $(1 - \rho_2)$, the outcome of the game becomes x_e. With probability ρ_2, e loses and F retains policy x_F. Regardless, e incurs war costs (w_e). Petroleum production can decline due to the conflict (reflected by $pq*(1-z)$, $0 \leq z \leq 1$). Oil revenues remain if e does not attack, but e loses its preferred policy.

If e attacks F, M has the option of intervening. If M intervenes, the probability that the F-M coalition wins (ϕ_2) is at least weakly greater than the odds for F alone. M pays some cost h for fighting and also imposes higher war costs on e for fighting the coalition. If e and M fight, we assume petroleum is not traded among combatants. Utility functions for e and M appear below:

$$\begin{aligned} U_e &= a * \Big(i * \Big(\phi_2 * \Big(1 - (x_e - x_F)^2\Big) + (1 - \phi_2) * (1) - w_{eM}\Big) \\ &\quad + (1 - i) * \Big(\rho_2 * \Big(1 - (x_e - x_F)^2\Big) + (1 - \rho_2) * (1) + (p * q * (1 - z)) - w_e\Big)\Big) \\ &\quad + (1 - a) * \Big(\Big(1 - (x_e - x_F)^2\Big) + p * q\Big) \end{aligned} \tag{19}$$

$$\begin{aligned} U_M &= a * \Big(i * \Big(\phi_2 * (1 - x_F)^2 + (1 - \phi_2) * \Big((1 - x_e)^2\Big) - h\Big) \\ &\quad + (1 - i) * \Big(\rho_2 * (1 - x_F)^2 + (1 - \rho_2) * \Big((1 - x_e)^2\Big) + (((v - p) * q) * (1 - z))\Big)\Big) \\ &\quad + (1 - a) * \Big((1 - x_F)^2 + ((v - p) * q)\Big) \end{aligned} \tag{20}$$

We also specify war costs and the probability of victory for the coalition. Equation 21 is equivalent to equation 1, with notation to distinguish probabilities across models. To avoid an artificial result of fixed war costs, w_e rises in the magnitude of the difference between x_e and x_F. Similarly, war costs for e increase in M's war effort when e is facing the coalition of M and F.

$$\phi_2 = 1 - \left(\frac{1 - \rho_2}{1 + \alpha * h}\right) \tag{21}$$

$$w_e = \Big(\psi + \mu * (x_e - x_F)^2\Big) \tag{22}$$

$$w_{eM} = w_e * (1 + \lambda * h) \tag{23}$$

Taking the derivative of equation 20 with respect to i, and setting the result equal to zero

($\frac{\partial U_M}{\partial i} = 0$), we solve for q such that M is indifferent to intervening in the dispute between e and F:

$$\hat{q}_M = -\frac{h\left(1+\alpha\left(h-(\rho_2-1)\left(-2x_e+x_e^2-(x_F-2)\,x_F\right)\right)\right)}{(1+\alpha h)\,(p-v)\,(z-1)} \tag{24}$$

We plot equation 24 below, after addressing e's attack decision (a), with and without M intervening. Taking the derivative of U_e with respect to a in each case, setting both equations equal to zero ($\frac{\partial U_{e,i=0}}{\partial a} = 0$, $\frac{\partial U_{e,i=0}}{\partial a} = 0$), and solving again for respective critical values of q, we get:

$$\hat{q}_{e,i=1} = -\frac{(1+\alpha h)(\,1+h\lambda)\,\psi+(-1+(1+\alpha h)\,(1+h\lambda)\,\mu+\rho_2)\,(x_e-x_F)^2}{p+\alpha hp} \tag{25}$$

$$\hat{q}_{e,i=0} = -\frac{\psi+(-1+\mu+\rho_2)\,(x_e-x_F)^2}{pz} \tag{26}$$

Equation 25 is negative for most parameter values, as e prefers to avoid expensive losing contests with M. Equation 26 details conditions under which e is willing to fight F if M will not intervene. Figure 8 combines the $\hat{q}_{e,i=0}$ surface (in red) and $\hat{q}_M$ (equation 24, in blue).[13] Below $\hat{q}_M$ (blue surface), M will intervene, so e does not attack. Above $\hat{q}_{e,i=0}$ (red surface), e is unwilling to attack even if M will not intervene. Between the two surfaces, e attacks F, and M is unwilling to intervene.

