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Breaking the Curse

Governing the Dynamic between Natural Resources and Violent Conflict

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ABSTRACT

For many developing countries, the extraction of natural resources has been a curse, as they still face extreme poverty, corruption, government failure and violent conflict. While political and institutional deficits have been widely cited as sources for economic failure and violent conflict, there has not been any systematic analysis of the impact of governance factors on the resource-conflict dynamic. To close this gap, this research examines the impact of resource type, abundance and dependence on risk and duration of violent conflict and explores the importance of the quality of the governance of natural resources in preventing or overcoming the resource-curse. The analysis confirms that resource abundance as well as resource dependence positively correlate with both the risk and the duration of violent conflict and that good (resource) governance increases state stability and, in countries with a conflict history, the duration of peace.

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For many developing countries, the extraction of natural resources has been a curse, as they still face extreme poverty, corruption, government failure and violent conflict. While political and institutional deficits have been widely cited as sources for economic failure and violent conflict, there has not been any systematic analysis of the impact of governance factors on the resource-conflict dynamic. To close this gap, this research examines the impact of resource type, abundance and dependence on risk and duration of violent conflict and explores the importance of the quality of the governance of natural resources in preventing or overcoming the resource-curse. The analysis confirms that resource abundance as well as resource dependence positively correlate with both the risk and the duration of violent conflict and that good (resource) governance increases state stability and, in countries with a conflict history, the duration of peace.

(142 words)

INTRODUCTION

Africa is a vast, diverse and exotic continent rich in minerals and natural resources[1]. Yet, this continent is also plagued by state fragility, corruption, environmental degradation, poverty, underdevelopment and violence. Rather than being a blessing, Africa's resources have often been described as a curse, encouraging first colonial and, during the Cold War, superpower economic and military interventions. Although the number of interstate wars has sharply declined on a global scale since the end of the Cold War, incidents of civil war have increased considerably, particularly in Africa. On a continent as rich in natural resources, these provide an increasingly important means of funding those civil wars. Several studies have demonstrated that low-income countries, especially those characterized by slow growth and weak state structures combined with considerable dependence on primary commodity exports, are prone to civil wars and can easily become caught in a 'conflict trap', increasing the danger of further conflict (Brzoska and Paes, 2007; Collier, 2007; Sambanis, 2007; Siegle 2007; Collier et al., 2003; Collier and Hoeffler, 2000).

Perhaps no other work has more profoundly shaped the ongoing debate around the relationship between natural resources and violent conflict than the econometric studies conducted by Paul Collier and his colleagues at the World Bank's Development Research Group. Among the most widely reported results of this research was the finding that countries with dependency on primary commodities are at higher risk of experiencing civil war, which, in turn, they argued, retards development. Collier and his colleagues attributed the correlation between natural resources and civil war primarily to the economic motivations of greedy ("loot seeking") internal actors, motivated in large part

[1] Africa possesses among others 99 percent of the world's chrome resources, 85 percent of its platinum, 70 percent of its tantalite, 68 percent of its cobalt, and 54 percent of its gold. Moreover, Nigeria and Libya are among the leading oil producing countries in the world. See Rena, 2007.

by profit prospects from primary commodity exports, particularly in non-pluralistic, low-income countries. Although "natural resources are seldom the entire story behind a conflict, . . . they have the potential to compound other problems and make them unmanageable" (Collier et al., 2003, p. 63). One of the key conclusions Collier and his colleagues reached was that governance is a pivotal variable in explaining why resources are a blessing for some countries but a curse for others (Collier, 2007).

Since publication of the initial World Bank study, a number of observers have reiterated the pivotal role of resource governance as a conflict prevention and transformation measure (Collier, 2007; Siegle 2007; Basedau, 2005). However, as of yet, there has not been a systematic empirical analysis of the effects of resource governance on the relationship between natural resources and violent conflict. Exactly this is the aim of the present research. In the first part of this article, we provide a brief review of the relevant literature and conceptualize the three central variables: natural resources, internal conflict and resource governance. In the second part, we test the effects of quality of resource governance on the relationship between natural resources (type, abundance, dependence) and onset, duration and intensity of conflict, based on the analysis of secondary data for 90 countries over an 11-year time period (1996–2006). In the final part, we discuss the importance of measuring resource governance for understanding the dynamics underlying the resource-conflict trap and develop concrete policy recommendations with implications for conflict prevention and resolution.

