

**Oil and Political Stability:  
Explaining the Variety of Political Outcomes in Petro-States**

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Word Count: 11,841  
(last modified 10/22/2007)

Abstract: Although the negative relationship between fuel exports and democracy is quickly becoming conventional wisdom, heavy debate remains over the causal mechanisms that lead to this outcome. One of the largest and most fundamental areas of controversy is whether fuel exports provide resources for and allow the establishment of institutions that make authoritarian regimes more stable, or whether these resources cause instability and civil war. This study contends that fuel exporting states experience a wide variety of regime outcomes, and that this variety can largely be explained by differentiating those states that are both dependent and rich from fuel exports from those that are just dependent. Using data on 166 developing countries from 1965 to 2001, this paper shows that revenues from fuel exports are generally stabilizing, but that dependence is destabilizing. These results are strongest for fuel export income in promoting authoritarian stability, and for fuel dependence in destabilizing democratic regimes. Similarly, fuel export income decreases the probability of civil war, while fuel dependence increases this probability.

\* The author would like to thank Marcus Kurtz, Timothy Frye, Janet Box-Steffensmeier, Richard Gunther, Ben Ansell and the UMich writing group for their comments and help. All opinions and mistakes are the author's.

Why are countries that depend on fuel exports for their economy less likely to be democracies than non-fuel exporting countries at similar levels of economic development? While the relationship between these two variables, usually referred to as the political aspect of the "natural resource curse," has moved closer to conventional wisdom in comparative politics, the reason for this relationship is still a matter of debate.<sup>1</sup> Part of the reason for the continued debate is the relatively recent rise of large-N, cross-national studies of the phenomenon (Ross, 2001). Prior to this, the presence of large-scale oil resources was thought to inhibit democracy, but analysis was primarily limited to single or comparative case studies (e.g. Crystal, 1989; Karl, 1997), the inclusion of a binary oil variable as a control variable in larger models (e.g. Barro, 1999), or the exclusion of major oil exporters from the data altogether (e.g. Przeworski et. al., 2000). As such, hypotheses about the relationship tended to be structured around regional patterns.

With the rise of large-N evaluation in the natural resource curse debate, an a-priori question has become especially salient -- are fuel dependent countries more likely to be authoritarian because authoritarian regimes are more likely to survive (Smith, 2004; Morrison, 2007), because democracies are less stable (Karl, 1997; Jensen and Wantchekon, 2004), or because deep social conflicts make democracy less likely (Ross, 2006; Collier and Gunning, 1999)? The answer to this question impacts what hypotheses are most likely to explain the natural resource curse and how future research will go about testing them.

Given the answers presented in other high-profile studies on the subject, this paper reaches some surprising conclusions. (1) If fuel dependence is run by itself in models of stability, the results generally support the contention that fuel dependent states are more stable.

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<sup>1</sup>The *political aspect* of the "natural resource curse" is to be differentiated from, although not wholly unrelated to, the economic aspects of the curse, which notes natural resource exports' tendency to be associated with weaker average growth (see Sachs and Warner, 1995).

If, however, the magnitude of income per-capita that is garnered from fuel exports is taken into account, fuel dependence has the opposite effect -- in other words, fuel income is stabilizing, but fuel dependence is destabilizing. (2) These results are generally stable across phenomena, including authoritarian stability, democratic stability, and the probability of civil war. (3) The largest impact of fuel income is on the stability of authoritarianism, while the largest impact of dependency is on the fragility of democracies and the probability of civil conflict.

These results point to a substantial difference between what Karl (1997) labels "capital surplus" and "capital deficient" oil exporters. They also provide a clearer idea of what researchers must look for in a large-N explanation of the natural resource curse. In particular, scholars must look at how the same variable -- income from fuel exports -- produces a number of different regime outcomes, and how this, in turn, explains the general pattern of less democratic governance in fuel exporting states.

### **Regime Stability**

The most cited explanations for the lack of democracy in fuel dependent states draw from the experience of countries in the Middle East. This literature focuses primarily on explaining political regime stability. Ross' (2001) article was the first to analyze whether theoretical concepts developed in the Middle East literature extend to a large-N framework. In this article, he finds support for several hypotheses. First, he suggests that fuel exporters' ability to raise revenue without taxation reduces calls for political reform. Second, fuel exporters have greater resources for patronage, which they use to reduce pressure for democracy. Third, the government's oil wealth, either purposefully or inadvertently, hinders the formation of civil society groups. Together, these hypotheses are labeled the "rentier effect" of oil revenues (see Mahdavy, 1970; Beblawi, 1987). He also finds some support for the contention that fuel wealth

does not result in socio-economic development that is proportionate to the increases in per capita GDP. In all of these explanations, the implication is that fuel dependent states are more likely to be authoritarian because increased government revenues, obtained independently of social collection, make authoritarian governments more stable.

Most scholars, even the ones discussed in the next section, will grant that when raw material values are high, authoritarian governments can prevent changes in government through "buying off" the opposition. Many, however, do not believe that it will last when the government runs short on revenue because of low raw material prices. Benjamin Smith (2004) argues that this is not the case. He contends that four fuel exporters, the "big four," grab the attention of researchers -- Iran, Nigeria, Algeria and Venezuela. Instability in these four countries has led researchers to predict government crises as a result of falling fuel prices.<sup>2</sup> However, he argues cases like Suharto in Indonesia and Saddam Hussein in Iraq, who both lasted more than thirty years, are more common (p. 242). A duration analysis of fuel dependent regimes in the developing world from 1974 to 1999 supports his argument. These results, contrary to what would be expected, hold up regardless of whether oil prices are high or low. He theorizes that oil dependent regimes effectively use their revenues to align social interests and create institutions to support the regime. This article was the first large-N analysis of stability in fuel exporting countries, and is the touchpoint for the debate over whether underlying stability or instability results from dependence on fuel resources.

Another hypothesis for authoritarian stability revolves around increased spending on repression. Some scholars note a positive correlation between oil dependence and spending on military and police as a proportion of their income (Skocpol, 1982; Clark, 1997). These studies have difficulty, though, separating increases in military and police spending as an effect of

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<sup>2</sup> Ross (1999) makes the case that Venezuela was actually quite stable as compared to its neighbors and doubts whether most oil states are all that more unstable than their neighboring countries.

domestic and international instability, as opposed to a cause of domestic tranquility. Similarly, the international support given to oil-rich regimes is often cited, primarily in the media, as a reason for authoritarian politics. In the case of Iran, for example, observers credit US support for both the rise and fall of the Shah (e.g. Cottam, 1979). Others contend that Saudi Arabia, Kuwait and other oil rich regimes in the Middle East do not receive nearly the international pressure regarding their human rights practices that countries without oil do (Ross, 2 May 2006).

Dunning (forthcoming) turns the stability argument on its head, arguing that fuel exports make democracies more stable. Building on recent advances in formal models of democratization (Boix, 2003; Acemoglu and Robinson, 2004), he argues that the increased ability for government distribution provided by fuel export revenues lessens the necessity for re-distribution in democracies. Elites, in turn, are more likely to accept democratization, since it does not result in higher taxation. Such effects are especially pronounced in areas, such as Latin America, where inequality and distribution are particularly salient. Morrison (2007) draws an even more general conclusion using similar models. He argues that non-tax revenues, including those from oil exports, make both authoritarian and democratic regimes more stable because they allow social spending to offset demands of the poor in authoritarian regimes, and lessen the need for taxation of elites in democracies.

The “rentier effect,” slow socio-economic development, institution building, repression, the lack of international pressure, and the offsetting of domestic demands for re-distribution are all plausible explanations for the statistical pattern of the natural resource curse, but all of them rely on explaining the pattern through regime stability.

### **Political and Social Instability**

On the other side of the issue, a number of scholars suggest that the main reason for the

pattern of non-democracy is the instability of governments, especially democratic ones, in fuel dependent states. Karl's (1997) work on Venezuela, Iran, Nigeria, Algeria, Indonesia and Norway is the best-known example of this literature. She contends that when a government receives a large windfall from spikes in oil prices, it will have a difficult time resisting social pressures to increase spending.

As a result, when faced with competing pressures, state officials become habituated to relying on the progressive substitution of public spending for statecraft, thereby further weakening state capacity (1997, p. 16).

Governments will remain relatively stable as long as the price of fuel continues to rise. When the price falls, however, the fragile framework on which the government in a developing state rests will collapse. Chaudhry (1997) and Luong and Weintal (2006) make similar arguments about the importance of establishing government capacity, especially in establishing an effective taxation bureaucracy, to avoid instability during a price drop. Henry (2004), on the other hand, doubts whether fuel export income results in weak government capacity, arguing that institutions for distribution can be just as complex and resilient as those for extraction.