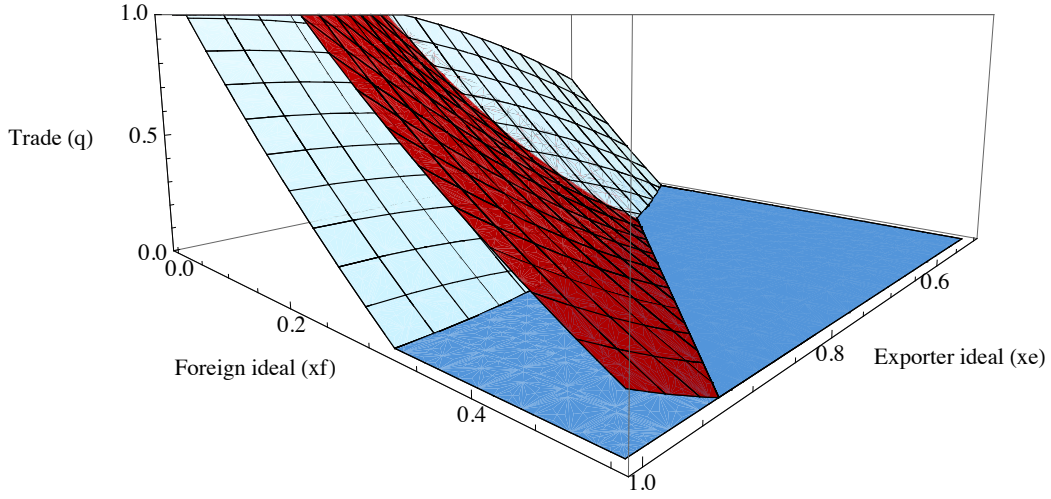

Figure 8: The relationship between exporter and foreign state policy and trade threshold

[13]Parameter values are as follows: $v = 1$, $p = 0.5$, $z = 0.5$, $\rho_2 = 0.33$, $h = 0.25$, $\alpha = 15$, $\lambda = 0.1$, $\psi = 0.1$, $\mu = 0.25$.

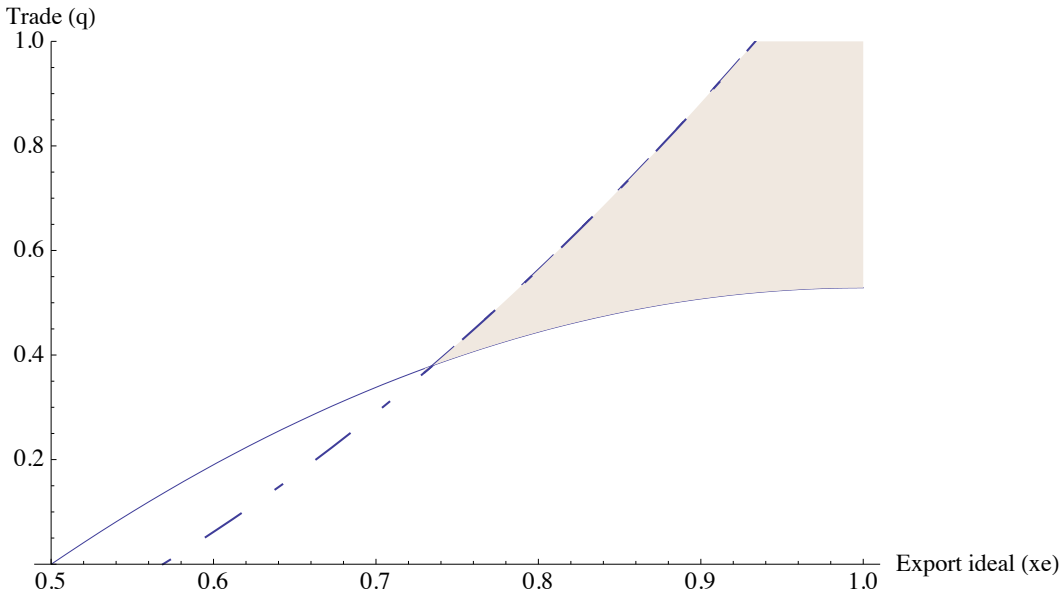

Figure 9: The relationship between exporter ideal and oil trade threshold ($x_F = 0.15$)

Disputes between e and F occur in the wedge-shaped region above M's intervention threshold and below e's attack threshold. Only e's with extreme policy preferences initiate a contest. As the previous model revealed, petrostates can sustain incumbents with extreme policy preferences. Figure 9 shows this relationship in two dimensions.[14] The incumbent, e is more likely to attack with moderate oil exports. For many parameter values, too little oil allows M to intervene, while too much oil commerce leaves e reluctant to attack. The beige shaded region in Figure 9 is where disputes can occur, avoiding major power intervention while minimizing disruption of petroleum exports. The upper threshold on conflict also implies that these disputes should be relatively moderate in intensity. Given these relationships, our final two hypotheses appear below:

Hypothesis 4 *Oil exporting countries are more likely than non-oil exporting countries to initiate low-intensity militarized disputes against non-oil exporting countries.*

Hypothesis 5 *Oil exporting countries are no more likely than non-oil exporting countries to initiate high-intensity militarized disputes against non-oil exporting countries.*

[14]Think of the figure as a "slice" of Figure 8. Equilibria and optimal strategies for all games appear in the appendix.