Resource exploitation and economic development

Preceding the academic interest in examining the connection between natural resources and violent conflict, a number of observers had warned for years of potential destructive economic effects of natural resource abundance, especially in developing countries. More than four decades ago, Seers (1964) found a close correlation between economic growth in oil rich countries and rising unemployment, poverty and inequality. Similarly, Karl (1997) drew attention to the paradox that high revenues generated during the massive oil booms of the 1970s and early 1980s led to declines in welfare. Analyzing the long-term growth trajectories of 21 countries, Lal (1993) found that eight out of ten land-abundant (resource-rich) countries pursued policies that led to growth collapses, while all three resource-deficient countries in the sample maintained rapid growth (see also Auty, 2007). In light of the seemingly paradoxical findings that the surplus from natural resource exports actually reduces growth, a number of observers have described resource abundance as a curse rather than a blessing for resource-dependent developing states (Brunnschweiler, 2006; Auty, 2003, 1993; Gylfason, 2001; Sachs and Warner, 1995).

Economists explain the resource curse through a series of unfortunate economic incentives. During boom periods, natural resource exports generate a massive influx of foreign exchange, simultaneously increasing the dependence on exports of those resources and diminishing the competitiveness of other sectors of the economy. This so-called 'Dutch disease', named after the decline of the manufacturing sector in the Netherlands in the 1960s following the discovery of natural gas, creates pressure on the real exchange rate, which in turn, can trigger domestic inflation (Ernst, 2007; Collier, 2007 and 2004; Corden, 1984; Corden and Neary, 1982).[2] In addition, prolonged dependence on primary resource

[2] The concept was first called 'The Dutch Disease' in an article in *Economist* (26 November 1977, pp. 82–83).

exports tends to delay competitive industrialization and slow the absorption of surplus rural labor (cf. Auty, 2007).

The effects of the Dutch disease are magnified in fragile developing states characterized by weak state structures, corruption and predatory interests of governing elites (Ernst, 2007; Karl, 1997; Yates, 1996; Mahdavi, 1970). Beblawi and Luciani (1987) characterized these so-called "rentier economies" to share four main attributes: (1) rents from natural resources are the single most important source of income; (2) massive inflow of rents derive from foreign exchange; (3) only a minority of the population is engaged in rent generation, while the majority is involved in its distribution and consumption; and (4) the government is the principal rent recipient. Given these attributes, it is not surprising that ruling elites, i.e., the rentier class, have a vested interest in maintaining the *status quo* and very little incentive to promote true democratic reforms. Ernst (2007) explains that the resource curse becomes a resource trap particularly in resource-dependent countries with autocratic governance structures:

> Any country can catch Dutch disease, whether democratic or totalitarian. But lack of democratic control and concentration of market power exacerbate the effects. Hobbesian anarchy or kleptocracies diminish competitiveness further, especially with government-imposed or –tolerated monopolies that create contrived rents (Ernst, 2007. p. 3).

THE DYNAMIC BETWEEN RESOURCES AND CONFLICT

The link between resource abundance and the onset and duration of civil war gained attention initially at the end of the 1990s when non-governmental organizations (NGOs) exposed the trade connection between 'conflict diamonds' and small arms and light weapons in Angola and Sierra Leone (Partnership Africa Canada, 2003; Human Rights Watch, 1999; Global Witness, 1998). Analyzing key conflict motivators, Collier and his World Bank colleagues concluded that "the key root cause of conflict is failure of economic development" (Collier et al., 2003, p. 53). Collier et al. found stronger empirical evidence linking the onset and duration of civil war to the capture of natural resources (i.e., greed) than to ideologically, religiously or ethnically motivated grievances. The idea that violent conflict was motivated primarily by economic considerations (i.e. greed) was particularly appealing to critics of the "clash-of-civilizations" thesis which links the inevitability of future wars to fundamental and unchangeable differences in religious, ethnic or civilianizational identities (cf. Huntington, 1996). Equally appealing were economic explanations of civil wars to policy makers "discouraged by the complexity and seeming intractability of 'ethnic' and religious conflicts . . . " (Ballentine and Nitzschke, 2003, p. 4).