Other scholars posit a pattern of democratic instability that works in reverse of Karl's boom-bust cycles. Lam and Wantchekon (2002; see also Jensen and Wantchekon, 2004) suggest that oil dependent states in Africa experience "political Dutch disease," whereby politicians elected to government with high fuel revenues are able to use resources to consolidate a one-party state. This explains the drop in democracy after the third wave of democratization in several African countries (see Bratton, 1998). They argue that office-seeking leaders are able to use patrimonialism and corruption to lock in an electoral advantage. Thus, high fuel revenues increase the danger of a democracy being replaced by a one party state.

Still others point to an even larger pattern of political instability in fuel dependent states, especially in terms of social unrest and civil war. Ross (2003, p. 21; see also Ross, 2006)

observes this pattern, noting that five of the twenty most oil dependent states he looks at have experienced some type of civil war related to natural resource reserves since 1990. In a similar vein, Collier and Hoeffler (1998) observe a strong correlation between dependence on natural resources and the probability of civil war. Bannon and Collier (2003, p. 5; see also Collier and Hoeffler, 2004) note that oil increases the risk that a civil war, when it occurs, involves secession. These authors posit several reasons for the relationship between fuel exports and civil war. First, separatist groups must bankroll themselves, and they use extortion and the exploitation of trade in primary commodities to do it. High revenue exports are an easier to use for extortion, trade, taxation and/or participation in the trade itself. Second, regions have a larger incentive to assert their independence where the distribution of resources aligns with other cleavages of conflict, such as ethnicity. Third, poor governance and corruption exacerbate civil strife, as it leads to perceptions of a national resource being stolen by corrupt elites.<sup>3</sup> The debate over whether there is a link between fuel exports and civil war is very active, with several authors throwing doubt on whether there is a link and whether current causal explanations are sufficient (e.g. Smith, 2004; Di John, 2005).

Those who argue for a link between fuel exports and civil war usually stop short of linking it to regime outcomes. However, a relationship between fuel dependence and social unrest may explain the lack of democracy in some states. As Linz and Stepan (1978, p. 18) note, "Civil war almost always results in non-democratic governance." Wantchekon (1999) comes closest to making this link explicit, by contending that unequal distribution of oil resources results in resentment that undermines stability of democratic rule. If this is the case, then fuel export dependence should be correlated with greater incidence of civil war, and this, in turn, should explain some of the democratic under-performance in these states.

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<sup>3</sup>See Ross (2006) for a statistical analysis of these causal pathways, as well as the most detailed statistical analysis of the links between fuel and mineral exports and civil war.

Weak governance, decaying bureaucracies, political Dutch disease, and civil conflict all provide convincing explanations for greater democratic fragility in fuel dependent states. This predicted outcome stand in contrast, however, to the pattern of authoritarian stability predicted in the previous section.

### **Establishing Causal Pathways**

As more scholars have attempted to generalize about the natural resource curse in a large-N framework, the effort to establish a baseline causal pathway underlying the statistical patterns has increased in importance. Are fuel exporting states more likely to be non-democratic because of social and political instability, or are they more likely to be authoritarian because fuel exports insulate governments against pressures for democracy? Is there a general pattern on which scholars can make generalizations?

This debate is more than just scholarly posturing. With the explosion of literature claiming to have discovered the reason for the natural resource curse, whether we are looking for causes of stability or instability is of prima facie importance, since it serves as a baseline expectation for theoretical explanations and a focal point for hypothesis testing. Indeed, as demonstrated above, most of the explanations put forth so far concentrate on one or the other of these two causal pathways.

To begin answering the stability/instability question, we should start with an even simpler question -- who are these countries? Table 1 lists the major fuel-dependent states -- defined as having an average of 5 percent or more of GDP made up of fuel exports from 1965 to 2001. Along with listing the dependence on fuel exports, the table also gives the approximate amount of income generated by fuel exports per-capita, patterns of change in the countries' Polity IV scores (Marshall and Jaggers, 2002), and the incidence of civil war (Gleditsch et. al. 2002).

Polity scores range from -10 to 10 and are based on the presence or absence of institutions characterizing democracy or authoritarianism. A score of -10 indicates the most authoritarian and 10 represents the most democratic. In this table, a country was labeled "democratic" for a Polity score between 5 and 10, "semi-democratic" for a score from 1 to 5, "soft-authoritarian" if the score was between -5 and 0, and "authoritarian" for scores less than -5.

Civil wars are classified into three types. "Minor" conflicts are those involving at least 25 battle-related deaths per year and less than 1,000 during the course of the conflict.

"Intermediate" conflicts are those with between 25 to 1,000 battlefield deaths per year and more than 1,000 deaths over the course of the conflict. Conflicts labeled "war" have at least 1,000 battle-related deaths per year (Gleditsch et. al., 2002).<sup>4</sup>

Several striking patterns emerge from the table. The first is that dependence on fuel exports and the per-capita magnitude of the revenues from those exports are not the same. During the time period studied here, Angola and Nigeria top the list on dependence, with approximately 41 and 40 percent of their economies in fuel exports respectively. The per-capita income from these exports, however, is approximately \$201 for Angola and \$107 for Nigeria. In contrast, Norway averages about 8 percent of its GDP from fuel exports during this time, but receives approximately \$2,366 per-capita from those exports.

Second, no clear pattern of Polity classification or civil conflict emerges. About half of the countries go through several large changes in their level of democracy and authoritarianism, and a similar number appear to be relatively stable. The same is true of civil wars, with some experiencing several major civil conflicts and others experiencing no measurable unrest at all.

### **[Table 1 About Here]**

Figure 1 charts the Polity scores for each of the countries in Table 1. The result is a mess,

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<sup>4</sup> This is the same coding scheme used by Smith (2004).

but a telling one. While many countries remain steady at the very top (Norway and Trinidad) or very bottom (Saudi Arabia, UAE, Syria, etc.), a number of countries make very large jumps around the chart (Nigeria, Congo-Brazzaville, etc.). An overall pattern is impossible to extract from looking at this figure.

### **[Figure 1 About Here]**

So what is happening? Is there a pattern here? And, if so, is it the general pattern of stability that Smith (2004) outlines, or the pattern of cyclical instability predicted by Karl (1997)?

### **Explaining the Diversity of Regime Outcomes**

An answer from these questions can be found through a conceptual separation between fuel export dependence and fuel export income. Karl (1997, p. 17-18) contends that a difference exists between "capital-deficient" and "capital-surplus" countries. The former have larger populations and more diverse economies, and, because of this, tend to not only absorb all their oil revenues and continue to be net importers of capital. Capital-surplus countries, on the other hand, cannot absorb all their revenues, and continue to run balance-of-payment surpluses, even during bust periods. If, as Bueno de Mesquita et.al. (2002) contend, surplus resources are key to maintaining power under crises, capital-surplus countries would be expected to be much more stable than their capital-deficient counterparts. As Karl (1997, p.18) put it, "[A]lthough all oil-exporting developing countries are highly dependent on petroleum, this dependence is felt more acutely in capital-deficient countries because their opportunities are so clearly bounded." While this distinction is critical to understanding patterns of development among fuel exporters, it has been largely ignored by scholars. None of the large-N studies cited here mention Karl's scope

conditions, and even Karl (1997) dedicates less than two pages to its discussion.<sup>5</sup>

Fuel exporting countries are also, generally speaking, countries where distribution from the government is larger and more important. As Ross (2 May 2006) noted, fuel resources make governments, but not necessarily the population, rich (see also Jensen and Wantchekon, 2004, p. 818-819). Even where the resource is not exploited by a state-owned company, limited employment gains, geographic concentration of the resources, and the lack of spillover to other industries make government distribution and investment essential, especially in developing countries (e.g. Auty and Gelb, 1986). Therefore, fuel export revenues increase government discretion over the distribution of economic goods and the relative importance of government decision-making in individual income.

Capital-surplus countries can use this to maintain the stability of the current government. High non-tax revenue increases the government's ability to distribute funds to reward support and buy-off potential rivals. A widespread group of the population benefits from these distributions, meaning that those people or groups who may consider toppling the current government are faced with large short-term costs from the loss of government distribution. Since others face similar disincentives, organization of a critical mass for successful revolt is difficult. These problems are more apparent in authoritarian regimes for a couple of reasons. First, opposition groups are usually latent, since electoral organization and operation is banned or tightly controlled. This means higher costs associated with organization. Second, democratic states are more likely to have basic rule-of-law constraints that make distribution more stable across different leaders (see e.g. Wantchekon, 1999, on Norway). Finally, as Bueno de Mesquita et. al. (2003) argue, the smaller ratio in the size of winning coalition to size of selectorate makes the distribution of private goods easier in authoritarian regimes.