4 Data and Method

We base our empirical tests on an established statistical model of conflict (c.f., Oneal and Russett 2005). This approach is prudent given limited quantitative research on this subject. We examine the period 1946-1999 due to data availability (Fearon and Laitin 2003). The post-World War II period is also ideal as a sample given the centrality of oil for industrial development. Oneal and Russett (2005) report a sample of 464,953 dyad years for the period 1885-2001, while the sample from 1946-1999 contains roughly 405,000 dyad years. Reducing the test period does not substantially alter sample size. Oneal & Russett estimate the effect of liberal variables on militarized interstate disputes (MIDs), using dyad years as their unit of analysis. They predict MID onsets, distinguishing between all MIDs, fatal MIDs, and wars. We use directed dyad years, given directional hypotheses.

A thorough test of the formal models involves assessing the impact of petroleum on rivalry and policy affinities. Thompson's (2001) concept of strategic rivalry involves a leader's perception of other states rather than actual dispute involvement. While researchers have also used the MID data to generate rivalry measures (Diehl and Goertz 2000), Thompson's approach minimies the risk of partial identification between independent and dependent variables. Thompson (2001) conducted an extensive review of historical sources to code rivalries as a psychological, rather than behavioral condition. He identifies 173 rivalries between 1816 and 1998. We operationalize rivalry as a discrete variable, coded as one (1) in any year in which a rivalry is said to exist in a dyad, and 0 otherwise.

We measure state interests using United Nations General Assembly voting data to construct an "affinity" index (Gartzke and Jo 2002). The index reports the similarity of annual UN voting patterns for pairs of states, using the "S" coding (Signorino and Ritter 2001). Values range from one ("most similar"), to negative one ("least similar"). Hypothesis 3 predicts that petroleum exporters maintain more divergent preferences than other states, relative to major powers and the hegemon.

We use data developed by Fearon (2005) to measure oil export status. The literature identifies a threshold of 1/3rd of total export revenues as appropriate in singling out relatively important oil exporters. Including states with more modest petroleum exports could bias in favor of our hypotheses, as these states are less attractive targets. As robustness checks, we also evaluated a measure of the ratio of energy rents to national income, using a minimum threshold of 10%.

The rest of our controls parallel those used by Oneal and Russett (2005), with appropriate changes to conform to the directed dyad research design. To measure trade and GDP post-World War II, Oneal and Russett rely on Gleditsch's (2002) data. To investigate the effect of democracy, Oneal & Russett use the Polity IV data on regime type (Marshall and Jaggers 2002). As with Oneal & Russett, we also control for major power status, alliance membership, contiguity and the distance between capitals, all with variables derived from the Correlates of War project. Oneal and Russett follow Beck, et al. (1998) by including a count of the years since the last militarized dispute (peace-years) and natural-cubic splines to smooth the observed effect over time. We use the ReLogit estimator in MLE regressions to address bias associated with rare events data (Tomz, et al. 1999). In assessing rivalry, we use a variant of the peace years and splines (non-rivalry years) to address temporal dependence. Tests of policy similarity are conducted using OLS regression.

5 Results

Table 1 presents coefficient estimates and standard errors for six ReLogit regressions in which the dependent variable is whether state A initiated a dispute against state B in a given year. Regressions differ in the number and kinds of controls, and in the conflict intensity of the dependent variable. In most instances, there is a variable for each state, plus a third variable for interactions between monadic values. Model 1, the "Basic" regression, includes only the two monadic oil export dummies, the peace year and spline temporal dependence controls (omitted to save space), and an intercept. As these results indicate, exporters are more likely to initiate MIDs, but no more likely to be the targets of aggression. Thus, hypothesis 1 and hypothesis 4 appear to be sustained in this regression.

We introduce the interaction $Oil\ A \times Oil\ B$ to model 2 to assess whether pairs of oil exporters behave differently from other combinations of states. This second regression also incorporates a series of geopolitical and "Realist" variables, including major power status, capabilities, alliance status, and contiguity. With the exception of major power status for the potential initiator, distance, contiguity and (marginally) the interaction between capabilities, these additional variables do not have much effect on whether states fight. Similarly, pairs of oil exporters appear to function in much the same way as other dyads, or at least other dyads containing at least one oil exporter.

