

Of Rulers, Rebels and Revenue: State Capacity, Civil War Onset and Primary Commodities

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Cameron G. Thies  
Associate Professor  
University of Missouri  
Department of Political Science  
310 Professional Building  
Columbia, MO 65211-6030

Telephone: 573-882-0056  
Fax: 573-884-5131  
Email: [thiesc@missouri.edu](mailto:thiesc@missouri.edu)

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## **Abstract**

This paper investigates the relationship between civil war onset and state capacity, including the role that primary commodities play in that relationship. It accomplishes this task by moving the theoretical focus of the civil war literature away from an almost exclusive concern with rebels, to a consideration of both rebels and rulers as rational predators attempting to maximize their revenue. In order to deal with the endogeneity posed by including fiscal measures of state capacity in single equation models of civil war onset, the paper employs a simultaneous equations framework. This framework allows us to capture the effects of civil war onset on state capacity and vice versa, as well as the effects of primary commodities on both endogenous covariates. The main findings from this analysis include: state capacity does not affect civil war onset, but civil war onset reduces state capacity; state capacity reduces civil war incidence, just as civil war incidence reduces state capacity; and that primary products only directly affect state capacity, but they do not directly affect civil war onset or incidence as found in previous contributions to the literature.

## Introduction

This paper reframes a question that has dominated the civil war literature in recent times. Instead of asking what role primary commodities play in the onset of civil war, I ask how primary commodities affect the relationship between civil war and state capacity. Although a variety of mechanisms have been offered to link rebel incentives and primary commodities to the onset of civil war, most of these mechanisms ignore the role of the state. Instead, motivated by greed or grievance, rebels see the state as a prize to capture outright or an easy target to bleed through secession. Rebel predation seems to occur in these models with little preemption or reaction from the state. Yet, rulers have often themselves been modeled as revenue-maximizing predators in the literature developed to explain European state building, as well as a few contributions to the civil war literature. I seek to unite these literatures and model the interaction of rebels and rulers as if both were rational predators seeking to enhance their revenues. Primary commodities are a natural source of revenue for both the state and rebels, thus they are a useful place to begin the investigation of the relationship between state capacity and civil war onset.

The relationship between civil war onset and state capacity is plagued by problems of endogeneity. Theoretically, we know that the process of building modern states involves state making activities to eliminate or neutralize internal rivals to the state. More capable states are likely to be better suited to the tasks of state making. Less capable states may be unable to check the activities of internal rivals prior to the onset of violent conflict. Empirically, we can test for endogeneity in statistical analyses of civil war onset that include some measure of state capacity and vice versa. Most of the civil war literature has ignored endogeneity issues. Yet, if we are to seriously investigate the proposition that both states and rebels are simultaneously preying upon each other and society, we must adapt our statistical techniques to adequately represent that

relationship. The paper conducts an analysis using a two-stage estimation technique that allows us to model simultaneity when one of the endogenous variables is continuous and the other is dichotomous. The paper uses several continuous fiscally-based measures of state capacity and the typical dichotomous measures of civil war onset to develop the system of equations.

The findings are startling. First, state capacity does not significantly affect the onset of civil war, while the onset of civil war significantly reduces state capacity. Second, state capacity significantly reduces civil war incidence, while civil war incidence also reduces state capacity. Finally, with the exception of the oil exporter dummy variable, primary commodities play almost no direct role in civil war onset or incidence. Instead, primary commodities work their direct effects on state capacity in models of civil war onset or incidence.

### **Predatory Rebels and Predatory Rulers**

A variety of mechanisms have been proposed to link the existence and/or production of natural resources to the onset of civil war. Most of these are framed in terms of incentives or opportunities provided to rebels, while only a few are developed from the perspective of their main opponents—the rulers. Ross (2004; 2006) identifies six such mechanisms from his review of select cases of civil war. First, he identifies a “looting” mechanism closely associated with the work of Collier and Hoeffler (1998; 2004). Rebels are expected to use looted natural resource wealth to cover their start-up costs (i.e., arms, soldiers) prior to launching a civil war. This can be accomplished by the sale of directly extracted resources or by extorting money from those who do the extraction. States with greater natural resource abundance should therefore have a higher risk of civil war. Second, Collier and Hoeffler also suggest a “grievance” mechanism in which the extraction of resources poses significant negative externalities on some members of the population. Land expropriations, environmental degradation, labor migration, and other

effects of extraction create grievances. Such grievances could be exploited by rebels wishing to secede from or capture the state. Third, as suggested by LeBillon (2001), Collier and Hoeffler (2004) and Ross (2006), resource wealth located in peripheral areas or in areas dominated by a single ethnic minority may provide the local population with an incentive to secede. The fourth mechanism is the only one to focus on the state: oil wealth raises the risk of civil war by weakening the state's bureaucratic and administrative capacity. Fearon and Laitin (2003) make this argument specifically for the civil war literature, building on a long history of research on the "resource curse" and "rentier states" (e.g., Chaudhry, 1997; Karl, 1997; Ross, 2001; Ross, 2006). Two additional, "unexpected" mechanisms arise from his review of pertinent cases, including that resource wealth encourages foreign intervention on behalf of rebel movements and that it also allows rebel groups to sell future exploitation rights (booty futures) to the resource wealth they plan to capture.

Humphreys (2005) expands the range of links between natural resources and civil war onset by offering six rival families of mechanisms. First, the "greedy rebels" mechanism comes in three variants: a) the aforementioned "looting" mechanism, b) the notion that resource wealth increases the value of the "prize" of capturing the state because of swollen government coffers, which he attributes to Fearon and Laitin (2003) and Ross (2006) attributes to Englebert and Ron (2004), Fearon (2005) and LeBillon (2005), and c) Ross' (2004; 2006) mechanism on the ethnogeographic concentration of resources. Second, the "greedy outsiders" mechanism, in which natural resources might prompt third parties to participate in or foster civil war. Third, the "grievance" mechanism comes in four variants: a) countries with moderate levels of natural resource dependence may experience inequality as part of the development process, b) natural resource dependent economies may be vulnerable to terms of trade shocks that

disproportionately harm certain sectors of society (also mentioned by Ross, 2006), c) natural resource extraction may lead to forced migration, and d) natural resource wealth may be perceived as unfairly distributed across the population. Fourth, the “feasibility” mechanism suggests that natural resources may finance rebellion that has started for other reasons, which he suggests includes the aforementioned booty futures. Fifth, the “weak states” mechanism with two variants: a) the societal side, which argues that when citizens are not taxed they have less power over their government and fewer channels to redress grievances, and b) the state side, which is the same as Ross’s (2004; 2006) description of the effect of resource wealth on state institutions as developed by Fearon and Laitin (2003). The final mechanism deals with “sparse networks” and the way that natural resources affect the daily economic activities of individuals and their attitudes, including “Dutch Disease” dynamics and liberal arguments about the pacifying effects of trade and exchange.

Many of these mechanisms explicitly or implicitly characterize rebels as “rational predators” or “rational entrepreneurs of violence” who extract lootable resources in their environment as a means to an end of overthrowing the government, or simply as an end in itself (e.g., Herbst, 2000b; Ron, 2005). It should also be clear that the civil war literature has largely pursued the importance of natural resources from the perspective of rebels, while ignoring the perspective of the rulers at the helm of the state (Fearon, 2005: 500-503). However, both are crucial pieces to the puzzle. Primary commodities are readily taxable *and* lootable, thus they are attractive to rulers and their rivals (Collier, 2000). In fact, rebels obtaining the resources they need to exist separately from the state and state rulers reacting to such unsanctioned extraction are about as close an analogy to early modern European state formation as we will find in contemporary times. As Le Billon (2001: 563) notes, “contemporary resource-linked conflicts

are rooted in the history of ‘resource’ extraction successively translated by mercantilism, colonial capitalism, and state kleptocracy,” which suggests this research fits comfortably within the predatory theory approach state building.