But Collier et al.'s simple and seemingly elegant argument also generated fierce criticism. One objection voiced against the economic logic of resource wars is its reductionist view regarding the inevitability of the 'curse,' as, for instance, certain commodities are more vulnerable to world market volatility than others(Basedau, 2005). Moreover, a number of studies found that among natural resources, oil was the single most significant predictor of the outbreak of conflict and its duration (Fearon, 2005;

Fearon and Laitin, 2003; Basedau, 2005; Ross, 2004). In addition, a number of observers have also raised methodological and analytical concerns regarding the economic logic of resource wars above and beyond a general distrust in "reductionist" quantitative analysis. First, there is always a danger of inferring individual motivations from aggregated statistical analysis (Ballantine and Nitzschke, 2005; Ballantine and Sherman, 2003; Franke, 1999). Second, underlying the greed thesis is the unexplored assumption that "rebels, not state actors cause conflict, leading to a pro-state bias in analysis and policy action" (Ballentine and Nitzschke, 2005, p. 4). Consequently, conflict analyses based on the greed thesis, by their very nature, disregard the complexity, richness and the unique characteristics underlying each conflict. Third, the greed logic may obstruct creative conflict prevention measures, as rebel groups are treated as quasi-criminals (e.g. "narco-guerillas" in Colombia), hence ignoring the import and ramifications of politically-motivated behavior (cf. Collier, 2000). Fourth, the relationship between natural resources and conflict could be spurious, i.e., the correlation could be caused simply by the cessation of other economic activities, such as tourism or manufacturing, as a result of the conflict (Humphreys, 2005).

Finally, the availability of natural resources does not *per se* create sufficient opportunity for rebellion. Rather, as Ballentine and Nitzschke point out, "critical governance failures are a mediating variable" (2003, p. 5). Ernst agrees that

> (...) for too long, the resource curse debate has been caught in a sterile loop. The impact of the curse can be attributed to the lack of institutions (...) that (...) by fostering greater transparency and accountability, can break the vicious cycle of rent appropriation and its use to consolidate power for the few (2007, p. 5).

More directly, Siegle (2007) views the resource curse as a specific governance problem and concludes,

> (...) democracies' oversight mechanisms are what contributes most to the consistency and stability of their [natural resource-rich countries] development performance. Democracies with relatively stronger systems of checks and balances are also less susceptible to the corrosive effect of natural resource revenues (2007, p. 39).

And even Collier acknowledges "excellent governance and economic policies can help the growth process (...). By contrast, terrible governance and policies can destroy an economy with alarming speed" (2007, p. 64).[3]

Thus, governance is becoming widely accepted as a key factor for understanding the resource-conflict dynamic and the mutually reinforcing traps that low-income, resource-dependent countries are often caught in (see also Dunning, 2005; Snyder and Bhavnani, 2005). Consequently, Basedau (2005) suggested the inclusion of the more comprehensive concept of 'resource politics' into the analysis of the "complex and dynamic interplay" between resources and conflict. Stevens (2003) called for a more comprehensive analysis of those countries that benefit from resource abundance to counter the simplistic assumption that the mere occurrence of natural resources

[3] Already in 2004, did Collier argue that "the challenge for both Africa and the international community is to change the political and economic governance of such resources so that the future is not a repetition of the past." See http://www.crimesofwar.org/africa-mag/afr_04_collier_print.html.

increased the risk of armed conflict. And Siegle concluded that redressing the imbalance produced by the resource curse

> will require recognizing the autocratic roots of this curse and changing incentives that leaders of resource-rich societies face. Helping natural resource-rich countries join the democratic path—by building accountable institutions, strengthening citizens' capacity for collective action, establishing global norms for transparent reporting of natural resource revenue, and cultivating more innovative scenarios for reform—can all play a role toward this end (2007, p. 42).

However, "good direct measures of a state's administrative capacity and integrity" are still lacking (Fearon, 2005, p. 502).