Table 1: ReLogit Models of MIDs on Oil Exports and Other Variables (Directed Dyads, 1945-2000)

Variable	1: Basic Coeff. (S.E.)	2: Inter. Coeff. (S.E.)	3: Controls Coeff. (S.E.)	4: Fatal Coeff. (S.E.)	5: War Coeff. (S.E.)	6: War Coeff. (S.E.)
Oil Exporter A	**0.435** **	**0.447** **	**0.391** **	**-0.240**	**-0.322**	**0.0359**
	(0.154)	**(0.145)**	**(0.134)**	**(0.207)**	**(0.240)**	**(0.239)**
Oil Exporter B	**0.0981**	**0.0813**	**0.0940**	**-0.337**	**-1.485** ***	**-0.529**
	(0.166)	**(0.190)**	**(0.173)**	**(0.243)**	**(0.423)**	**(0.367)**
Oil A × Oil B		**-0.268**	**-0.0391**	**0.801**	**2.375** ***	
		(0.307)	**(0.316)**	**(0.434)**	**(0.647)**	
Major Power A		0.848 **	0.916 **	0.607	0.493	0.477
		(0.297)	(0.295)	(0.337)	(0.444)	(0.452)
Major Power B		0.484	0.563	1.190 ***	1.646 ***	1.650 ***
		(0.405)	(0.381)	(0.328)	(0.442)	(0.445)
Maj. A × Maj. B		0.382	0.454	0.177	0.467	0.393
		(0.695)	(0.595)	(0.583)	(0.913)	(0.960)
Capability A		3.387	2.885	4.730 *	8.681 ***	8.825 ***
		(2.039)	(1.937)	(2.207)	(1.817)	(1.845)
Capability B		3.154	2.401	3.449	2.198	2.241
		(3.024)	(2.706)	(2.161)	(2.002)	(2.034)
Cap. A × Cap. B		44.24 *	39.05 *	-20.73	-9.208	-7.805
		(19.71)	(17.04)	(30.34)	(39.98)	(41.81)
Alliance		-0.262	-0.0732	-0.566 ***	-1.447 ***	-1.427 ***
		(0.144)	(0.146)	(0.144)	(0.366)	(0.374)
Distance (ln)		-0.461 ***	-0.475 ***	-0.472 ***	-0.399 ***	-0.407 ***
		(0.0183)	(0.0177)	(0.0207)	(0.0311)	(0.0313)
Contiguity		-0.274 ***	-0.240 ***	-0.0691	0.110	0.105
		(0.0652)	(0.0638)	(0.0719)	(0.118)	(0.121)
Democracy A			0.140 ***	0.152 ***	0.0793	0.0725
			(0.0231)	(0.0292)	(0.0493)	(0.0491)
Democracy B			0.164 ***	0.156 ***	0.170 ***	0.165 ***
			(0.0244)	(0.0292)	(0.0413)	(0.0408)
Dem. A × Dem. B			-0.0289 ***	-0.0403 ***	-0.0615 ***	-0.0603 ***
			(0.0038)	(0.0059)	(0.0117)	(0.0114)
Trade A			1.404	3.677	-23.44	-24.01
			(1.907)	(2.942)	(24.65)	(24.72)
Trade B			0.618	6.538 **	-59.96	-61.65
			(1.858)	(2.421)	(74.31)	(74.59)
Trade A × Trade B			-29.66	-977.5	902.3 *	909.4 *
			(65.49)	(638.1)	(390.0)	(393.7)
Intercept	-4.116 ***	-0.190	-1.149 **	-0.846	-2.604 **	-2.539 **
	(0.169)	(0.412)	(0.425)	(0.487)	(0.802)	(0.824)
N	826561	826561	804935	804935	804935	804935

Significance levels : $*$: 5% $**$: 1% $***$: 0.1%. Peace year and spline variables omitted to save space.

Interpreting tabular results involving interaction terms can be difficult (Braumoeller 2004). Though less problematic here given that the variables involved are dichotomous, it is still useful to graph key relationships. Figure 10 reports marginal effects for the oil export status variables. On the y (horizontal) axis is the probability of a MID. The vertical (x) axis lists the four possible categories of relationships. Adjacent to each oil export category is a box-whisker plot of the distribution of predicted probabilities based on the coefficients and standard errors estimated in model 2. Using the Clarify software (Tomz, et al. 2003), each box-whisker plot reports the mean (center vertical line), 25% and 75% confidence intervals (outside edges of box surrounding the mean), the 2.5% and 97.5% confidence intervals (vertical "tails" at the end of each "whisker"), and "outside values" (large round dots). Using the modal category of "Neither Oil", note that only the "Only A Oil" category reports a mean with 95% confidence intervals outside the mean for "Neither Oil." We cannot rule out the possibility that the means for "Only B Oil" and "Both Oil" are equivalent to "Neither Oil," but can do so for the "Only A Oil" category. As such, we cannot reject hypothesis 2, that oil states are no more likely than other states to initiate disputes against other oil exporters.