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<sup>5</sup> Only Ross' (2003) review article of Karl's book makes mention of her scope conditions, but, even here, the primary focus is on her decision to only look at countries that make up a large proportion of global exports.

Governments in capital-deficient countries face more difficult choices. Distribution cannot, by definition, be as large or widespread. This means significant groups are likely to be left out of the receipt of government funds. Governments in these states will often attempt to make up the difference through large-scale borrowing and attempts at rapid investment (see Karl, 1997, p. 18), but these policies, more often than not, cause crises to deepen over the long-term. At the same time, dependence on fuel export revenues means that the relative value of government distribution increases. In extreme cases, such as in some areas of Nigeria, the struggle to ensure government patronage can literally become a matter of life and death (Joseph, 1996). Groups that are left out of government distribution have greater incentive to challenge the current government, either through overturning current institutions or through separatism, while groups with control over government distribution have an incentive to remove uncertainty over future access to distribution through exclusionary politics.

The problem of instability is especially difficult for democracies, which inherently involve some level of uncertainty in the control over government. The more important access to government distribution is for individual well-being, the less likely an individual is to accept a system that allows uncertainty. In addition, minority groups, who are likely to be disadvantaged by majority rule, have an incentive to revolt in order to keep control over their resources. In the case of Nigeria, for example, the struggle between the oil rich Niger River Delta area in the South and the more populous areas of the North has been a continual area of democratic difficulty. These problems are likely to be most severe where well-defined and well-organized group divisions have already been established.

This is a critical addition to the literature on civil conflict. Di John (2005, p. 966) criticizes the argument that the presence of oil resources results in violent conflict for control of those resources, primarily because these resources are difficult to loot and develop, and because

rebel leaders have difficulty credibly committing to a different re-distribution of resources. When the relative importance *and* scarcity of fuel income is taken into account in those states, the rent-seeking argument makes more sense. Social psychology has long argued that the presence of scarcity increases the salience and importance of group identity (Sherif et. al., 1961; Insko et. al., 1992). Thus, dependence without corresponding income from fuel exports should explain not only increased incidence of civil conflict, but also why these conflicts are more likely to involve succession. How ironic then that the latest, and most comprehensive study, done by Ross (2006), he argues that "[t]here is no good rationale for measuring natural resource production (or exports) as a fraction of GDP" (p. 276). If, however, resource wealth encourages national conflicts by increasing the relative value of the state as a target, the relative scarcity argument would suggest that dependence on fuel exports, whether operationalized as a percentage of GDP or of merchandise exports, is more critical than per-capita income.<sup>6</sup>

Based on the above analysis, four hypotheses can be formulated:

*Hypothesis 1: Based on Smith's (2004) findings, it is expected that, when run by itself, fuel export dependence should be positively related to regime stability.*

*Hypothesis 2: When fuel export income is included, it should have a positive relationship to regime stability, while fuel export dependence should have a negative relationship.*

*Hypothesis 3: If hypothesis 2 is correct, the, the expectation is that the stability effects of fuel export income will primarily be concentrated among authoritarian regimes, while the negative effects of fuel export dependence will be felt primarily on the survival of democracy.*

*Hypothesis 4: Fuel export income should be negatively related to instances of civil war and other disorder, while fuel export dependence should be positively related.*

The next section tests these hypotheses in a large-N cross-national framework.

## **Testing Causal Pathways of the Natural Resource Curse**

This section re-examines the relationship between fuel exports and stability on several

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<sup>6</sup>It should be noted that the causal mechanism as stated in this sentence is only a slight paraphrase of Ross (2006, p. 280).

fronts: overall regime stability, authoritarian stability, democratic stability, and civil conflict. To start, some discussion is needed on the method of evaluation.

### *Variables*

The dependent variables are drawn from three datasets. First, regime stability variables are drawn from the Polity IV (Marshall and Jaggers, 2002) and the ACLP dataset (Alvarez et. al., 1996; Alvarez et. al., 1999; Przeworski et. al., 2000). Polity, as noted above, looks at institutional variables to assign democracy and autocracy scores ranging from 10 to -10. Here a three point or greater change in the Polity score is considered a substantial institutional change, and is coded as a regime change, as is a transition period defined by a lack of stable political institutions (see Marshall and Jaggers, 2002, p. 16). Based on this, Polity provides the variables *Durable*, which gives the number of years since the last regime change, and *Transflag*, which denotes with a dummy variable the first year of a new regime.<sup>7</sup>

The ACLP dataset, on the other hand, codes regimes as a dummy variable of either being authoritarian or democratic. This coding is based on whether there is competition and the potential of losing in elections. The time to changes from democracy to authoritarianism, or vice-versa, is measured in *Ager*. The base year is generally the same as in the Polity dataset, with some differences due to the definition of regime transition and idiosyncratic differences in start date (see Appendix I). Changes in the regimes are noted by *Ttr* in the dataset.<sup>8</sup>

Each of these variables captures a slightly different aspect of regime stability. The Polity measure looks at institutional stability, not just transitions between democracy and non-democracy. It should give the reader an idea of general stability of institutions within a country,

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<sup>7</sup> For the purposes of this study, *Transflag* is set at t-1 to denote the end year of a regime. Year zero in this data is set at 1800, the time of the last transition before 1965, or the earliest year the country enters the dataset. Data from periods marked as transitional according to the Polity authority codes are not included in the models.

<sup>8</sup> Again, this was set to t-1 to denote year of change, as opposed to year of establishment.

not just of the persistence, or lack thereof, of competitive elections. Its weakness, however, is that it does not draw a clear line between democracy and non-democracy, which complicates conclusions about the overall effect of the independent variables on competition, and makes the drawing of thresholds in some of the models difficult.

The ACLP measure looks specifically at democratic-authoritarian transitions. Therefore, it provides a more direct measure of the stability of authoritarian or democratic forms of rule in these countries and clear transition points for some of the duration models where this is needed. On the other hand, by only focusing on democracy and authoritarianism, it often misses significant regime changes that are authoritarian to authoritarian, such as the 1979 revolution in Iran (Przeworski and Limingi, 1997, p. 160, fn. 12). Most major shifts in governance are from one type of authoritarian regime to another (Linz, 2000; Kennedy, 2007). Thus, this data may overestimate the level of stability in authoritarian regimes, especially in developing countries.

Civil conflict is measured in a similar way to Smith (2004). It relies on the ordinal data outlined above in the discussion of Table 1. One important change is made for this study. In addition to measuring the variable ordinally, this study also looks at different binary operationalizations of the variable. This includes a measure which assigns a 1 for any type of registered civil conflict in the dataset, a measure which only codes for “moderate” and “war” conflicts, and a measure which only codes for “war” events. One of the primary differences between Smith's (2004) findings and those of previous scholars (Coller and Hoeffler, 1998; Bannon and Collier, 2003) is their use of different datasets and operationalizations. The CoW dataset, used by previous scholars, only codes events that are equivalent to “war” in this data (Sarkees, 2000).<sup>9</sup> Thus, it is important to take into account how different operational definitions

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<sup>9</sup>The coding is a little more complicated in this regard. While the original definition set the definitional threshold on civil war at 1,000 annual deaths, this criteria has been relaxed recently. The most recent version of CoW does not specifically articulate this threshold, but it still causes some complication in coding. A detailed discussion of

might influence the results. For example, if fuel resources not only affect the probability of civil war, but also the length and intensity (see e.g. Bannon and Collier, 2003; Ross, 2003), then the relationship between fuel exports and all types of civil conflicts may be weak, at the same time as the relationship between fuel exports and major civil conflicts is strong.<sup>10</sup>

The main independent variables of interest are fuel export dependence and per-capita fuel export revenue. Dependence on fuel exports (*Fuel Dependence*) is calculated using the percentage of merchandise exports made up of the exports of petroleum, natural gas and coal (World Bank, 2003).<sup>11</sup> Fuel export revenue per-capita (*Fuel Income*) is approximated by multiplying *Fuel Dependence* against the total value of merchandise exports and dividing by the population (World Bank, 2003).<sup>12</sup> Both of these variables are averaged over the time period under study. This is done for several reasons. First, the primary implications of these variables are between countries, as opposed to within country over time. Theory development has been based analysis on actors having complete information and maximizing their average utility over their lifetime, making within-country fluctuations less relevant for hypothesis testing.<sup>13</sup> Second,

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this can be found in Sambanis (2004).

<sup>10</sup>This argument could actually be taken further. While Smith (2004) suggests that it is advantageous that his models can take into account both probability and intensity of civil conflicts, it could just as easily be argued that these are two different phenomena. The large number of cases that have no civil war in any particular country year would suggest that the proper way to model both phenomena would be to use tobit or a sample selection model. Placing both in the same model is likely to be misleading.