Predatory theories of state building have always considered the impact of both internal and external competitors upon the ruler’s ability to control a specific territory and population for extractive purposes. For example, according to Charles Tilly (1985: 182) rulers, or their agents, carry out four different activities in the process of building the state. First, they engage in war making, which consists of eliminating or neutralizing rivals located outside of the territory they are attempting to control. Second, they engage in state making, which consists of eliminating or pacifying potential rivals to their rule from within their territorial base. Third, they engage in protection of those parties that support their continued rule. Finally, in order to accomplish the first three activities, they must engage in the extraction of resources from the population and territory they are attempting to control. The extraction of resources led the state to strike bargains with its subject population over time that drew them into adjudication, distribution, and production activities. In the case of Europe, these bargains also led to representative institutions and the legalization of extractive and protective activities. As Tilly (1992) and Bates (2001) have observed, developing countries have achieved varied levels of success at these state building activities.

North’s (1981) model of state formation also focuses on the exchange between the ruler and the ruled. The state provides protection and justice for the ruled in exchange for revenue. In so doing, the state creates a system of property rights that helps to maximize revenue. By providing the institutionalized rules of the game for exchange (law, justice, and defense) that reduce transaction costs, the state is also able to encourage economic development. Yet, the

most efficient set of property rights to maximize societal output is never consistent with the ruler's desire to maximize his own income. North (1981) and Levi (1981; 1988) argue that whenever there are close internal or external substitutes to the ruler, the ruler has less leverage in extracting income from society. The amount of the ruler's income will vary across groups as their opportunity costs for staying with the current ruler instead of switching to a rival vary. Therefore, groups in border regions that possess desirable resources may bargain to reduce the ruler's claims on their property in the face of credible threats to exit the state for a geographically proximate external rival (Levi, 1981: 449). Other internal competitors to the ruler may drive down their share of the overall tax burden depending upon their relative violence potential regardless of their proximity to an external rival. In a system of states, each state must constantly revise its system of property rights to balance economic growth and revenue extraction in the face of more efficient competitors, or risk extinction.

Most of the empirical work derived from predatory theory has focused on the relationship between war and state building (e.g., Organski and Kugler 1980; Cohen et al. 1981; Rasler and Thompson 1985; Rasler and Thompson; 1989; Kirby and Ward, 1991; Jagers 1992; Desch 1996; Stubbs 1999). In this literature, the development of a state is gauged in terms of its political capacity, rather than other connotations of the term such as political representation, participation, or institutionalization, which are usually viewed as unintended consequences of the pursuit of revenue. As Organski and Kugler, 1980: 72) remark, "a highly capable political system need not be free, democratic, stable, orderly, representative, participatory, or endowed with any of the other desiderata alluded to by laymen and experts as bases for evaluating the political life of a nation." On the conceptual level, political capacity refers to the ability of a central government to extract resources from society in order to pursue its policy preferences

(Organski and Kugler, 1980; Arbetman and Kugler, 1997). The extraction of resources through taxation is one of the most directly observable ways in which central governments affect individuals and organized groups in society. Higher levels of extraction through taxation reflect increased autonomy, capability and legitimacy of central governments. The inability of central governments to extract through taxation indicates at a minimum a general lack of government capability, since government action is predicated upon income.

The effect of civil wars on state capacity has received some attention, especially with regard to developing states. Many scholars of the developing world (e.g., Centeno 2002; Herbst 2000a; Desch 1996; Clapham 1996; Lustick 1997; Jackson and Rosberg 1982) suggest that internal conflicts in developing countries reflect the absence of international competitors and the inability of states to centralize power domestically. The limited interstate wars fought by developing countries have not provided the opportunity for rulers to increase their extraction from society and centralize power. Civil wars have only served to undermine attempts to build the state. Recent quantitative analyses, such as Thies (2005; 2006) confirm a significant, negative relationship between civil war incidence and tax revenue extraction. Yet, these single equation models do not consider the possibility of endogeneity, nor have they investigated the relationship between revenue extraction and civil war onset. Regardless, they do provide some precedent for extending predatory models of the state to empirical investigations of civil war.

The predatory state seeking to maximize its revenue while dealing with internal and external competitors outlined by Tilly, North, Levi and others provides an overarching theoretical framework for a number of complementary civil war models of predatory rebels. Several contributions to the literature have moved in this direction (e.g., Snyder, 2006; Snyder and Bhavnani, 2005; Dunning, 2005) and some of the foundational pieces in the literature have

as well (e.g., Collier and Hoeffler, 1998; Fearon and Laitin, 2003). A brief review of this literature demonstrates that rebels and rulers are both considered important actors. Yet, empirically, the literature has not yet provided a good indicator of state capacity. Per capita income is the most frequently used measure, but it is a rough proxy for a great number of things. Revenue extraction is repeatedly mentioned by these scholars as a measure of state capacity, but the endogeneity problems posed by including it in a single equation model have ruled out its use thus far. Natural resources are also assumed to weaken the state, which is consistent with the resource curse literature, but is now being challenged within the civil war literature itself.

Collier and Hoeffler (1998) originally formulated a model in which rebel greed drives rebellion. The objective of rebellion in their analytical framework is either to capture the state or secede from it. The incentive to rebel is a product of the probability of victory and the state's capacity to defend itself. The state's capacity to defend itself is a function of its ability to tax. In particular, if the rebels' goal is to capture the state, then the potential state revenue becomes both an incentive to greedy rebels as well as an impediment to their success. If the goal of the rebels is secession, then state revenue no longer determines potential gains, but it still serve as a deterrent, even though Fearon (2005: 503-504) suggests that the capture of state revenues could still motivate secessionism. For Collier and Hoeffler (1998), the size of the population is argued to more adequately capture the desire for secession.

The cost of rebellion is modeled as a function of per capita income—high income populations have more to lose in a civil war than low income populations. The costs of rebellion increase with the duration of the conflict, which is again a function of the state's capacity to defend itself. The problem, as Collier and Hoeffler (1998: 564) note, is that taxation and military expenditure (or any similar measure of state strength or capacity) are endogenous to the risk of

rebellion. Collier and Hoeffler (1998: 566) choose to proxy taxable capacity with per capita income and the natural resource endowment. In this formulation, ethno-linguistic fractionalization (ELF) and size of the population serve as proxies for transaction costs of coordinated action, instead of indicators of grievance as in later studies. They find that per capita income reduces the risk of civil war, which suggests that wealthier states are better able to defend themselves from rebellion than poorer states. The effect of natural resources initially increases civil war incidence ( $sxp$ ), but then reduces it ( $sxp^2$ ), indicating that only an abundance of natural resources served the state's interest in deterring rebellion. ELF and its squared term were not consistently significant across their statistical models. Finally, larger populations increased the risk of civil war. These findings were provocative enough to launch much of the recent literature on civil war and primary commodities.

Rather than focus on rebel greed, Fearon and Laitin (2003) argue that weak central governments increase the probability of insurgency as a result of their inability to effectively manage potential counterinsurgent practices at the local level. Without robust and efficient administrative, military and police apparatuses, the state is a sitting target for rebels regardless of motive. In keeping with the spirit of predatory theory, they suggest that “where states are relatively weak and capricious, both fears and opportunities encourage the rise of would-be rulers who supply a rough local justice while arrogating the power to ‘tax’ for themselves and, often, for a larger cause” (Fearon and Laitin 2003, 76). In order to test their argument, they substitute per capita income as a proxy for state strength, much like Collier and Hoeffler (1998). Their findings support the argument that states with higher incomes per capita are at significantly less risk for civil war than those with lower incomes. This finding, along with the significantly increased risk associated with large populations, political instability, being a new state or an oil

exporter are more important than grievance indicators like ethnic or religious diversity, the lack of democracy or civil liberties, economic inequality or linguistic and religious discrimination. With the exception of the oil exporter dummy variable, they do not find evidence that supports Collier and Hoeffler's (1998) earlier findings about the importance of primary commodity exports as source of greed-based rebellion.