CONFLICT RESOURCES

Much of the research conducted to date has been examining the effects of resource abundance and resource dependence on conflict in general. Resource abundance, typically defined as the share of primary exports in GDP, in combination with poor governance and institutional quality, has been determined as a key source for the resource curse (cf. Auty, 2007 and 2003; Brunnschweiler, 2006; Collier et al., 2003; Sachs and Warner, 1995, see above)[4]. Resource dependence, by contrast, indicates the extent to which a country is sensitive or vulnerable to supply and demand shifts in the market. Dependence may vary in terms of proportion or value of the resource(s) of all exports but also in terms of diversification within this dependence (cf. Basedau, 2005). Vulnerability to price shocks will be greater in countries that depend largely on a single commodity. For the purpose of the present analysis, we defined resource dependence as the proportion of natural resource revenue from total merchandise exports and included countries in our sample whose resource dependence exceeded 10 percent (see below).

Apart from abundance and dependence, a number of observers have also noted that type of resource might affect onset and duration of conflict differently. For instance, Siegle (2007) found that hydrocarbon-rich countries were twice as likely as others to experience intrastate conflict, and Fearon (2005) showed that oil exports predicted higher civil war risk. Also conflict-relevant are: the location of resources as well as the technical modes of exploitation. Economies dependent on point-source resource extraction—e.g., minerals and plantation crops characterized by intensive production—often show evidence of worse performance and more fragile institutions than economies dependent on more 'diffuse' resources, characterized by more extensive production (Brunnschweiler, 2006). In terms of the relationship between conflict propensity and resource governance, the regional concentration of resources has been shown to encourage secessionist insurgencies in some cases, while the exploitation of diffuse resources is typically more difficult to control by the central state (cf. Basedau, 2005).

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[4] Measuring resource abundance in terms of resource-to-GDP ratio may itself be misleading, since a high ratio might describe great mineral wealth, but it is also indicative of a weak non-mineral economy, which could be a result of the conflict itself (cf. Ross, 2006). To avoid this ambiguity, Humphreys (2005) suggested to define resource abundance as a „resources-*per-capita*" ratio.

The purpose of the analysis below is to examine the impact of resource type, abundance and dependence on risk and duration of violent conflict and to explore the importance of the governance of natural resources in preventing or overcoming the resource curse. The following section will define what we mean by resource governance in greater detail.

DEFINING RESOURCE GOVERNANCE

Effective resource governance requires shaping policy sectors through a mix of opportunities and incentives aimed at transforming the curse into a blessing. Concrete measures include democratic oversight, transparent revenue-sharing, effective corruption control, a stable investment environment, and the establishment and enforcement of international control regimes. In general, the greater the revenue volatility, the higher deficit spending tends to be and the more difficult planning for booms and busts becomes (Shaxson, 2005, p. 312). These tendencies are magnified in countries with large resource exports, as they tend to levy lower taxes on their population (Siegle, 2007). Low taxes, in turn, oftentimes correlate with low democratic control and weak state structures and, subsequently, higher risk of civil war (Ross, 2004; Fearon and Laitin, 2003). Moreover, many resource-rich developing countries, particularly in Africa, are plagued by high levels of corruption and a lack of transparency (cf. Sambanis, 2007; Collier, 2007). In general, transparency and democratic control have been shown to enhance both economic and political stability, boost a country's propensity to attract external investments, and, as a result, reduce the risk of civil war (Dunning, 2005; Humphreys, 2005; Collier et al., 2003). Therefore, any assessment of resource governance and its effect on violent conflict must carefully collect and analyze data on the specific resource-related governance measures and track trends across time. However, most research to date has relied on standard measures of good governance and employed those as proxies for resource governance.

This is exactly where the main contribution of this research lies: in examining the extent to which resource-specific governance variables affect the resource-conflict dynamic. Since there is no readily available conception of resource governance, let alone a comprehensive data base[5], we combined existing data sources on good governance—e.g. regime type, political right, civil liberties, and press freedom—with resource-specific indicators such as adherence to resource-specific international treaties, institutions or certification schemes (resource regime compliance indicator (RRI), see below). 'Resource governance' in the present context describes the way in which governments regulate and manage the use of natural resources and the redistribution of costs and revenues deriving from those resources (cf. Schure, 2007). This includes the regulation and administration of the extraction process, the way resources are processed and traded, and the control over resource specific revenues. Although we acknowledge that it would also be important to consider the political context at the local level, the lack of available statistical data precludes us from including local politics as part of our analysis (cf. Ross, 2004)[6].