<sup>11</sup>This is slightly different from the measure used by Smith (2004). He uses the percent of GDP made up of fuel exports. This variable was also calculated, and the results were generally consistent with what is presented here, and the correlation between the two variables is .813. The preference for fuel exports as a percent of merchandise exports was because of three major fuel exporters, Libya, Iraq and Qatar, which were left out of the data due to incomplete GDP information. Since all three of these were very stable during the time period studied, this change should actually be in favor of Smith's findings.

<sup>12</sup>The trend recently (see Ross, 2006; Dunning, forthcoming) has been to use the World Bank's environmental accounting data, which estimates the value of resource rents based on production, average global prices, and approximate cost of production (Hamilton and Clemens, 1999). There is minimal difference between measures - the correlation between the country means of the two variables is .957. The WDI data is preferred because of its longer time coverage and this author's discomfort with assuming zero production for countries not covered in the dataset. The empirical results are invariant, and interested readers can find corresponding analysis with this data in the online appendix (author's website).

<sup>13</sup>A more formal treatment of this theory can be found on the author's website in the posted dissertation chapter, <http://polisci.osu.edu/grads/kennedy>. The use of country averages is consistent with the practice in the economic literature on oil development and growth (see Sachs and Warner, 1995).

both variables are complex movers, in that they are indexed with variables which are, at least in part, dependent on the original variable. For example, an increase in fuel export dependence can be due to decreased value of fuel export or an economic downturn (reduction in merchandise exports), with very different implications for stability. Third, there is no theory for timing of onset for the effect of these variables, nor for the dissipation of their impact.<sup>14</sup>

Several control variables are utilized to test the robustness of the findings. The log of per-capita GDP is used to account for the effect of the level of economic development on government stability. While the primary effect during this time period is likely to be in stabilizing democracies (Przeworski and Limongi, 1997), there is also some level of destabilizing for authoritarian regimes (see e.g. Boix and Stokes, 2003).

Economic growth is measured as the percent growth in GDP year on year (World Bank, 2003). Economic growth is the standard operationalization of economic performance, and a proxy measure of government performance (see e.g. Bueno de Mesquita et. al, 2003). Higher growth should make political regimes more stable.

Percentage of the population that is urban (*UrbPop*) is often seen as a destabilizing factor for regimes. Urban populations tend to demand greater resources and have an easier time overcoming the collective action costs of mobilizing. Ethno-linguistic fragmentation (*ELF*), measured as the probability that two randomly chosen individuals in a country would not speak the same language (Roeder, 2001), is used to control for ethnic tensions that might endanger regime stability and make civil conflict more likely (see Horowitz, 1985; Roeder, 1999).<sup>15</sup>

Finally, the end of the Cold War in 1991 had repercussions for the stability of

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<sup>14</sup> It should be noted that the impact of these variables are generally consistent when not averaged, although the effects are somewhat dissipated. The primary variable affected is fuel export dependence in models where it is run by itself and in the prediction of civil war.

<sup>15</sup> As with any study which uses cross-sectional-time-series data of economic and social indicators, some countries will be left out of particular models because of missing data. The N is noted for each model in the tables.

authoritarian regimes, not just in the former Soviet Union, but also for all of the outside regimes that depended on Soviet funding or on the Communist model for legitimacy (see Huntington, 1991; Fukuyama, 1989). For democratic regimes on the other hand, this period is expected to be a more stable one, both because of ideological reinforcement (Fukuyama, 1989) and mutual democratic support (Kadera et. al., 2003). The end of the Cold War is also noted for marking the beginning of a period of increased ethnic warfare and civil war in some countries, as the traditional centers of power collapsed and were re-constituted (Horowitz, 1985; Huntington, 1996; Roeder, 1999). Thus, this dummy variable is included in all models to indicate whether the country-year is after the end of the Cold War (*Post CW*).

### *Methodology*

This study uses Cox proportional hazard models for evaluating how fuel export dependence affects stability. This setup uses time as the dependent variable and reports hazard ratios for each independent variable (see Box-Steffensmeier and Jones, 1997; 2004). Hazard ratios have the advantage of easy interpretation. Values above 1 indicate the percent more likely a political regime is to fail based on a one point increase in the independent variable. For example, a value of 1.234, indicates that a one point increase in the independent variable results in a 23.4 percent increase in the probability of failure in the next year of observation. Similarly, scores below 1 suggest a lower chance of failure. So a score of .766 would suggest that a one point increase in the independent variable makes a regime 24.4 percent less likely of collapsing. All models use robust clustered standard errors to account for non-independent errors due to regimes in the same country.

Cox models are the workhorse for the social sciences when analyzing duration (see e.g. Bueno de Mesquita et. al., 1999; Chiozza and Geomans, 2004; Colaresi, 2004). As with most

event history methods, these models do a much better job dealing with the time-dependence (the relationship between age and stability) and censoring problems (observations that enter or leave outside of the dataset's observation period) that plague non-event-history methods. While some regimes that collapsed prior to 1965 will be censored, as well as those that collapse after 2001, using time as a variable solves the issue for regimes that were established prior to the start of the dataset.<sup>16</sup> Compared with other event history models, the Cox framework is preferable because the underlying hazard of regime failure is not clearly defined in the literature. Therefore, using a parametric model, which imposes a structure on the data, is uncalled for and might produce model dependent and misleading results (see Box-Steffensmeier and Jones, 1997; Jones and Branton, unpublished). Because the baseline hazard is estimated from the data, Cox models produce robust estimates, regardless of the underlying pattern of time dependence.

Cox models assume that the relationship between the covariates and the duration of a regime is constant over time, what is called the proportional hazards assumption. To avoid misleading inference, I test for disproportionality utilizing a global test on the Schoenfeld residuals. Harrell's rho is utilized to determine if individual covariates have a disproportional influence over time. If they are found to have such an effect ( $p < .05$ ), their interaction with the natural log of time is included in the model (Box-Steffensmeier and Zorn, 2001; Box-Steffensmeier, Reitter and Zorn, 2003).

Panel data are used to measure the probability of civil war in any particular country-year, both due to the lack of time-based data (i.e. time since last civil war) and because of the lack of theoretical backing for an underlying duration dependency in civil conflict. Random effects estimation was chosen for several reasons. First, it allows the inclusion of variables that do not

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<sup>16</sup>Consistent with Smith (2004), I limit my dataset to just developing countries. I have used both setups in previous versions of this paper and found minimal differences between models, other than slight decrease in standard errors, and a slight increase in the stabilizing effects of fuel income on democracies, in models which included developed states.

vary within countries over time. Second, using the weighted average of the within- and between-estimator allows for more specific modeling of both inter- and intra-country effects.<sup>17</sup> Finally, as long as it does not result in biased coefficients, due to misspecification of the model, the random effects estimator is to be preferred because of its increased efficiency. Since the main variables of interest are explicitly modeled for between effects (see Green, 1997, p.619-620), a fixed effects model would be inappropriate.<sup>18</sup> With the ordinal variable version of the civil war variable, a normal random-effects regression was used, along with panel-corrected standard errors (see Beck and Katz, 1995). With the binary variables, a logistic random-effects regression model was utilized (see STATA, 2005).

### *The Effect of Fuel Exports on Regime Stability*

Table 2 gives the results of the duration analysis of all regime types. The results of Model 1 give some very weak support to Smith's (2004) contention that fuel exporters are more stable. While neither fuel dependence nor its interaction with time are statistically significant ( $p = .404$  and  $p = .448$ ), the hazard ratio indicates that transitions, as measured by the ACLP dataset, are somewhat less likely as fuel exports increase as a percent of total exports for the first five years and are increasingly destabilizing thereafter. Fuel dependence is similarly not significant in Model 2 ( $p = .460$ ) and the hazard ratio suggests that political regimes are .04 percent more likely to collapse for every one percent increase in dependence. While not reported here, models which do not take into account disproportionality yield much stronger support

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<sup>17</sup> As Plumper and Troeger (2007) note, the inefficiency in fixed effects can result in bias, especially where the ratio of between to within variance is low. In this case, the ratio is 6.019 for fuel export dependence, well above the ratio of about 2.8 level at which fixed effects becomes problematic (p. 136).

<sup>18</sup> While explicitly modeling the relationship as a between-effect undermines the ability of this model to claim robustness for unit heterogeneity, except as captured by the unit and time random variables, models were run to test the effect of dynamics in accordance with Wilson and Butler's (2007) recommendations. All of these models were also run using generalized estimating equation models (see Zorn, 2001), and estimated with an explicit AR(1) correction. While this resulted in some loss of information, the effects of the main variables of interest remained constant.