Fearon (2005) expands the earlier argument in Fearon and Laitin (2003) that state dependence on oil rents produces weaker administrative and bureaucratic structure by suggesting that dependence on primary commodities more generally will produce weak states. While large oil revenues may increase the prize of the state, the measure of primary commodities advocated by Collier and Hoeffler (1998; 2004) consisting of cash crops and fuel exports is not likely to be much of a prize, since rebels lack the national distribution system to exploit these resources. Further, even if rebels are able to tax primary commodities to fund their start-up costs, those same commodities provide a relative easy source of tax revenue for the government. Fearon (2005: 502) then poses a critical question: "Why should rebels be more favored by this source of revenue than the government?"

This is *the* crucial question left unanswered in the literature. Resource rents are often argued to be the cause of corrupt state institutions, poor economic growth and governance, budgetary mismanagement, and a variety of other factors commonly subsumed under the heading of the "resource curse" (Karl, 1997; Ross, 2001). Le Billon (2001: 567) suggests that resource rents are often disproportionately spent on the security sector, especially as resources in unstable domestic environments motivate building up military capability to deter against potential internal rivals. Resource rents also provide the substance upon which many patronage systems are organized. Jensen and Wantchekon (2004) find that resource abundance deters both

democratic transition and consolidation in Africa. The net result according to Le Billon (2001: 567) is that many rulers can avoid the need for broad-based taxation in a diversified economy, and the popular legitimacy that would support such taxation. Instead, resource rents finance a repressive security apparatus and reward individuals and groups that support the ruler (Reno, 1998). As the wealth gap between those who are connected to the state and those outside of the ruler's patronage network widens, violence often becomes the only option available to redress both greed and grievance issues. In sum, "resource dependent countries thus tend to have predatory governments serving sectional interests" (Le Billon, 2001: 567). As this statement suggests, access to the primary commodity network is often linked to specific ethnic groups, thus exacerbating the potential for conflict (Herbst, 2000b).

Yet, Snyder (2006) argues that lootable wealth does not necessarily breed disorder. Instead, when considering the preferences of ruler and private economic actors in designing institutions of extraction, a range of observable outcomes is possible. "If rulers are able to forge institutions of extraction that give them control of revenue generated by lootable resources, these resources can actually contribute to the maintenance of order by providing the income with which to govern. In contrast, the breakdown or absence of such institutions can produce instability in two ways: first, by causing a fiscal crisis that renders the state vulnerable to collapse and second, by making it easier for rebels to organize" (Snyder 2006: 947). Rulers prefer public extraction, such as state-owned mining and oil companies that maximize rents while minimizing transaction and agency costs associated with monitoring and enforcing contracts (Levi, 1988: 30-32). Private actors prefer private extraction because it maximizes their income by denying the rulers a share of the wealth. Joint extraction and no extraction are also possibilities depending upon the types of carrots and sticks the rulers have at their disposal. This

is critical, since under the right conditions, “rulers, not rebels, will control the income generated by lootable resources” (Snyder and Bhavnani 2005). Work by Luong and Weinthal (2006) on the ownership structures, and Dunning (2005) on the incentives faced by rulers deciding whether to diversify economies away from natural resources also moves us to reconsider resource abundance as a “structural variable willfully exerting its own effects” (Smith 2004: 243).

Smith (2004) finds empirical evidence that oil-rich states, in particular, were less likely to suffer regime failure or the onset of civil war than states without oil wealth. He suggests that rulers may have forged robust social coalitions rather than simply used their wealth to purchase legitimacy. Rulers may also have built state institutions that were able to deal with opposition in both non-repressive and repressive ways. In sum, the current resource curse literature based on the examination of a few outlier cases may have overstated the case for the weakening of state institutions and legitimacy that Fearon and Laitin (2003) assume along with most of the resource curse literature. Smith’s (2004) work calls into question prevailing assumptions about the role of natural resources in conditioning the incentives and activities of both the rulers at the helm of the state and rebels who may seek to displace them.

This reading of the literature suggests a couple of things. First, we should focus on the relationship between rebels and rulers acting as rational predators attempting to maximize their revenues. Second, despite a plethora of mechanisms linking natural resources to civil war onset via rebel incentives, the role such resources play in conditioning the actions and incentives of state rulers is largely missing from the literature. Third, we need to explicitly measure the capacity of the state using some measure of revenue extraction, rather than the rough proxies that have previously been used in the civil war literature. Finally, including a measure of state capacity introduces endogeneity problems that must be appropriately addressed. Hegre and

Sambanis (2006: 513) note that endogeneity is one of the serious, but largely unaddressed issues in the civil war literature. Only a handful of contributions to the literature have attempted to model this endogeneity (e.g., Sambanis 2001; Miguel et al 2004). The typical solution is to lag some of the suspect independent variables; however as Miguel et al. (2004: 730) note, this approach assumes that these lagged variables (of economic activity, etc.) do not anticipate the onset of civil war and adjust accordingly. In their view, this is not a very convincing solution to the endogeneity problem. While it is unlikely that we could ever deal with every potential source of endogeneity, we can focus on obvious cases where previous theory and empirical tests indicate a problem. The relationship between civil war onset and state capacity is one obvious example. Cast in this theoretical light and with the appropriate statistical techniques, we can test the relationship between civil war and state capacity, including the role of natural resources.

### **Data and Method**

There are two endogenous equations in this model. One represents the onset of civil war and the other the capacity of the state. The civil war onset equation is based on the Fearon and Laitin (2003) model. The state capacity equation is derived from the empirical literature that deals with the fiscal size and strength of the state. I discuss issues of identification and the management of time dependence in the errors after outlining each equation below.

The technique I use to analyze this system of equations was originally developed by Maddala (1983) and more practically implemented by Keshk (2003). This method is designed for simultaneous equation models where one of the endogenous variables is continuous and the other is dichotomous. This two-stage estimation technique creates instruments for the endogenous variables and then substitutes them for their endogenous counterparts in the structural equations. The continuous variable is estimated with OLS and the dichotomous

variable with probit in both the first and second stages of estimation. This is one way to address the problem of simultaneity that can produce biased and inconsistent estimates resulting from standard estimation techniques. It has previously been applied to estimate the relationship between trade and conflict (Keshk et al. 2004) and democracy and conflict (Reuveny and Li 2003), among other applications.

### *The Civil War Equation*

The civil war equation starts with the model developed by Fearon and Laitin (2003). This model is frequently used as a baseline by many subsequent studies that have offered conceptual or methodological innovations (e.g., Humphreys 2005; Lujala et al. 2005; Cederman and Girardin 2007). Due to data limitations present in the state capacity equation, I use Fearon and Laitin's (2003) data for 1960-1999. This results in the loss of 34 episodes of civil war onset out of a total of 127 in the original data set. Since some of the most significant measures employed in Fearon and Laitin's (2003) data prior to 1960 are interpolated, including the measure of primary commodity exports and the oil dummy, this may not pose as great a problem as one might think. We may actually have more confidence in the post-1960 data. If anything, this post-1960 analysis tests the robustness of earlier findings.