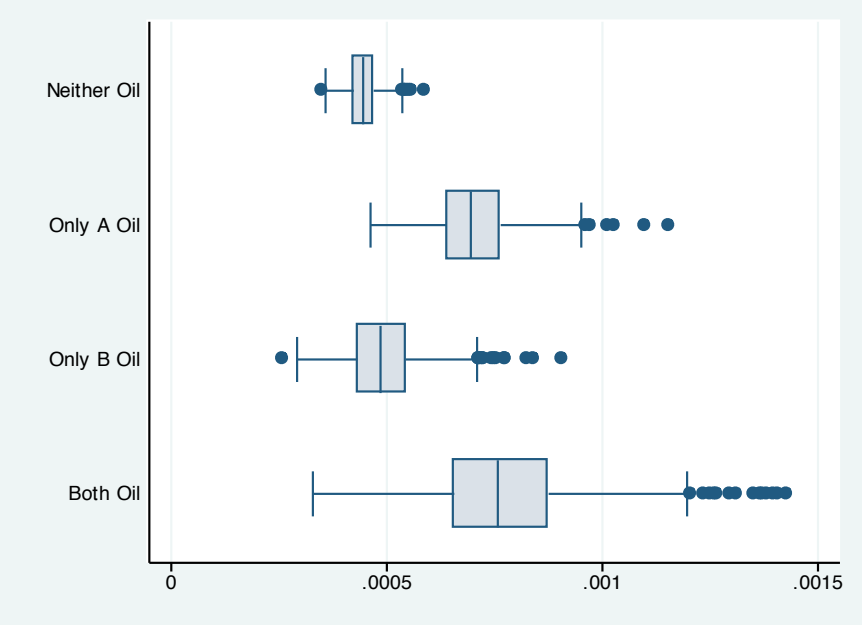

Figure 10: The marginal effects of oil export status on MID initiation

Model 3 adds additional "Controls" involving liberal variables (democracy and trade), but

the results for the key oil export dummies are again largely unchanged. Monadic democracy is associated with a significant increase in conflict behavior, while the interaction term is negative (special democratic peace). Trade dependence and interdependence are not statistically significant.

The fourth regression in Table 1 evaluates only fatal MIDs (disputes involving at least one battlefield casualty). Here, the results change somewhat, as none of the coefficients on the oil export dummies is statistically different from zero. This suggests that hypothesis 5 (and by extension, hypothesis 4) may not be incorrect. Oil exporters are more likely to initiate disputes only at lower intensities. At higher intensities, exporters are inhibited by the petroleum trade, even as they become more concerned about the prospect of intervention or decapitation by major importers.

Limiting MID observations to wars again alters relationships in ways that reflect the models' predictions. Oil exporters are no more likely to initiate disputes against other states at high dispute intensities. In contrast, oil exporters are significantly less likely to become the targets of wars (hypothesis 1). In what looks like support for blood oil arguments, pairs of oil exporters appear to be significantly more likely to fight wars than other combinations of states. However, as Figure 11 demonstrates, the actual relationship is quite different. Oil targets and pairs of oil exporting states are significantly less likely to experience wars than are non-oil exporting dyads and dyads containing an oil exporting potential initiator (hypotheses 1 and 2). The last regression in Table 1, Model 6, is for reference, showing that the effects of oil status on conflict are not monotonic.

Since most countries are incapable of projecting power far from home, the task of policing global energy networks falls disproportionately on the hegemon and other major powers. If there are dyads that practice blood oil, they should involve the major powers. In regressions not reported here, we examined models similar to those in Table 1 involving only US dyads, or major power dyads. Contrary to the expectations of blood oil, major powers are no more likely to use force against oil exporters than against other states. There is no statistically significant difference between how the United States treats oil exporters and behavior toward non-oil exporters. The war sample is too small to be evaluated, but patterns are the same for MIDs and fatal MIDs in all samples.[15] The more intense the dispute behavior, the less oil states and their adversaries experience conflict.

[15] Estimates do not converge. All results, including those discussed in this paragraph, are available from the authors.