Smith's (2004) contention, emphasizing the importance of testing for disproportionality in event history models.

When the control for per-capita fuel export income is included the results change dramatically. Fuel export dependence and its interaction with  $\ln(t)$  are within acceptable bounds of certainty in Model 3 ( $p = .000$  and  $p = .001$ ) and fuel dependence comes close in Model 4 ( $p = .141$ ), but both models show that fuel dependence *increases* the probability of regime transition under both methods of measurement. A one percent rise in fuel dependence initially makes a political regime 10 percent more likely to collapse, according to the ACLP definition, and this decreases slowly over time. Within the Polity definition of regime change, a ten percent increase in dependence results in a 4 percent increase in the chance of a transition.

Per-capita fuel export income is statistically significant in both models. The hazard ratios suggest that a one dollar increase in per-capita income from fuel exports initially decreases the likelihood of transition in the ACLP framework by 3.5 percent ( $p = .007$ ), and this effect dissipates slowly over time ( $p = .006$ ). Similarly, a ten dollar increase in per-capita income from fuel exports results in a .5 percent decrease in the probability of a substantial institutional change ( $p = .015$ ).<sup>19</sup>

### [Table 2 About Here]

These results are generally repeated when looking separately at the survival of authoritarian and democratic regimes. Examining only at those regimes coded as authoritarian in the ACLP dataset or with scores less than or equal to 7 in the Polity dataset, the effects of fuel export dependence are still heavily influenced by per-capita fuel income.<sup>20</sup> In Table 3, the first

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<sup>19</sup> These results are not simply due to overly high collinearity. The mean VIF in these models is 2.00, with the log of per-capita GDP and percentage of population in urban centers being the two largest offenders. The respective VIF scores for fuel dependence and fuel income are 1.36 and 1.41. These are well below even the more conservative levels for collinearity concerns.

<sup>20</sup>The 7 threshold in the Polity scores has been the standard threshold in a number of studies (see e.g. Kadera et. al.,

two models appear to support Smith's (2004) contention that fuel export dependence is stabilizing for authoritarian regimes in developing states. In Models 7 and 8, where fuel income is included, the results for fuel dependence reverse. In Model 7, a one percent increase in fuel dependence is associated with a 2.5 percent increase in authoritarian instability ( $p = .072$ ), while, in Model 8, it is associated with a .4 percent increase in the instability of authoritarian institutions ( $p = .196$ ). Instead, it is per-capita fuel export income that has a consistently positive effect on the survival of authoritarian regimes, with a dollar increase making them 1.3 percent less likely to transition to competitive politics according to the ACLP data ( $p = .009$ ) and .1 percent less likely to experience an institutional transition in the Polity data ( $p = .000$ ).

**[Table 3 About Here]**

The flip-side of these results, and the test for the second causal pathway of the natural resource curse, is presented in Table 4. Only regimes coded as democracies by the ACLP dataset are included in models 9 and 11, and only those with Polity scores greater than 7 are included in models 10 and 12. In the first models, there is some suggestion in the coefficients that fuel dependency makes democracies more fragile, but these results do not reach commonly accepted levels of statistical significance ( $p > .200$ ). When fuel income is added in models 11 and 12, the relationship between fuel dependence and democratic fragility becomes much stronger. The hazard ratios suggest that a one percent increase in dependence on fuel exports initially makes a country 2.9 percent less likely to experience a transition to authoritarianism in the ACLP dataset ( $p = .124$ ), but this quickly changes over time. After about three and a third years, dependence becomes destabilizing, and this effect increases with time ( $p = .074$ ). A one percent increase in dependence is also associated with a 3.2 percent increase in the likelihood of experiencing substantial institutional alteration in the Polity data ( $p = .030$ ). Fuel income, on the other hand,

seems to have a generally stabilizing effect on democracies as well as authoritarian regimes, but the certainty of these results is not up to normally acceptable levels. The hazard ratios in Model 11 suggest that fuel income is initially destabilizing ( $p = .458$ ) but quickly become stabilizing with time ( $p = .293$ ). In Model 12, the hazard ratio for fuel income suggests that each dollar makes a democracy .3 percent less likely to experience a substantial institutional change ( $p = .140$ ).

**[Table 4 About Here]**

Comparing the results of these models suggests that fuel export income is more stabilizing for authoritarian regimes. Under the Polity definition of regime stability, fuel income is twice as stabilizing for authoritarian regimes than for all regime-types. A \$10 increase in fuel export income makes all regimes about .5 percent more stable, while that same increase makes authoritarian regimes 1 percent more stable. The effect of fuel export income on the stability of authoritarianism or all regime types, under the ACLP definition, is compared in Figure 2. The results are a little more difficult to interpret, both because of the smaller number of transitions in the ACLP dataset and because of the disproportionality of the main independent variables over time, but they generally support the same conclusion. While the stabilizing effect of fuel income on all regime types, in red, is larger at first, it quickly dissipates, and after about eleven years, fuel income is more stabilizing for authoritarian regimes, in blue.

**[Figure 2 About Here]**

Fuel dependence, on the other hand, appears to be more destabilizing for democracies. The results for the Polity measure of regime stability are unambiguous. The effect on democracies was the only one to reach commonly accepted levels of statistical significance and the hazard ratio is eight times larger. Figure 3 gives the comparisons of fuel dependence's effect on democracies, non-democracies and all regimes under the ACLP definitions. While initially

fuel dependence is more destabilizing for authoritarian regimes and for all regime-types, the destabilizing effect on democracies eventually becomes greater. After about ten years the destabilizing effect on democracies is greater than that on authoritarian regimes, and after about sixteen years it surpasses the effect for all regimes.

**[Figure 3 About Here]**

These results paint a relatively clear picture of what is happening in the data. Contrary to much of the current debate over the effects of fuel exports, these results suggest that fuel exports can be either a stabilizing or de-stabilizing force, depending on the magnitude of income derived from them and the level of dependence. High levels of per-capita income derived from fuel exports are found to generally be stabilizing, but more so for authoritarian regimes. Dependence on fuel exports, on the other hand, is found to be de-stabilizing, especially in the democratic context.

*Effect of Fuel Exports on Civil War*

In exploring the effects of fuel dependence and fuel income on the probability of civil conflict, several patterns emerge. In Model 13, the effects of fuel dependence and fuel income on the ordinal measure of civil conflict are not statistically significant ( $p = .201$  and  $p = .139$ ). They do, however, indicate a similar directional relationship to that in the previous section. Fuel dependency seems to marginally increase the probability and severity of civil conflict, while fuel income has the reverse effect.

These patterns become stronger in Model 14, which ignores the intensity of conflict to focus solely on incidence of civil conflict. In this model, a one percent increase in fuel dependence increases the probability of civil conflict by approximately 1.1 percent ( $p = .073$ ). Conversely, a ten dollar increase in per-capita fuel income is also associated with a two percent

decrease in the probability of a civil conflict ( $p = .004$ ).

Model 15, which looks only at “moderate” and “war” events, supports the contention that thresholds in measuring civil conflicts matter. Fuel dependence increases the likelihood that a country will experience a mid-range or severe civil conflict in a particular year by about 3.9 percent in this model ( $p = .009$ ). Per-capita fuel income from exports, on the other hand, decreases this probability by about 11 percent for every additional ten dollars of income ( $p = .006$ ).

Model 16, takes the threshold argument one step further. It only looks at those coded as “war” incidents, approximately equal to what is coded in the CoW dataset. Under this operationalization, the relationship between fuel dependence and civil war remain relatively stable. A one percent increase in the dependence on fuel exports increases the chance of a major civil war by about 3 percent ( $p = .017$ ), while a ten dollar increase in per-capita fuel income is associated with a 6 percent drop in the probability of a conflict ( $p = .049$ ).

### **[Table 5 About Here]**

This analysis lends even greater support to the contention that there is a difference between fuel exporting countries that are capital-surplus and those that are capital-deficient. Fuel export dependence increases the chance of civil conflict, while fuel export income decreases this probability. This effect is largest when looking at the incidence of moderate to severe conflicts. If civil instability contributes to authoritarian governance, then this is part of the explanation for why fuel dependent regimes are less likely to be democratic.

## **Conclusions**

Several conclusions can be drawn from the above results. First, there does not seem to be one causal pathway associated with the natural resource curse. Not only are the countries that

receive a large portion of their GDP from fuel resources a diverse group, but the differences appear to be systematic. If scholars are to find intermediate variables to explain the negative correlation between fuel export dependence and democratization, then these intermediate variables must explain how the same resources can result in very different causal pathways. This is a major challenge to many of the current explanations for the natural resource curse, in which there is an explicit or implicit assumption that fuel exports are either a stabilizing force for authoritarianism or a destabilizing force which hurts the chances of democracy. In large part, this stems from generalizations being extrapolated from regional or case studies. The result is that these causal pathways do not extend easily to a global context.