The variables used in this equation for civil war onset are identical to those used in Fearon and Laitin's (2003: 76) basic model. *Civil war onset* is coded dichotomously according to whether violent civil conflicts meet the following criteria:

- (1) They involved fighting between agents of (or claimants to) a state and organized nonstate groups who sought either to take control of a government, to take power in a region, or to use violence to change government policies.
- (2) The conflict killed at least 1,000 over its course, with a yearly average of at least 100.
- (3) At least 100 were killed on both sides (including civilians attacked by rebels). The last condition is intended to rule out massacres where there is no organized or effective opposition.

*Prior war* is a dichotomous control variable that indicates whether or not a civil war was ongoing in the previous year. *Per capita income* is measured in thousands of 1985 U.S. dollars and lagged one year. *Population* is the logged population size, which is lagged one year. *Mountainous terrain* is measured as the logged share of a state's terrain covered by mountains. *Noncontiguous state* is a dichotomous variable that captures the effect of having noncontiguous territory, such as islands or enclaves. *Oil exporter* is a dummy variable for states that obtain more than one-third of their export revenues from oil exports. *New state* is a dichotomous variable marking the first and second years of a state's independence. *Instability* is a dummy variable that indicates whether the state had a change of three or greater in the Polity IV regime index in any of the prior three years. *Democracy* is a lagged Polity IV value derived from the polity2 score that varies between -10 (most autocratic) and +10 (most democratic). *Ethnic fractionalization* is represented by the commonly used ELF index of ethnolinguistic fractionalization, which ranges from 0 (complete ethnic homogeneity) to 100 (complete ethnic heterogeneity) by measuring the probability that two randomly chosen individuals belong to different ethno-linguistic groups. *Religious fractionalization* is a measure that Fearon and Laitin (2003) construct along similar lines to the ELF index to represent religious diversity.

In a second series of equations, I model *civil war incidence*. Civil war incidence is based on Fearon and Laitin's (2003) list of civil wars, but rather than focus on just the onset of hostilities the variable is coded 1 for years in which a state is involved in a civil war. It may be the case that the full effects of the relationship between civil wars and state capacity are only observable when looking at the entire process of civil war from beginning to end. It also allows for a comparison of the findings to other studies of civil war incidence (e.g., Elbadawi and Sambanis 2000; Lujala et al. 2005). The same set of exogenous variables is used to predict civil

war incidence as civil war onset. In both cases, the models are identified by the exclusion condition (e.g., Greene 2003; Gujarati 2003). There are four variables that are unique to the civil war equations, including prior war, population, mountainous terrain, and noncontiguous state. I also employ the technique developed by Beck, Katz and Tucker (1998) to address the problem of serial correlation. The civil war equations are estimated with a counter for the number of years that a state has been at peace and three cubic splines to account for the effect of autocorrelation. Their inclusion has no appreciable effect, much as found by Fearon and Laitin (2003: 83); however, I include them for consistency with previous civil war models.

#### *The State Capacity Equation*

The measurement of state capacity is inherently problematic and has been subject to a great deal of debate through the years. I adopt what might be considered a fiscal sociology approach to the measurement of state capacity, which is also quite common in political science (e.g., Campbell 1993; Lieberman 2002). As Lieberman (2002: 95) notes, when using taxation data the researcher must be careful about the “fit between the indicator(s) and the particular concept under investigation.” In our case, the concept of state capacity could be proxied by any number of indicators. Fearon and Laitin (2003) proxy state capacity with per capita income, while Collier and Hoeffler (1998) use per capita income and the natural resource endowment. Collier and Hoeffler (1998) are clear that they would rather use an indicator of taxation, but do not because it is endogenous to the risk of rebellion. Since I will employ a statistical technique to deal with that endogeneity, I can reasonably use measures of tax revenue and expenditures.

The paper uses four different measures of state capacity, reflecting variously the size and scope of the state as well as its strength. Let me describe each measure and clarify how it captures some aspect of state capacity. First, *government share* of consumption is a broad

measure of the amount of a society's resources consumed by government. It measures government expenditures, rather than revenue gathering activity. A larger government share is a measure of the size and scope of a state, and only indirectly a measure of its strength. A government may consume a large portion of society's wealth, but still be fairly weak or fragile. Oil-rich states are the classic example. Government share will still represent the "prize" of the state, even if it is a relatively weak state. This measure was originally suggested by Ross (2006), though it proved insignificant in most of his analyses. Government share is taken from the Penn World Tables 6.2 (Heston et al. 2006).

Second, *total revenue* as a percentage of GDP is a broad measure of the government's income. It includes taxes on income, profits, and capital gains, social security contributions, payroll, property, domestic goods, international trade and transactions, and non-tax revenue. Total revenue is in many ways another proxy for the size and scope of the state. It is probably not the best measure of revenue extraction, since it contains non-tax revenue. Non-tax revenue is of particular interest when we consider the effects of primary commodities since many developing countries accrue rents from the mining sector, including oil, rather than tax revenue. This is actually very difficult to sort out since the difference between rents and tax revenue is dependent upon the ownership structure of these industries, which is only now being investigated in any detail (Luong and Weinthal 2006; Snyder 2006). This would also be true of nationalized industries of any sort. Total revenue may also represent the "prize" of the state. The variable for total revenue is from an ongoing data collection effort by Johnson and Rabinowitz (2005).

The next two measures are based more directly on tax revenues. The *tax ratio* is the state's tax revenue as a percentage of GDP. The tax ratio is the conventional gauge of the state's extractive capacity (e.g., Campbell 1993; Chaudhry 1997; Cheibub 1998; Fauvelle-Aymar 1999;

Tsai 1999; Centeno 2002; Thies 2005). As Organski and Kugler (1980, 74) argue “taxes are exact indicators of governmental presence.” Taxation and the development of bureaucracies that support regularized extraction activities are fundamental to the survival of the modern state. Lieberman (2002: 97) suggests that “tax revenue remains a unique source of revenue with respect to the challenge it presents for distributing the burden within society and coordinating payment with the state.” The tax ratio is created from total revenue minus non-tax revenue and social security contributions divided by GDP. It is less a measure of the size and scope of the state than total revenue or government share, but more a measure of state strength reflecting the ability to extract resources from individuals and groups in society. The tax ratio should represent an impediment to civil war onset. The tax ratio is from an ongoing data collection effort by Johnson and Rabinowitz (2005).

Finally, *relative political capacity* (RPC) is a measure of the relative strength of the state compared to other states with similar levels of development and resource endowments. It is an index that compares the actual level of tax revenue extraction to a predicted level of extraction. A state that scores 1 on the RPC indicator is extracting exactly as one would predict compared to other states with similar levels of economic development and natural resources. States that score higher than 1 are stronger in the sense that they are extracting more than expected, while those that score lower than 1 are weaker in that they are extracting less than expected. The RPC score is estimated as a function of per capita income, the share of agriculture in the economy, the share of mining in the economy, and major oil production. Organski and Kugler (1980) first developed RPC as a better measure of the ability of a government to mobilize the resources of its population in order to effectively wage war, rather than rely on rough proxies like national capabilities. It has been used in a wide array of studies as a more precise indicator of the

strength of the state than the tax ratio. RPC should represent an impediment to civil war onset. RPC is from an ongoing data collection effort by Johnson and Rabinowitz (2005).

The state capacity equation uses a number of standard control variables for predictions of revenue extraction, which should apply across all four measures with some caveats mentioned below. A number of the control variables overlap with those found in the civil war equation, including oil exporter, new state, instability, democracy, ethnic fractionalization and religious fractionalization. Being an *oil exporter* has long been identified as a source of the “resource curse” faced by many developing countries that may have prevented economic and political development. According to Fearon and Laitin (2003), it is the primary culprit in their argument that weak states are a target for insurgents. Oil could hypothetically have either positive or negative effects on our various measures of state capacity, depending upon the ownership structure. If oil produces rents (tax revenue) for the state, then it will probably have negative (positive) effects on measures based on tax revenues. Unfortunately, this is impossible to sort out with existing data.