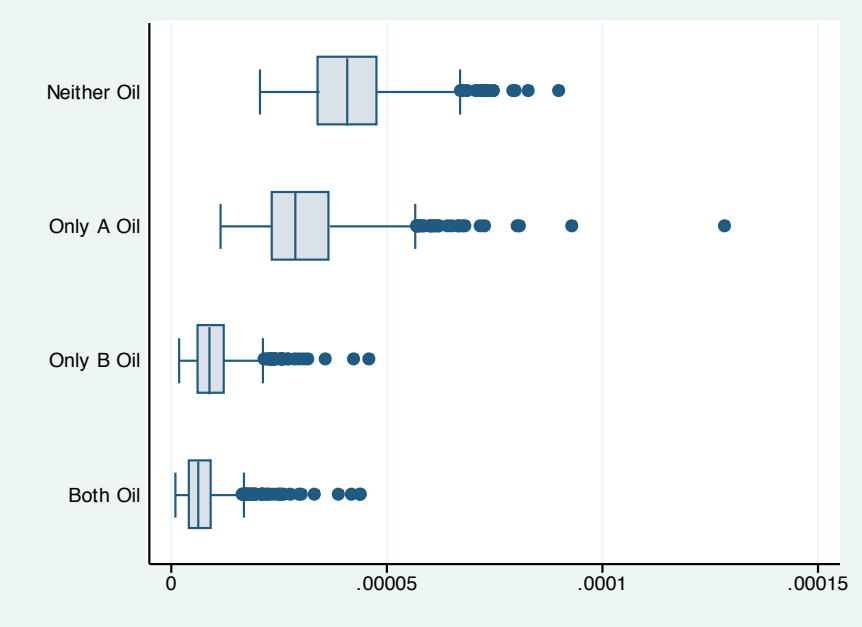

Figure 11: The marginal effects of oil export status on MID War initiation

It is conceivable that oil avarice is not reflected in actual disputes or violence, but could appear as heightened international tensions. Thompson's sample of rivalries is explicitly designed to measure leaders' attitudes towards their counterparts in other countries, rather than behavior. Table 2 lists six regressions, three of which involve rivalry status as the dependent variable. We estimate rivalry onset in a slightly different manner than the MID regressions in Table 1. It is not clear how to distinguish between initiators and targets of rivalry, so we evaluate dyads, not directed dyads, in Table 2. We seek to know whether oil exporters and major importers are more or less likely to experience rivalries than other pairs of states. Model 7 sets a baseline for this comparison. While pairs of oil exporters ("both") are no more rivalrous than non-oil exporters, dyads containing just one oil exporter ("either") are slightly more prone to enter a rivalry than other combinations of states. Despite the intuition that petrostates are more radical, the evidence shows that oil exporters have only significantly more rivalries in general, and are no more rivalrous with other oil exporters.

Model 8 estimates the determinants of rivalry between the United States and other countries.[16]

[16]We drop variables that no longer make sense in the smaller sample. There are no cases where both states are oil exporters, at least one state is always a major power, and the higher democracy threshold in the dyad does not vary.

Table 2: ReLogit Regressions of Rivalry and Affinity on Oil Exports and Other Variables (Dyads, 1945-2000)

Variable	**7: Rival** All Dyads **Coeff.** **(S.E.)**	**8: Rival** U.S. Dyads **Coeff.** **(S.E.)**	**9: Rival** Maj. Power **Coeff.** **(S.E.)**	**10: Affinity** All Dyads **Coeff.** **(S.E.)**	**11: Affinity** U.S. Dyads **Coeff.** **(S.E.)**	**12: Affinity** Maj. Power **Coeff.** **(S.E.)**
Oil Exporter (either)	**0.681** *	**-12.53** ***	**-4.308** ***	**0.0559** ***	**-0.0777** *	**-0.0708** *
	(0.348)	**(3.190)**	**(1.103)**	**(0.0037)**	**(0.0338)**	**(0.0313)**
Oil Exporter (both)	**0.707**			**0.117** ***		
	(0.498)			**(0.0070)**		
Major Power (either)	3.420 ***			-0.293 ***		
	(0.617)			(0.0096)		
Capability Ratio (ln)	-0.741 ***	-2.751 ***	-1.238 ***	-0.0012	0.0424 ***	0.0162 *
	(0.158)	(0.401)	(0.173)	(0.0013)	(0.0089)	(0.0069)
Alliance	1.210 ***	-0.923	0.978	0.112 ***	0.310 ***	0.0544 *
	(0.319)	(2.697)	(1.100)	(0.0052)	(0.0422)	(0.0239)
Democracy (low)	-0.0677 **	-0.310	-0.0851 *	0.0051 ***	0.0068 *	0.0049 **
	(0.0242)	(0.528)	(0.0387)	(0.0003)	(0.0027)	(0.0015)
Democracy (high)	0.0276			-0.0119 ***		
	(0.0212)			(0.0003)		
Trade (low)	-63.57	-2861.0	-557.6 ***	0.912	10.38 *	3.960
	(44.50)	(1489.8)	(129.6)	(0.490)	(4.544)	(2.824)
Distance (ln)	-0.902 ***	-0.00005	0.0003	0.0125 ***	0.0491	-0.0939 ***
	(0.198)	(0.0004)	(0.0002)	(0.0031)	(0.0337)	(0.0196)
Contiguity	3.205 ***	14.39 *	4.526 ***	0.0513 ***	-0.0197	0.100
	(0.459)	(5.816)	(1.141)	(0.0107)	(0.0667)	(0.0597)
Intercept	3.903 *	2.204	0.909	0.635 ***	-0.637 *	0.992 ***
	(1.592)	(4.975)	(0.952)	(0.0256)	(0.314)	(0.154)
N	406572	6348	33552	362328	5928	18979

Significance levels : $*$: 5% $**$: 1% $***$: 0.1%. Peace year and spline variables omitted to save space.