Second, this study highlights the importance of utilizing both fuel export dependence and fuel export income in large-N discussions of the link between natural resources and political regimes. Some large-N work focuses on measures of the dependence, fuel exports as a percentage of either GDP or merchandise exports, often conflating dependence and income in their theoretical arguments (e.g. Ross, 2001; Smith, 2004; Di John, 2007). While others criticize indexing fuel export income, even arguing that these variables are theoretically and empirically uninformative (Ross, 2006; Dunning, forthcoming). I argue that both variables are informative and theoretically important, but that authors need to be clear about the difference. This argument is most closely associated with Karl's (1997) distinction between capital-surplus and capital-deficient fuel exporters. But while Karl shies away from theorizing about capital-surplus states, this study suggests that such theorizing is an integral part in understanding the cross-country patterns that emerge among major fuel exporters.

Finally, the results highlight the importance of two exogenous factors for political behavior in fuel exporting states. Some of the most recent studies focused on policy decisions by political actors in relation to fuel development (Dunning, 2005; Luong and Weinthal, 2006).

While these studies highlight important characteristics of political behavior, they are not independent from the resources and demands that accompany fuel resource development. Decisions on state ownership, for example, are at least partially based on the resources available to and the current demands placed on and resources available to political leaders (Luong and Weinthal, 2001). A full understanding of the problems posed by natural resource development will require explanations that work on both levels.

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## Tables

**Table 1. Outcomes in Fuel Dependent Regimes, 1965-2001**

<i>Country</i>	<i>Average Dependence on Fuel</i>	<i>Average Income per-Capita from Fuel</i>	<i>Polity Outcomes</i>	<i>Civil Conflicts</i>
Angola	40.98%	\$200.61	1975-1990 authoritarian 1991 transition 1992 interregnum 1993-1996 transition 1997-2003 soft-authoritarian	1990-1994 war 1995 intermediate 1996-1997 minor 1998 war
Nigeria	39.65%	\$106.61	1960-1965 democratic 1966-1977 authoritarian 1978 transition 1979-1983 democratic 1984-1997 authoritarian 1998 transition 1999-2003 semi-democratic	1966 minor 1967-1970 war
Saudi Arabia	34.85%	\$3,065.24	1926-2003 authoritarian	1979 minor
Azerbaijan	34.68%	\$147.25	1991 soft-authoritarian 1992 semi-democratic 1993-1994 soft-authoritarian 1995-2003 authoritarian	1993 minor 1994 war 1995- minor
Oman	31.51%	\$1,561.06	1800-2003 authoritarian	
Kuwait	29.97%	\$4,709.60	1963-1989 authoritarian 1990 foreign takeover 1991-2003 authoritarian	
Trinidad	29.31%	\$1,212.25	1962-2003 democratic	1990 minor
Gabon	28.46%	\$1,388.57	1960-1989 authoritarian 1990 transition 1991-2003 soft-authoritarian	
Congo Brazzaville	27.01%	\$241.18	1960-1962 semi-democratic 1963-1990 authoritarian 1991 transition 1992-1996 semi-democratic 1997-2003 authoritarian	1993-1994 minor
Yemen	26.53%	\$73.94	1990-1992 transition 1993-2003 soft-authoritarian	1994 war
Algeria	21.50%	\$346.08	1962-1988 authoritarian 1989-1991 soft-authoritarian 1992-1994 authoritarian 1995-2003 soft-authoritarian	1991-1992 – minor; 1993-2001 – war

<i>Country</i>	<i>Average Dependence on Fuel</i>	<i>Average Income per-Capita from Fuel</i>	<i>Polity Outcomes</i>	<i>Civil Conflicts</i>
Iran	18.62%	\$230.39	1955-1978 authoritarian 1979-1981 transition 1982-1996 authoritarian 1997-2003 semi-democratic	1966-1968 intermediate 1979-1982 war 1983-1988 intermediate 1990-1993 intermediate 1996-1997 intermediate 1999-2001 intermediate
UAE	17.73%	\$5,895.76	1971-2003 authoritarian	
Venezuela	16.67%	\$619.74	1958-2003 democratic	1992 minor
Turkmenistan	15.81%	\$190.95	1991-2003 authoritarian	
Syria	13.72%	\$97.99	1963-2003 authoritarian	1966 minor 1979-1981 minor 1982 war
Russia	12.08%	\$283.30	1992 democratic 1993-1999 semi-democratic 2000-2003 democratic	1993-1994 minor 1995-1996 war 1999-2001 war
Kazakhstan	11.81%	\$159.55	1991-2001 soft-authoritarian 2002-2003 authoritarian	
Indonesia	8.23%	\$51.30	1959-1998 authoritarian 1999-2003 democratic	1965 minor 1967-1969 minor 1975-1978 war 1979-1989 intermediate 1990-1991 minor 1992 intermediate 1997-1998 intermediate 1999-2001 minor
Norway	7.59%	\$2366.34	1945-2003 democratic	
Ecuador	6.94%	\$102.70	1961-1967 soft-authoritarian 1968-1969 democratic 1970-1971 soft-authoritarian 1972-1978 authoritarian 1979-2003 democratic	
Malaysia	5.54%	\$171.37	1957-1968 democratic 1969-2003 semi-democratic	1965-1966 minor 1974-1975 minor 1981 minor

\*Some countries are left off the list because their fuel income is derived primarily through

refining and shipping, as determined by comparing the World Bank (2003) and BP (2005) data. These are Bahrain, Lithuania, Bhutan, Lithuania, Singapore, and Belarus. Leaving these countries out of the statistical analysis does not significantly change the results. Libya, Iraq, and Qatar are not included in this table because of lack of data on their GDP. They are included in later models.

**Table 2: Effect of Fuel Dependency on Stability of All Regime Types in Developing Countries**

	Model 1 ACLP	Model 2 Polity	Model 3 ACLP	Model 4 Polity
Fuel Dependence	.995 (.404)	1.0004 (.460)	1.100 (.000)	1.004 (.141)
Fuel Dependence * ln(t)	1.001 (.448)	---	.978 (.001)	---
Fuel Income	---	---	.965 (.007)	.9995 (.015)
Fuel Income * ln(t)	---	---	1.009 (.006)	---
Ln(Per-capita GDP)	25.366 (.000)	122.968 (.000)	119.522 (.000)	167.100 (.000)
Ln(Per-capita GDP) * Ln(t)	.281 (.000)	.066 (.000)	.237 (.000)	.064 (.000)
Growth in GDP	.972 (.005)	.965 (.000)	.964 (.003)	.966 (.005)
Urb Pop	1.002 (.409)	.915 (.000)	.993 (.252)	.914 (.000)
Urb Pop * ln(t)	---	1.047 (.000)	---	1.046 (.000)
ELF	1.001 (.420)	1.001 (.382)	1.002 (.419)	1.002 (.326)
Post CW	.850 (.299)	.665 (.183)	.932 (.410)	.592 (.127)
Post CW * ln(t)	---	1.236 (.116)	---	1.282 (.083)
N	3182	2933	3177	2928
Failures	87	170	87	170
Groups	110	113	109	112
Log-likelihood	-501.353	-908.530	-482.483	-905.668
Wald-Test	111.98 (.000)	288.43 (.000)	109.96 (.000)	276.96 (.000)

Note: Entries are hazard ratios with p-values, calculated from robust clustered standard errors, in parentheses. All tests are 1-tailed, except those for the Wald-Test.

**Table 3: Effect of Fuel Dependence on the Stability of Authoritarian Regimes in Developing Countries**

	Model 5 ACLP	Model 6 Polity	Model 7 ACLP	Model 8 Polity
Fuel Dependence	.928 (.023)	.995 (.185)	1.025 (.072)	1.004 (.196)
Fuel Dependence * ln(t)	1.015 (.030)	---	---	---
Fuel Income	---	---	.987 (.009)	.999 (.000)
Ln(Per-capita GDP)	513.066 (.000)	518.401 (.000)	3206.42 (.000)	1553.600 (.000)
Ln(Per-capita GDP) * ln(t)	.184 (.000)	.056 (.000)	.159 (.000)	.047 (.000)
Growth in GDP	.977 (.031)	.967 (.027)	.972 (.026)	.967 (.010)
Urb Pop	.993 (.284)	.890 (.000)	.987 (.140)	.884 (.000)
Urb Pop * ln(t)	---	1.053 (.000)	---	1.054 (.000)
ELF	.999 (.448)	1.009 (.216)	1.003 (.344)	1.015 (.132)
ELF * ln(t)	---	.998 (.350)	---	.997 (.268)
Post CW	3.261 (.000)	1.837 (.092)	3.645 (.001)	1.440 (.209)
Post CW * ln(t)	---	.939 (.360)	---	1.021 (.452)
N	2170	2187	2165	2182
Failures	57	151	57	151
Groups	92	99	91	98
Log-likelihood	-287.941	-749.018	-270.928	-738.672
Wald-Test	58.64 (.000)	302.68 (.000)	77.84 (.000)	241.00 (.000)

Note: Entries are hazard ratios with p-values, calculated from robust clustered standard errors, in parentheses. All tests are 1-tailed, except those for the Wald-Test.