The *new state* variable serves as a proxy for institutional capacity in the state capacity equation. Jackman (1993) argues that the chronological age of the state is an important feature of its political capacity. Older organizations have in some sense adapted to their environment in order to survive. The age of an organization also impacts its legitimacy to the extent that the organization is perceived by the relevant population to have always existed. Jackman (1993, 93) argues that “the liability of newness is most pronounced in the first years...,” which is reflected in the coding of this variable. *Instability* should have a uniformly negative effect on state capacity. Predatory theory based on the European experience expects a negative relationship between *democracy* and tax-based measures of state capacity (e.g., Tilly 1985; Olson 1993),

although previous empirical studies find mixed evidence for this proposition in the developing world (e.g., Cheibub, 1998; Thies, 2004). *Ethnic fractionalization* or *religious fractionalization* that might potentially lead to violence may serve as a focal point for bargaining with the state over relative shares of the tax burden that ultimately reduces state extraction. Ethnic and religious diversity serve as a type of transaction cost as suggested by Collier and Hoeffler (1998).

I also control for several other indicators of the transaction costs associated with taxation, including per capita income, trade openness, and several measures of the sectoral composition of the economy (e.g., Cheibub 1998). The impact of national wealth and economic development on the tax ratio is assessed with *per capita income*. *Trade openness* measured as imports and exports as a percentage of GDP is expected to be positively related to tax revenues as international trade is relatively easy to tax as it moves through a limited number of ports. Reliance on customs duties is especially common in developing countries. Data on trade openness is from the Penn World Tables 6.2. *Inflation* is expected to be negatively associated with government revenues, since poor monetary policy is likely to have a negative impact of the functioning of the economy and consequent tax collection efforts. I also include *agriculture* as a percentage of GDP as one indicator of the sectoral composition of domestic product. The standard argument is that it is easier to tax the modern sectors of the economy (manufacturing or mining) as opposed to agriculture. The data on inflation and agriculture is from the World Development Indicators. I discuss measures of primary commodities, including mining, below.

*Official development assistance* (ODA) as a percentage of total revenue, and public and publicly guaranteed *debt* as a percentage of GDP are both included in the model as the literature suggests that these sources of international funds have prevented developing states from augmenting their domestic resource extraction capabilities (e.g., Snider 1990; Bates 2001;

Remmer 2004). Both variables should be negatively associated with the variables representing revenue extraction and positively related to government share. The data on ODA is from the OECD, while the data on debt is from the World Development Indicators.

Finally, I control for the effect that fiscal *federalism* may have on central government revenue extraction. Subnational units in federal political systems that have the authority to raise taxes may crowd out the central government, thus reducing the federal government's portion of revenues. This variable is the dichotomous "author" variable from the Database of Political Institutions described in Beck et al. (2001), which indicates whether "subnational governments have extensive taxing, spending, or regulatory authority."

All of the models of state capacity are identified by the exclusion condition. There are six variables that are unique to the state capacity equations, including trade openness, agriculture, debt, ODA, inflation, and federalism. Serial correlation is a potential problem in the state capacity equations. It is addressed by the use of robust standard errors, which are adjusted for clustering on countries (White 1980; Newey and West 1987). These standard errors are consistent in the face of serial correlation and heteroskedasticity of a general type (Keshk 2003).

I do not include regional dummy variables in the following models. Some contributions to the civil war literature do, but most do not. Much like Fearon and Laitin (2003: 87), whether I include all regional dummies save one, or I include them individually, they do not significantly affect the other coefficients in the models. I report models without regional dummies below.

#### *Additional Considerations for Testing the Effects of Primary Commodities*

Since Collier and Hoeffler (1998) originally posited a link between primary commodities and civil war, a great deal of effort has been spent trying to determine what types of commodities may be linked to civil war, how they should be measured, how to model the linkage, and what

causal logic may explain the linkage. In the first set of models, I simply replicate the inclusion of Fearon and Laitin's (2003) *oil exporter* dummy variable to see how it affects the relationship between civil war and state capacity. Yet, a wide variety of measures for oil and other primary commodities have been developed in the attempt to understand their impact on civil war. We also know that primary commodities directly affect the state's capacity. In order to provide a robust test of the effects of primary commodities on both endogenous variables, I substitute a variety of indicators present in the literature. In addition to the oil exporter dummy, I also include a measure of *fuel exports* as a percentage of GDP measured on a yearly basis from Fearon (2005). I also test Humphreys' (2005) measure of *oil production* in barrels per capita per day. All measures of oil production should be positively related to civil war onset. The effect on state capacity is uncertain, depending upon whether oil produces rents or tax revenues.

Along with oil, diamond production has drawn a lot of attention, especially with regard to the "conflict diamonds" that are thought to contribute to the onset and duration of African civil wars. I test Humphreys' (2005) measure of *diamond production* in carats per capita, which he demonstrates is positively related to civil war onset. The effect of diamond production on state capacity is somewhat indeterminate as it is a function of ownership arrangements. Diamond production from kimberlite or laprolite mines is often included in corporate taxation when privately owned, but may also show up as rents in joint ownership schemes. Alluvial diamonds are more difficult for the government to regulate in many cases, so tax revenue or rents may elude the government. This is a "rough cut," on the effects of diamonds on state extraction as the difference between mined and alluvial diamonds is thought to affect civil war onset.

In order to further test this distinction, I separately replicate Lujala et al. (2005) by including dummy variables for the production of *primary diamonds* (kimberlite and laprolite)

and *secondary diamonds* (alluvial) from the DIADATA dataset produced by (Gilmore et al., 2005). Lujala et al.(2005) expect that primary diamonds will have no effect on civil war onset and reduce civil war incidence, since most of the revenues from primary diamonds will accrue to the state in some form. Secondary diamonds will produce a higher risk of civil war onset and incidence. Finally, I include a variable *secondary x conflict zone* from Gilmore et al. (2005) that captures whether secondary diamond production is occurring in areas of conflict. Secondary diamond production in conflict zones is expected to spur civil war onset. Secondary diamonds should diminish government revenues, as they are more readily extracted without government regulation. The interactive term may similarly diminish revenue extraction or one could even imagine the opposite as well-financed internal rivals may pose a greater threat to the state than their poorly financed counterparts, thereby stimulating extraction from other sources.

In order to test Collier and Hoeffler's (1998; 2004) finding that primary commodities in general should stimulate civil war, I include *sxp* and *sxp*<sup>2</sup>, and separately the *log of sxp* from Fearon (2005). These are the version of the measure that has been interpolated from 5 year observations to yearly observations. The measure includes food and live animals, beverages and tobacco, textiles, rubber, wood products, oil, coal, natural gas, animal and vegetable oils, fats, waxes, and nonferrous metals like silver, copper, nickel, aluminum, lead and tin (Fearon 2005: 491). Collier and Hoeffler (2004: 574) argue that the impact of *sxp* is positive on civil war onset until it peaks at around 33 percent of GDP, when it begins to decline. This is why both *sxp* and its squared term are typically included in the model. Fearon and Laitin (2003) and Fearon (2005) do not find support for this finding. Fearon (2005) actually finds better empirical support for the simple log of *sxp*. Since *sxp* is composed of mainly cash crops and fuel exports, Fearon (2005: 500) suggests that the type of distribution system required to take advantage of these resources is

rarely available to rebels. Hence, Fearon does not expect *sxp* to be related to civil war onset. Instead, it provides the government with an easy source of tax revenue, potentially increasing state capacity. Conversely, *sxp* may also tap into the “resource curse” if the government fails to develop administrative capacity beyond the distribution and taxation of primary commodities.