If oil states are particular targets of US aggression (or vice versa), then we should find that oil status predicts rivalry with the United States. If in contrast the United States is reluctant to upset world oil markets, as strategic oil predicts, we should observe a negative relationship between oil status and rivalry involving the United States. Our results show a strongly negative and statistically significant effect for rivalry onset between an oil exporter and the hegemon. The United States and oil exporters have unusually peaceful relations. Petrostates require the good will of the hegemon for protection and profits. The hegemon seeks to maintain stability and a steady supply of oil. Model 9 repeats the analysis for major powers, which are also less likely to experience a rivalry with a petrostate, despite the fact that exporters experience slightly more rivalries in general.[17]

Models 7 through 9 suggest that oil exporters maintain a special relationship with powerful states, one with fewer overt tensions. However, we do not yet know why petrostates and great powers are less often rivals. The absence of rivalry could result either from a lack of difference, or from a greater need to patch over differences. A more direct test of the hypothesis appears in regressions 10-12. Here, we estimate the determinants of policy affinity among states. This time, however, the dependent variable is metric, reflecting the degree of similarity in voting patterns in a given year between two nations in the UN General Assembly. High values reflect more similar voting patterns. As we observe in Model 10, oil exporters tend to vote with other nations, and with other oil exporters, more often than one would expect by chance. This relationship thus serves as a potential challenge to hypothesis 3; contrary to popular rhetoric, it does not appear that petrostates are generally more radical in their foreign policies, at least not in relation to most other nations. As the results of Model 10 also show, however, it is major powers that tend to exhibit significantly different preferences from other nations. Hypothesis 3 would be sustained if oil exporters maintain preferences that are even more divergent from those of major powers than are non-oil exporters.

Model 11 examines this relationship for US dyads. As the coefficient for exporter status shows, the hegemon tends to have significantly less affinity for the voting patterns of oil exporters than for those of non-oil exporting states. So, the United States and oil exporters disagree more often, but fight and experience rivalry less often than one would expect by chance. As Model 12 reveals, this

[17]We also found no unique statistically significant effect for the post-Cold War period for the oil export variables.

pattern is repeated for major powers. Thus, hypothesis 3 cannot be rejected; oil exporters have less similar policy preferences with the hegemon or major powers than other states. Exporters and major importers nevertheless experience fewer disputes or rivalries. Taken together, these findings suggest that oil exporters benefit from the special status implied by our formal theoretical models. Being able to supply oil provides important strategic advantages to petrostates, allowing them greater discretion in their foreign policies, greater autonomy, and also increased protection.

In addition to analyses reported above, we conducted a battery of robustness checks to assess the chances that our findings are the product of accident or spurious correlation. We examined a variable identifying the importance of petroleum as energy rents above a 10% threshold of GDP (World Bank 2007). We also used variables measuring mineral rents per GDP. These variables produced results comparable to those from the basic oil variable. Resource wars are said by advocates to be more prevalent after the end of the Cold War. While results are not significant for this short time period, we examined the period before 1992 and re-confirmed that our results. Israel is a particular target of Arab oil states. We added a dummy variable coding cases where one state in a dyad or directed dyad is Israel and the other is an oil exporter from the Middle East. While statistically significant (positive) the Israel dummy actually strengthens our findings in some models. Finally, we included a variable for civil war status in either or both states. Again, the variable is significant and positive for interstate conflict, but does not alter our key substantive results for oil.

In summary, we find that exporters are more likely than non-exporters to initiate MIDs of modest dispute intensity, though not against other oil exporters. There is no relationship between petroleum status and fatal MIDs, while exporters are significantly less likely to become targets of wars. This pattern is consistent with the moral hazard. Protection against major attack allows exporters to act more aggressively abroad, if only at modest dispute intensities. Contrary to the blood oil thesis, the United States and other major powers are less likely to experience rivalry with oil exporters, despite having significant policy differences. These results are robust to a number of specification changes and alternative indicators of natural resource wealth. The dependence by powerful states on petroleum affords exporters protection and greater autonomy. Exporters in turn provide oil and exercise divergent foreign policies within limits set by their powerful patrons/clients.

6 Conclusions

Interest in competition over natural resources has recently intensified. Oil in particular is viewed as a source of instability. There are many possible explanations for this renewed interest, including the need to find a substitute for the Cold War conceptual frame, the series of wars in the Middle East associated with Saddam Hussein's leadership of Iraq, general political instability within oil-producing states, and the rush to secure natural resources sparked by the rise of China and India, among others. While there is no secret about the importance of energy resources, there is also no reason to believe that countries that depend on others for a valuable resource need experience quarrelsome relations. Results reported here simply do not support the view that oil causes war.