**Table 4: Effect of Fuel Dependency on Stability of Democratic Regimes in Developing Countries**

	Model 9 ACLP	Model 10 Polity	Model 11 ACLP	Model 12 Polity
Fuel Dependence	1.002 (.386)	.986 (.235)	.971 (.124)	1.032 (.030)
Fuel Dependence * ln(t)		1.007 (.263)	1.024 (.074)	---
Fuel Income	---	---	1.001 (.458)	.997 (.140)
Fuel Income * ln(t)	---	---	.998 (.293)	---
Ln(Per-capita GDP)	.075 (.002)	.035 (.008)	.080 (.004)	.039 (.007)
Growth in GDP	.934 (.016)	.935 (.017)	.934 (.013)	.923 (.008)
Urb Pop	1.016 (.214)	1.015 (.337)	1.015 (.244)	1.003 (.470)
ELF	1.082 (.002)	1.052 (.083)	1.089 (.003)	.963 (.017)
ELF * ln(t)	.955 (.000)	.961 (.001)	.951 (.000)	---
Post CW	.132 (.000)	.446 (.175)	.123 (.000)	.911 (.450)
N	1012	746	1012	746
Failures	30	19	30	19
Groups	67	58	67	58
Log-likelihood	-132.068	-83.638	-130.308	-98.194
Wald-Test	105.25 (.000)	74.30 (.000)	115.59 (.000)	45.15 (.000)

Note: Entries are hazard ratios with p-values, calculated from robust clustered standard errors, in parentheses. All tests are 1-tailed except those for the Wald-Test

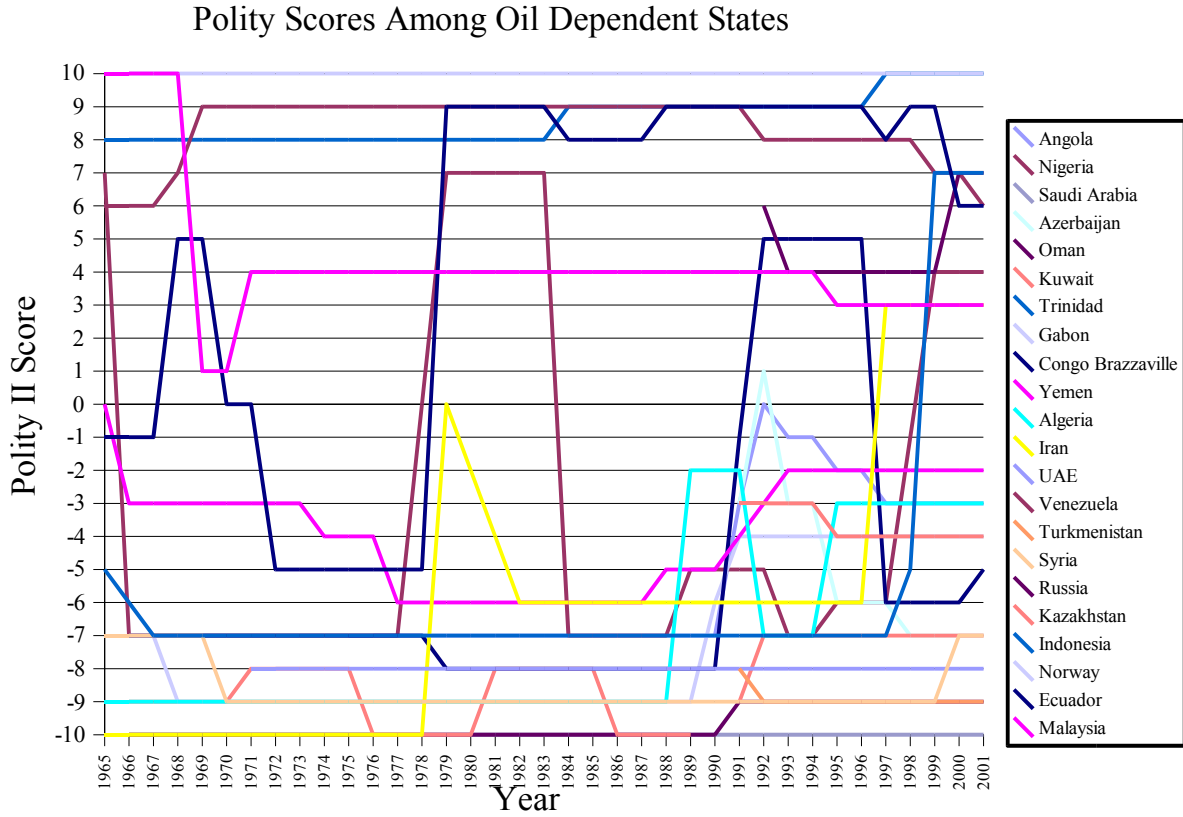
**Table 5: Effect of Fuel Dependence on the Probability of Civil War in Developing Countries from 1965-2001**

	Model 13: Civil War (ordinal)	Model 14: Civil War (all)	Model 15: Civil War (moderate/war)	Model 16: Civil War (war)
Fuel Dependence	.002 (.201)	.011 (.073)	.038 (.009)	.030 (.017)
Fuel Income	-.00006 (.139)	-.002 (.004)	-.011 (.006)	-.006 (.049)
Ln(Per-capita GDP)	-.144 (.223)	-.365 (.118)	.426 (.076)	-.178 (.296)
Growth in GDP	-.011 (.000)	-.054 (.000)	-.067 (.000)	-.074 (.000)
ELF	.003 (.135)	.014 (.004)	.014 (.004)	.014 (.007)
Post CW	.122 (.055)	.648 (.000)	.652 (.000)	.202 (.123)
R2 Within	.025	---	---	---
R2 Between	.034	---	---	---
R2 Overall	.023	---	---	---
N	3339	3339	3339	3339
Groups	114	114	114	114
Log-likelihood	---	-988.196	-797.295	-529.347
Wald-Test	---	73.86 (.000)	66.20 (.000)	46.43 (.000)

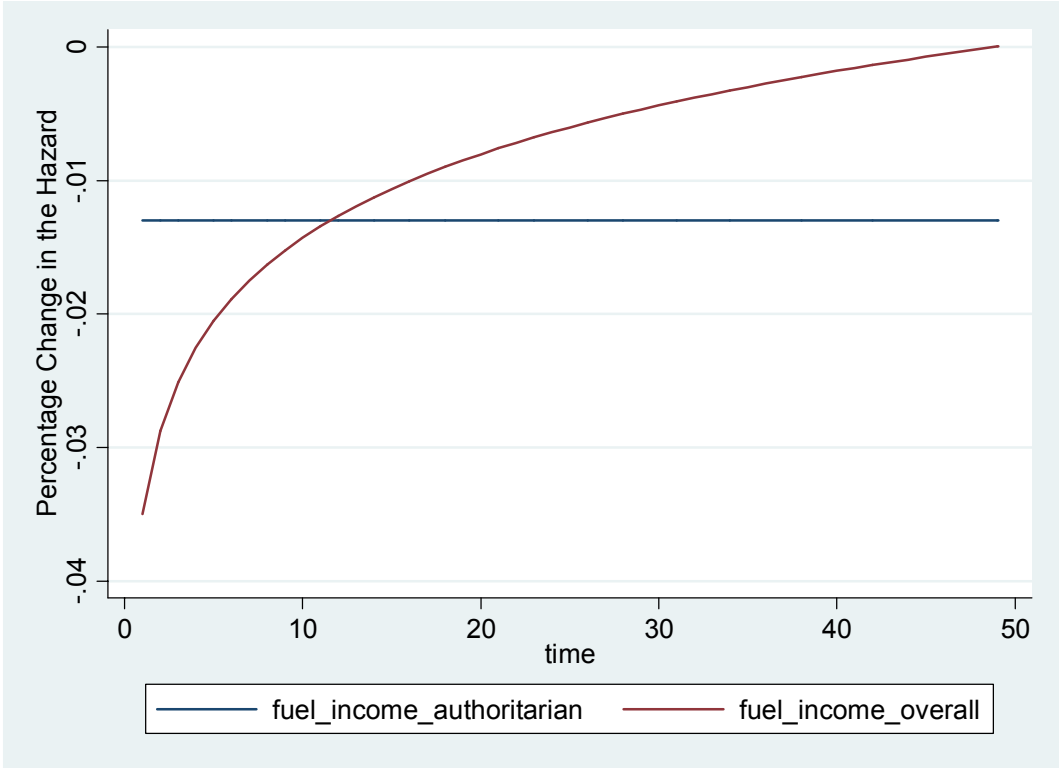
\*Values are the weighted average of the within and between coefficients with p-values, calculated from robust clustered standard errors, in parentheses. All test are 1-tailed except those for the Wald-Test.