I test two final blunt measures of primary commodities: mining as a percentage of GDP and non-tax revenue. Many studies of tax revenue include *mining* as a percentage of GDP, but the empirical results have proven inconclusive. Fauvelle-Aymar (1999) and Cheibub (1998) both found an unexpected negative association between mining and the tax ratio. As Leiberman (2002, 98) points out, this is likely due to the fact that some types of mineral production, such as oil, are rents and therefore classified as non-tax revenue for the state. Finally, Ross (2006: 288) includes *non-tax revenue* in a prediction of civil war onset, which fails to achieve significance. Since non-tax revenue is a substitute for tax revenue, we would expect it to be negatively related to the tax ratio and RPC. It should be positively related to total revenue by definition.

### **Analysis**

The use of the two-stage estimation technique for the system of simultaneous equations modeling civil war onset and state capacity as endogenous variables produces some intriguing results. In all models, the instruments produced in the first stage estimation exhibit good fit. The quality of these instruments is also reinforced by the fact that there is virtually no difference between the standard errors produced by the Maddala (1983) procedure or the White (1980) and Newey and West (1987). I only present the White/Newey and West standard errors produced in the second stage of the estimation in the tables discussed below. Tables 1 and 2 present the results from the simultaneous equation model of state capacity and civil war onset. Table 1 presents the first half of the model by demonstrating the effects of four different measures of

state capacity on civil war onset in four different models. The second half of these equations reveals the effects of civil war onset on the four different measures of state capacity in Table 2.

[Tables 1 and 2 about here]

The results indicate that no measure of state capacity is significantly related to civil war onset in Table 1. This finding contradicts arguments posed by Fearon and Laitin (2003) and Fearon (2005) that state weakness provides an opportunity for rebels to launch a civil war. Yet, the oil exporter dummy is positively related to civil war onset in two of the four equations as they would expect. What we are able to demonstrate with this modeling technique is that the effect of oil exports is separable from that of state capacity. Something other than oil's assumed pernicious effects on state capacity is responsible for the increased risk of civil war. It may simply be the "prize" of oil revenue, rather than the "prize" or weakness of the state that is motivating rebels. The measure of political instability is significant and positively related to civil war onset in all four equations. These findings are consistent with Humphreys (2005: 527-528) attempts to test arguments about state strength. Two of the three variables identified by Hegre and Sambanis (2006) as being consistent across virtually all models of civil war onset, including income per capita and population size are significant and in the expected direction (peace years is not shown in the table and is not consistently significant in the models). Prior war and mountainous terrain are also significant across all four models and in the expected direction. Democracy, noncontiguous state, and the measures of ethnic and religious diversity are never significant, and the measure of the new state is only significant in Model 1.

In Table 2, we can see that civil war onset disrupts the normal pattern of revenue extraction, whether that extraction includes non-tax revenue as in Model 2 and Model 4 (RPC is adjusted for oil production) or not, as in the case of the tax ratio in Model 3. Overall government

share of consumption is not significantly affected by civil war onset as indicated in Model 1. Many of the typical predictors of state capacity are significant in these models, including trade openness, income per capita, agriculture, debt, ODA, democracy and federalism. A couple of findings are especially noteworthy. The oil exporter dummy variable is again significantly related to total revenue and the tax ratio. This finding is expected with total revenue, since total revenue would include both tax revenue and rents from oil. The fact that it is also found with the tax ratio suggests that the sample of states contains oil exporters with private or joint ownership structures that produce tax revenue from oil, or that oil exporters actually have invested some of their windfall profits in building stronger state institutions that enable increased revenue extraction in other areas as suggested by Smith (2004). Instability is not significantly related to state capacity, despite its strong relation to civil war onset. Higher levels of democracy are related to increased revenue extraction. Finally, religious fractionalization is significantly related to all measures of state capacity. In fact, it appears to increase the revenue-based measures of state capacity. This is the opposite of what we would expect whether we consider religious diversity as a type of transaction cost or the basis for some grievance.

Tables 3 and 4 allow us to examine the simultaneous effects of civil war incidence and state capacity. The revenue-based measures of state capacity in Models 6, 7 and 8 are all significantly and negatively related to civil war onset. Thus, it appears that while more capable states are unable to deter the onset of civil wars, they are able to diminish their incidence. Prior war is positive and significantly related to civil war incidence, as are population and noncontiguous states, similar to previous models of civil war incidence. Per capita income is negatively related to civil war incidence as expected. Mountainous terrain, new states, instability and the measures of ethnic and religious diversity are not significantly related to civil war

incidence. Curiously, democracy is positively related to civil war incidence in the models with total revenue and tax revenue as representations of state capacity. The oil exporter dummy is not significant in any of the models, similar to previous findings (e.g., Lujala et al. 2005; Ross 2006).

[Tables 3 and 4 about here]

The other half of these models, presented in Table 4 are quite interesting. The incidence of civil war significantly increases the size of the state as measured by government share, while it significantly decreases the strength of the states captured by the revenue-based measures. Many of the typical control variables have their expected effects on state capacity. Several findings are worth mentioning though. First, the oil exporter dummy variable is positively related to total revenue and the tax ratio again. Instability significantly reduces all measures of state capacity. Democracy reduces the overall size of the state, but increases its revenue extraction capacity. Ethnic diversity reduces the size of the state and reduces its total revenue. Religious diversity reduces the size of the state, but increases the state's revenue extraction capability. This curious finding about religious diversity will require additional inquiry.

#### *Primary Commodities*

Tables 5 and 6 test the effects of a variety of measures of primary commodities found in the literature. In order to conduct these tests, I replaced the oil exporter dummy in the previous models with various configurations of these alternative variables. I only report the sign and the significance level for the coefficients. What is most stunning about Table 5 is the general absence of significant relationships between primary commodities and civil war onset. Only the oil exporter dummy variable exhibits a moderately robust relationship to onset in the total revenue and tax ratio models, as previously discussed. This relationship again disappears in the civil war incidence equations presented in Table 6. As previously mentioned, both of these

findings are consistent with previous studies, which should lend confidence to the rest of our findings with regard to primary commodities. Instead of affecting civil war onset or incidence, primary commodities are directly related to state capacity.

Let me briefly review the findings from the state capacity equations. In testing for the effect of oil, I report the original findings for the oil exporter dummy from the models presented earlier in the paper, then I substitute fuel exports and oil production per capita in separate equations. The substitution of these and other measures of primary commodities does not substantially affect the results from the previous equations. Fuel exports exhibit the same positive effect on state capacity in both the onset and incidence equations as the oil exporter dummy. Oil production per capita decreases the size of government, but increases its strength as measured by the tax ratio. These findings do not support the notion of a resource curse, but instead support Smith's (2004: 232) suggestion that "leaders in many of these states invested their windfall revenues in building state institutions and political organizations that could carry them through the hard times." Oil exporters may be subject to higher risk of civil war onset, but their capacity to deal with civil wars is also strengthened.

[Tables 5 and 6 about here]

In testing for the effects of diamond production, I first substitute diamond production per capita and find that it positively affects total revenue in both the onset and incidence equations and the tax ratio in the incidence equation. Of course, this measure does not discriminate between primary or mined production of diamonds and secondary or alluvial production. If I substitute the Gilmore et al. (2005) dummy variables for these distinctions and include an interaction for secondary production in conflict zones, we find significant effects on the size of government in the onset equation. Primary diamond production increases the size of

government, while secondary production decreases the size, and secondary production in a conflict zone increases the size of government. This last finding may be a little puzzling, but it may be the case that government expenditures increase in order to deal with the insurgency. These findings repeat in the incidence equation. In the incidence equation, we also see that both primary and secondary diamond production positively affect the RPC measure of state capacity, while the secondary production in conflict zone variable is negatively related to the RPC. This set of findings may be more consistent with theoretical expectations, since diamond production may generally produce revenue for the state with the exception of so-called conflict diamonds. Secondary production also positively affects the tax ratio in the incidence equation, which is not generally expected on its own. This entire set of findings about the relationship between diamond production and state capacity probably serves to highlight the inadequacy of the diamond data in terms of its ownership structure (Luong and Weinthal 2006).