Instead, trade in petroleum creates a bond between importers and exporters that conditions how each perceives its own interests. Exporters value security and profits to the point that they avoid direct confrontations with major importers. Confidence that they can act with near impunity to address secondary policy concerns is balanced by the realization that major war or direct aggression against other oil producer could provoke intervention. Importers for their part are able to intervene to reinforce, reassign, or expropriate petroleum property rights if necessary, but they prefer not to, even as they recognize that their dependence on oil affords exporters increased autonomy.

Markets usually smooth transactions between buyers and sellers. Our results indicate that even the most dispute-prone states, namely major powers, are not as vulnerable to the logic of blood oil as advocates charge. These nations have either anticipated and preempted the consequences of blood oil, or the danger was never great to begin with. Our evidence suggests an understanding exists between oil exporters and their powerful clients. The United States and other capable consumers protect exporters in return for a steady stream of petroleum. The prospect of intervention by major importers serves to discourage exporters from engaging in actions that could disrupt the global economic order. As such, it is the shadow of blood oil that is most potent. The massive financial costs of the US invasion of Iraq illustrates how expensive it would be for developed countries to acquire oil by force, just as the previous Gulf War demonstrated the willingness of the United States and other importers to thwart efforts to consolidate petroleum reserves. The limited and conditional nature of oil wars is likely to continue as long as it suits the interests of relevant actors.

A Equilibria and Optimal Strategies for the Games

The appendix provides players' optimal strategies and equilibria for the three games in the text.

A.1 External Adversaries/Allies Game:

A.1.1 Players' Optimal Strategies

$$
\begin{array}{rrcll}
\mathbf{F}: & \boldsymbol{a} & = & 1 & \text{if} \quad i=1, \text{ and } \rho < \hat{\rho}_{F,i=1}, \\
 & & & & \text{or if} \quad i=0, \text{ and } \rho < \hat{\rho}_{F,i=0}. \\
 & & = & 0 & \text{if else.} \\
\mathbf{M}: & \boldsymbol{i} & = & 1 & \text{if} \quad a=1, \text{ and } \rho < \hat{\rho}_{M}. \\
 & & = & 0 & \text{if else.}
\end{array}
$$

A.1.2 Equilibria for External Adversaries/Allies Game:

$$
\begin{array}{rll}
\textbf{[a=1,i=1]} & \text{if} & \rho < \hat{\rho}_{F,i=1}, \text{ and } \rho < \hat{\rho}_{M}. \\
\textbf{[a=1,i=0]} & \text{if} & \rho < \hat{\rho}_{F,i=0}, \text{ and } \rho \geq \hat{\rho}_{M}. \\
\textbf{[a=0]} & \text{if} & \rho \geq \hat{\rho}_{F,i=1}, \text{ and } \rho < \hat{\rho}_{M}, \\
 & \text{or if} & \rho \geq \hat{\rho}_{F,i=0}, \text{ and } \rho \geq \hat{\rho}_{M}.
\end{array}
$$

A.2 Internal Challengers/Foreign Clients:

A.2.1 Players' Optimal Strategies

$$
\begin{array}{rrcll}
\mathbf{M}: & \boldsymbol{t} & = & 1 & \text{if} \quad h < \hat{h}_{t=1}, \text{ and } r_M < \hat{r}_M. \\
 & \boldsymbol{d} & = & 1 & \text{if} \quad h < \hat{h}_{d=1}, \text{ and } r_M < \hat{r}_M. \\
 & & = & 0 & \text{if else.}
\end{array}
$$

Equilibria in the internal challenger game follow directly from M's optimal strategies.

A.3 Oil and Moral Hazard:

A.3.1 Players' Optimal Strategies

$$
\begin{aligned}
\mathbf{e}: \quad \boldsymbol{a} &= 1 \quad \text{if} \quad i = 1, \text{ and } q < \hat{q}_{e,i=1}, \\
&\qquad \text{or if} \quad i = 0, \text{ and } q < \hat{q}_{e,i=0}. \\
&= 0 \quad \text{if else.} \\
\mathbf{M}: \quad \boldsymbol{i} &= 1 \quad \text{if} \quad a = 1, \text{ and } q < \hat{q}_M. \\
&= 0 \quad \text{if else.}
\end{aligned}
$$

A.3.2 Equilibria for External Adversaries/Allies Game:

$$
\begin{aligned}
\textbf{[a=1,i=1]} \quad &\text{if} \quad q < \hat{q}_{e,i=1}, \text{ and } q < \hat{q}_M. \\
\textbf{[a=1,i=0]} \quad &\text{if} \quad q < \hat{q}_{e,i=0}, \text{ and } q \geq \hat{q}_M. \\
\textbf{[a=0]} \quad &\text{if} \quad q \geq \hat{q}_{e,i=1}, \text{ and } q < \hat{q}_M, \\
&\text{or if} \quad q \geq \hat{q}_{e,i=0}, \text{ and } q \geq \hat{q}_M.
\end{aligned}
$$

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