## Figures

**Figure 1. The Variation in Outcomes Among Fuel Export Dependent States**

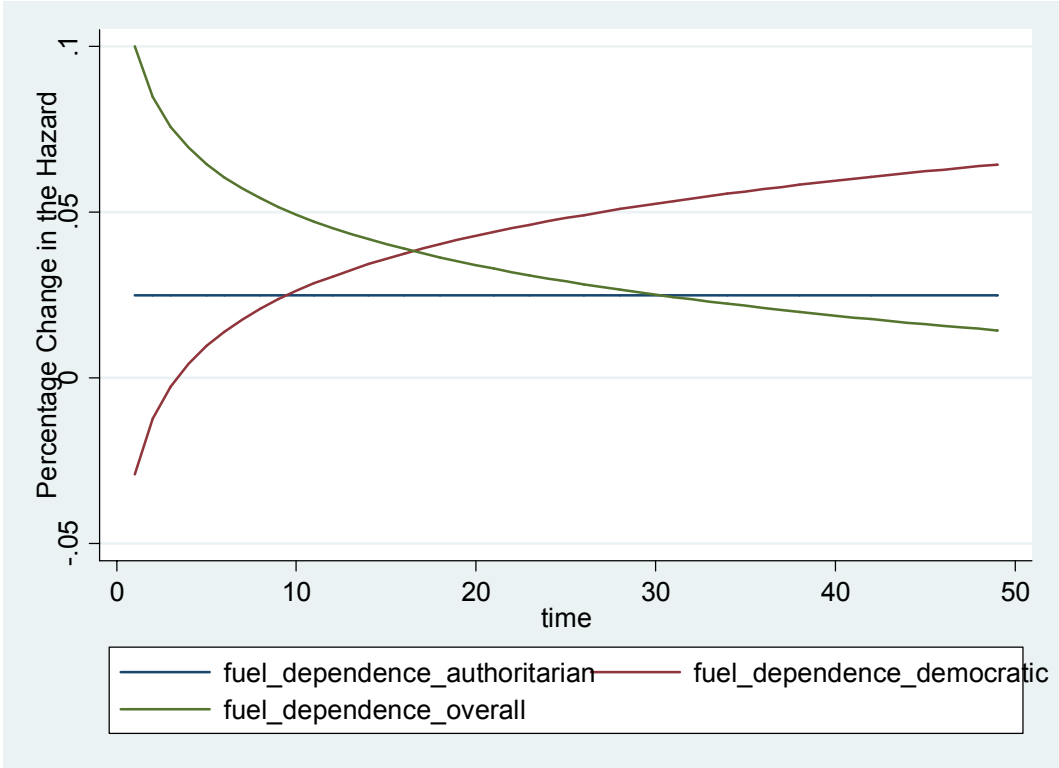


**Figure 2: Percentage Change in Estimated Hazard for Democracies and Non-Democracies in Developing Countries, based on Fuel Income (ACLP)**



Note: The figure plots the change in the estimated hazard for the fuel income variable.

**Figure 3: Percentage Change in Estimated Hazard for Democracies Non-Democracies, and All Regimes in Developing Countries, based on Fuel Dependence (ACLPL)**



Note: The figure plots the change in the estimated hazard for the fuel dependence variable.

## Appendix I: Countries and Regime Age at Entry (Polity/ACLP)

Afghanistan (1/2)	Germany (0/1)	Norway (19/81)
Albania (18/.)	Germany, East (16/17)	Oman (8/8)
Algeria (3/4)	Germany, West (16/17)	Pakistan (3/10)
Angola (0/1)	Ghana (5/9)	Panama (10/14)
Argentina (8/3)	Greece (16/17)	Papua New Guinea (0/1)
Armenia (0/.)	Guatemala (11/3)	Paraguay (11/96)
Australia (64/65)	Guinea (7/8)	Peru (32/3)
Austria (19/21)	Guinea-Bissau (0/1)	Philippines (15/1)
Azerbaijan (0/.)	Guyana (0/1)	Poland (18/40)
Bahrain (0/1)	Haiti (7/96)	Portugal (35/41)
Bangladesh (0/1)	Honduras (29/3)	Qatar (0/1)
Belarus (0/1)	Hungary (7/48)	Romania (16/75)
Belgium (20/47)	India (15/19)	Russia (0/1)
Benin (0/6)	Indonesia (6/9)	Rwanda (4/4)
Bhutan (58/58)	Ireland (44/45)	Saudi Arabia (39/39)
Bolivia (9/96)	Italy (17/20)	Senegal (2/6)
Botswana (0/1)	Iran (10/96)	Serbia and Montenegro (0/1)
Brazil (0/2)	Iraq (41/34)	Sierra Leone (4/5)
Bulgaria (18/32)	Israel (17/18)	Singapore (0/1)
Burkina Faso (5/6)	Ivory Coast (5/6)	Slovakia (0/1)
Burundi (0/4)	Jamaica (6/4)	Slovenia (0/1)
Cambodia (9/9)	Japan (13/14)	Somalia (5/6)
Cameroon (5/6)	Jordan (8/20)	South Africa (55/32)
Canada (77/46)	Kazakhstan (0/1)	Spain (26/29)
Cent. African Rep. (5/6)	Kenya (2/3)	Sri Lanka (17/18)
Chad (5/6)	Korea, North (17/17)	Sudan (0/1)
Chile (10/34)	Korea, South (2/5)	Swaziland (0/1)
China (16/96)	Kuwait (2/2)	Sweden (48/48)
Colombia (8/8)	Kyrgyzstan (0/1)	Switzerland (117/96)
Comoros (0/1)	Laos (0/7)	Syria (2/20)
Congo Brazzaville (2/3)	Latvia (0/1)	Taiwan (16/17)
Congo Kinshasa (0/6)	Lebanon (22/22)	Tajikistan (0/1)
Costa Rica (45/17)	Lesotho (0/1)	Tanzania (4/5)
Croatia (0/1)	Liberia (81/96)	Thailand (7/96)
Cuba (4/4)	Libya (14/14)	Togo (5/6)
Cyprus (0/1)	Lithuania (0/1)	Trinidad (3/4)
Czechoslovakia (17/18)	Madagascar (5/6)	Tunisia (6/10)
Czech Republic (0/1)	Malawi (1/2)	Turkey (4/5)
Denmark (19/65)	Malaysia (8/9)	Turkmenistan (0/1)
Djibouti (0/1)	Mali (5/6)	UAE (0/1)
Dominican Republic (0/96)	Mauritania (3/6)	Uganda (3/4)
Ecuador (4/3)	Mauritius (0/1)	Ukraine (0/1)
Egypt (13/44)	Mexico (35/96)	United Kingdom (85/55)
El Salvador (1/96)	Moldova (0/1)	United States (156/96)
Equatorial Guinea (0/1)	Mongolia (41/45)	Uruguay (13/24)
Eritrea (0/1)	Morocco (0/10)	USSR (43/96)
Estonia (0/1)	Mozambique (0/1)	Uzbekistan (0/1)
Ethiopia (19/96)	Myanmar (2/4)	Venezuela (7/7)
Fiji (0/1)	Namibia (0/1)	Vietnam (10/10)
Finland (21/22)	Nepal (5/96)	Vietnam, North (11/11)
France (7/91)	Netherlands (19/96)	Vietnam, South (37/37)
FYR Macedonia (0/1)	New Zealand (88/59)	Yemen (3/1)
Gabon (5/6)	Nicaragua (29/96)	Yugoslavia (11/37)
Gambia (0/1)	Niger (5/6)	Zambia (1/2)
Georgia (0/1)	Nigeria (0/6)	Zimbabwe (0/1)

\*There are three reasons for differences in start years between data sets: (1) since they measure transitions differently, there will be some difference in when they code the last transition; (2) the two datasets sometimes use different year zeros for particular countries; and (3) ACLP starts count at 1, while Polity starts at 0.