The Collier and Hoeffler (1998; 2004) measure of primary commodities,  $sxp$  and  $sxp^2$ , is found to significantly affect state capacity across all measures in both the onset and incidence equations. The same is true when I only include the log of  $sxp$  following Fearon (2005). The findings are what one would expect. Primary commodities increase the revenue extraction of the government until they become too large a portion of the economy, when their effect on extraction becomes negative. The measure of government share, as a proxy for size, finds the opposite. Using the log of  $sxp$ , one finds a positive effect on the revenue-based measures and a negative effect on the government share of consumption. This suggests that primary commodities do not necessarily weaken the state until they occupy a large portion of the economy. Ultimately, Collier and Hoeffler (1998; 2004) are correct in arguing that primary commodities are important, just not in the way that they suggest. Fearon's (2005) conjecture that

the cash crops and fuel exports represented by this measure provide the government with a relatively easy source of tax revenue is consistent with the data.

Finally, in separate tests I include a blunt measure of mining as a percentage of GDP and nontax revenue as a percentage of GDP. Mining is positively related to total revenue and the tax ratio in both the onset and incidence equations. Nontax revenue is also significantly related to all measures of state capacity in both the onset and incidence equations in expected ways.

Overall, if we take government share as a proxy for size of the state, then primary diamond production, secondary diamond production in a conflict zone, and nontax revenue robustly increase the size of the state. Secondary diamond production, *sxp* and the log of *sxp* negatively affect the size of the state. Yet, if we take the three revenue-based measures as indicators of the strength of the state, then on balance several of the oil production measures, primary commodities measured by *sxp* or its log, and mining as a percentage of GDP strength the state. High levels of *sxp* and nontax revenue generally decrease the strength of the state. Diamond production does not exhibit any consistent effect on the different revenue-based measures of state capacity, so it is difficult to draw any robust conclusions about that particular natural resource. Outside of the oil exporter dummy variable, there is little robust support for the prevailing view that primary commodities increase the risk of civil war onset or incidence.

### **Conclusion**

The goal of this paper was to investigate the relationship between civil war onset and state capacity, including the role played by primary commodities in that relationship. Predatory theories of state building, and indeed, many recent contributions to the civil war literature have begun to consider both state rulers and rebels as rational predators seeking to maximize their revenue. Since primary commodities are lootable and taxable, both rulers and rebels are likely to

be drawn to them as sources of revenue. Rather than assume the state is a function of per capita income that serves to constrain rebels, I modeled the state's capacity as a function of its fiscal size and strength. This analytical innovation required a change in technique away from single equation models of civil war onset, to a two equation model that captures the simultaneity of civil war onset and state capacity. This technique allowed us to more adequately observe how state capacity affects civil war onset and vice versa. It also highlighted the role of natural resources in this relationship. The results pose a considerable challenge to existing findings.

While much of the recent literature has focused efforts on refining the relationship between primary commodities and civil war onset, the results from this paper suggest that no direct, robust relationships exist. Only the oil exporter dummy is related to civil war onset in two of the four models. There are similarly no direct, robust relationships between primary commodities and civil war incidence. Does this mean that primary commodities have no effect on civil wars? Certainly, there are few direct effects. Primary commodities indirectly affect civil war incidence through their impact on state capacity. As we have seen, many primary commodities enhance state capacity in the incidence equations, and we have also seen that more capable states reduce civil war incidence. Yet, this indirect effect is not present in the onset equations. Although primary commodities affect state capacity, the effect is not reciprocal.

The findings also challenge the central tenet of the resource curse literature: that resource abundance will necessarily lead to states with weak bureaucratic and administrative structures. Many of the primary commodities tested in these models positively impact state capacity measured in fiscal terms. Smith's (2004) challenge to this literature with regard to oil is also confirmed. While oil wealth may on its own increase the risk of civil war, it also enhances the capacity of the state. As Smith (2004: 243) notes "there is little to guide scholarship in the study

of how oil wealth and strong institutions might mix. Theories to explain, and studies to trace, the processes through which many regimes in oil-rich countries might have indeed built strong states, are currently in short supply...” Future research on the impact of oil and other commodities on state capacity is needed to help us nuance our understanding of resources as a curse or a blessing, or more likely, some mixture of both.

In terms of the mechanisms related to the state that are thought to link primary commodities to civil war onset, we therefore find only partial support for the weak states mechanism. As Fearon and Laitin (2003) suggest, oil wealth does raise the risk of civil war, but contrary to their causal logic, it does so independently of state capacity. As we think about mechanisms, it may make more sense to frame the entire discussion in terms of ruler and rebel predation for revenue. Rebels may be motivated by greed for primary products that directly enhance the revenues of the state. Rulers wanting to remain in power may revise the property rights to those primary products in the face of organized opposition, so that violent conflict never breaks out as North (1981) and Levi (1981; 1988) suggest. Our efforts to understand the role of primary products in civil war onset may be more fruitfully directed toward answering the question posed by Azam (1995: 173) “How to pay for the peace?” Our data on primary products and institutional arrangements governing ownership are not as well developed as we need them to be to answer that question, though the theoretical frameworks and data collection efforts are in development now (e.g., Snyder 2006; Luong and Weintal 2006; Dunning 2005). Final judgment on the role of primary commodities in conditioning the relationship between rulers and rebels will have to await such data, but the results from this study urge us to take our collective scholarship in that direction.

**Table 1. The Effect of State Capacity on Civil War Onset**

Variables	Model 1	Model 2	Model 3	Model 4
Government Share	2.582 (1.878)			
Total Revenue		-.702 (1.405)		
Tax Ratio			-1.291 (1.788)	
Relative Political Capacity				-.011 (.646)
Prior War	-.559*** (.179)	-.530*** (.166)	-.530*** (.166)	-.543*** (.189)
Per Capita Income	-.126*** (.034)	-.125*** (.039)	-.128*** (.035)	-.133*** (.039)
Population	.149*** (.044)	.124*** (.042)	.124*** (.041)	.098** (.045)
Mountainous Terrain	.105** (.045)	.097* (.052)	.092* (.052)	.147** (.067)
Noncontiguous State	.198 (.164)	.237 (.160)	.237 (.160)	.273 (.173)
Oil Exporter	.187 (.171)	.321* (.179)	.325* (.173)	.234 (.174)
New State	.581* (.359)	.045 (.471)	.026 (.471)	.051 (.483)
Instability	.334*** (.127)	.328*** (.125)	.325*** (.125)	.344*** (.135)
Democracy	.008 (.009)	.010 (.010)	.011 (.010)	.005 (.011)
Ethnic Fractionalization	.269 (.217)	.181 (.227)	.196 (.217)	.371 (.252)
Religious Fractionalization	.040 (.286)	.226 (.287)	.227 (.286)	.103 (.307)
N	3998	4145	4144	3959

Note: Coefficients for peace years, cubic splines and constants are not shown. Robust standard errors are presented in parentheses. Two-tailed test: \*p<.10, \*\*p<.05, \*\*\*p<.01

**Table 2. The Effect of Civil War Onset on State Capacity**

Variables	Model 1 Government Share		Model 2 Total Revenue		Model 3 Tax Ratio		Model 4 RPC	
Onset	-.008	(.005)	-.028***	(.008)	-.027***	(.007)	-.166***	(.043)
Trade Openness	.019***	(.005)	.019**	(.009)	.008	(.009)	-.069	(.058)
Per Capita Income	-.002***	(.001)	.001	(.001)	-.006***	(.001)	-.037***	(.009)
Agriculture	-.026*	(.014)	-.271***	(.020)	-.222***	(.019)	-.256**	(.117)
Debt	.027***	(.004)	.029***	(.005)	.021***	(.004)	.128***	(.026)
ODA	.068***	(.013)	-.036**	(.016)	-.040***	(.015)	-.379***	(.091)
Inflation	.025***	(.004)	-.001	(.006)	.002	(.005)	-.039	(.035)
Oil Exporter	.005	(.005)	.029***	(.007)	.015**	(.006)	.011	(.040)
New State	-.009	(.013)	-.013	(.018)	-.013	(.016)	-.081	(.103)
Instability	-.004	(.004)	-.007	(.006)	-.005	(.005)	-.039	(.033)
Democracy	-.000	(.000)	.001**	(.000)	.011***	(.000)	.006***	(.002)
Federalism	-.016***	(.004)	-.047***	(.007)	-.032***	(.007)	-.173***	(.043)
Ethnic Fractionalization	-.009	(.006)	-.030***	(.008)	.002	(.008)	-.055	(.048)
Religious Fractionalization	-.013*	(.007)	.047***	(.011)	.036***	(.010)	.227***	(.064)
N	3998		4145		4144		3959	

Note: Coefficients for constants are not shown. Robust standard errors are presented in parentheses. Two-tailed test: \*p<.10, \*\*p<.05, \*\*\*p<.01

**Table 3. The Effect of State Capacity on Civil War Incidence**

Variables	Model 5	Model 6	Model 7	Model 8
Government Share	.873 (1.868)			
Total Revenue		-2.592** (1.284)		
Tax Ratio			-3.399** (1.576)	
Relative Political Capacity				-1.060* (.599)
Prior War	3.234*** (.328)	3.317*** (.312)	3.341*** (.311)	3.326*** (.325)
Per Capita Income	-.079*** (.023)	-.060** (.026)	-.080*** (.022)	-.097*** (.025)
Population	.159*** (.040)	.149*** (.038)	.151*** (.038)	.111*** (.040)
Mountainous Terrain	.051 (.038)	.013 (.043)	.011 (.043)	.026 (.057)
Noncontiguous State	.235* (.143)	.248* (.143)	.242* (.142)	.292** (.149)
Oil Exporter	-.157 (.163)	.002 (.172)	-.022 (.165)	-.170 (.167)
New State	.444 (.409)	.011 (.465)	.012 (.461)	.042 (.473)
Instability	.006 (.115)	-.079 (.115)	-.081 (.114)	-.131 (.122)
Democracy	.009 (.009)	.014* (.009)	.016* (.009)	.014 (.010)
Ethnic Fractionalization	.249 (.187)	.110 (.195)	.187 (.187)	.232 (.216)
Religious Fractionalization	.074 (.240)	.107 (.241)	.089 (.240)	.144 (.254)
N	3998	4145	4144	3959

Note: Coefficients for peace years, cubic splines and constants are not shown. Robust standard errors are presented in parentheses. Two-tailed test: \*p<.10, \*\*p<.05, \*\*\*p<.01

**Table 4. The Effect of Civil War Incidence on State Capacity**

Variables	Model 5 Government Share	Model 6 Total Revenue	Model 7 Tax Ratio	Model 8 RPC
Incidence	.007*** (.001)	-.006*** (.001)	-.004*** (.000)	-.042*** (.006)
Trade Openness	.032*** (.004)	.030*** (.004)	.020*** (.004)	-.011 (.641)
Per Capita Income	-.001 (.000)	.004*** (.000)	-.003*** (.000)	-.022*** (.002)
Agriculture	-.031** (.013)	-.269*** (.013)	-.220*** (.011)	-.233*** (.072)
Debt	.026*** (.003)	.025*** (.004)	.017*** (.003)	.103*** (.019)
ODA	.065*** (.012)	-.029** (.013)	-.034*** (.011)	-.326*** (.067)
Inflation	.023*** (.004)	.002 (.004)	.004 (.004)	-.011 (.024)
Oil Exporter	.003 (.004)	.022*** (.004)	.008** (.004)	.025 (.023)
New State	-.013 (.012)	-.016 (.012)	-.016 (.011)	-.110 (.069)
Instability	-.007** (.003)	-.014*** (.004)	-.012*** (.003)	-.082*** (.022)
Democracy	-.001** (.000)	.001*** (.000)	.001*** (.000)	.006*** (.001)
Federalism	-.015*** (.004)	-.045*** (.004)	-.030*** (.004)	-.173*** (.022)
Ethnic Fractionalization	-.016*** (.006)	-.028*** (.006)	.002 (.005)	-.041 (.031)
Religious Fractionalization	-.011* (.006)	.042*** (.007)	.032*** (.006)	.206*** (.039)
N	3998	4145	4144	3959

Note: Coefficients for constants are not shown. Robust standard errors are presented in parentheses. Two-tailed test: \*p<.10, \*\*p<.05, \*\*\*p<.01

Table 5. Primary Commodities and Civil War Onset

Variable	<u>Onset Equation</u>			
	Model 1 Government Share	Model 2 Total Revenue	Model 3 Tax Ratio	Model 4 RPC
Oil Exporter	+	+*	+*	+
Fuel Exports/GDP	+	+	+	+
Oil Production Per Capita	+**	+	+	+
Diamond Production PC	-	-	-	-
Primary Diamond Production	-	+	+	-
Secondary Diamond Production	-	-	-	-
Secondary x Conflict Zone	+	+	+	+
sxp	+	+	+	+
sxp2	-*	-	-	-
sxp (log)	+	+	+	+
Mining/GDP	-	+	+	+
Nontax Revenue/GDP	+	+	+	+
		<u>State Capacity Equation</u>		
Oil Exporter	+	+***	+**	+
Fuel Exports/GDP	+	+***	+***	+
Oil Production Per Capita	-	+	+	+
Diamond Production PC	+	+***	+	+
Primary Diamond Production	+***	+	+	+
Secondary Diamond Production	-***	+	+	-
Secondary x Conflict Zone	+***	-	+	+
sxp	-***	+***	+***	+***
sxp2	+	-***	-***	-***
sxp (log)	-***	+***	+***	+***
Mining/GDP	+	+***	+***	+
Nontax Revenue/GDP	+***	+***	-***	-***

**Table 6. Primary Commodities and Civil War Incidence**

Variable	<u>Incidence Equation</u>			
	Model 5 Government Share	Model 6 Total Revenue	Model 7 Tax Ratio	Model 8 RPC
Oil Exporter	-	+	-	-
Fuel Exports/GDP	-	+	-	-
Oil Production Per Capita	-	+	+	-
Diamond Production PC	-	-	-	-
Primary Diamond Production	+	+	+	-
Secondary Diamond Production	-	-	-	-
Secondary x Conflict Zone	+	+	+	+
sxp	+	+	+	+
sxp2	-	-	-	-
sxp (log)	-	+	+	+
Mining/GDP	-	-	-	-
Nontax Revenue/GDP	-	+	-	_*
		<u>State Capacity Equation</u>		
Oil Exporter	+	+***	+**	+
Fuel Exports/GDP	+	+***	+***	+
Oil Production Per Capita	_****	+	+***	+
Diamond Production PC	+	+***	+***	+
Primary Diamond Production	+***	-	+	+**
Secondary Diamond Production	_***	+	+***	+***
Secondary x Conflict Zone	+***	-	-	_***
sxp	_****	+***	+***	+***
sxp2	+***	_****	_****	_****
sxp (log)	_****	+***	+***	+***
Mining/GDP	+	+***	+***	+
Nontax Revenue/GDP	+***	+***	_****	_****

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