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5 The most viable alternative to readily available long-term data sources is the World Bank's Country Policy and Institutional Assessment (CPIA). However, country-specific data from this source has been publicly available only since 2006 (World Bank, 2006). In the future, we plan to compare CPIA data to the resource conflict monitor data compiled for this analysis and include, where appropriate, CPIA data into our calculations.

6 A number of recent studies have convincingly demonstrated the need to combine general statistical analyses with country-context specific qualitative studies of the interdependencies among state governments, extractive industry, local authorities and the local population. See in this context Böge, 2007 and Böge and Krieger, 2007.

Our interest in this research is to integrate general measures of good governance and governance measures specific to natural resources more systematically into a revenue-centered framework based on the assumption "that spending on social welfare reduces the risk of civil war by attenuating citizen grievances, thus making them less available for recruitment by rebels" (Snyder and Bhavnani, 2005, p. 571). More specifically, we explore the effects of regime type/level of governance on the redistribution of resource wealth by calculating the proportion of overall state revenues spent on health care and education as a measure of democratic share in the revenue distribution and as a proxy measure of grievance propensity. Especially investing in education, the "accumulation of human capital", has been determined to effectively reduce the risk of civil war and to boost economic growth (Collier and Hoeffler, 2002a; Gylfason, 2001; Ross, 2001). Patterns of state spending can provide a clue about the extent to which the general population shares in the revenues generated from resource riches.

Defining conflict

Most generally, conflict describes a state of opposition, disagreement or incompatibility between two or more individuals or groups engaged in the distribution or redistribution of scarce goods (cf. Azar, 1990; Collins, 1975). The distribution of natural resources and the redistribution of revenues from their extraction are especially characterized by high conflict potential. In their analysis of the resource-conflict trap, Collier and colleagues focus primarily on the extreme end of the conflict spectrum, namely civil war. Specifically, they account for conflicts that are "sufficiently large and sustained, and come into sufficient conflict with government forces, to generate at least 1,000 battle-related deaths" (Collier and Hoeffler, 2000, p. 4; see also Collier et al., 2003, p. 53; Collier, 2007, p. 18). Although Collier admits that "the figure of 1,000 combat deaths is arbitrary, the point of drawing a line is that there really is a big difference between low-level communal violence in which, say 50 people are killed and a war in which thousands get killed" (Collier, 2007, p. 18). Exactly this is the point. Using the CoW threshold excludes violent conflicts with fewer than 1,000 battle-related deaths and civilian non-battle-related casualties that are directly or indirectly related to the conflict. Therefore, Collier et al.'s analysis focuses exclusively on civil wars and ignores both non-violent and violent resource conflicts below the threshold.

A more nuanced conception of conflict is provided by the Heidelberg Institute for International Conflict Research (HIIK)[7]. The HIIK's annual Conflict Barometer defines conflict as "the clashing of interests (positional differences) over national values of some duration and magnitude between at least two parties (organized groups, states, groups of states, organizations) that are determined to pursue their interests and win their cases" (HIIK, 2006, p. 0) and distinguishes five levels of conflict intensity: (1) latent, if respective demands are articulated by one of the parties and perceived by the other as such; (2) manifest, if conflict measures are pre-violent; (3) crisis, if at least one of the parties uses violent force in sporadic incidents; (4) severe crisis, if violent force is repeatedly used in an organized way; and (5) war, if violent force is used with a certain continuity in an organized and systematic way. For the purpose of this research, we use

[7] For a detailed analysis of measures of conflict intensity see Boemcken and Krieger, 2006. The annual HIIK Conflict Barometer can be found at http://www.hiik.de/konfliktbarometer/index.html.en (last accessed 6 February, 2008).

the HIIK data to test hypotheses for conflicts of different intensity levels. Tests were conducted using the ordinal conflict intensity scale provided by the HIIK data as well as a binary variable differentiating between non-violent (HIIK: '1' and '2') and violent (HIIK: '3'–'5') conflicts (see below).

In addition to assuming that level of conflict intensity and conflict duration are inversely related to resource governance (cf. Collier, 2007; Basedau, 2005; Collier et al., 2003; Stevens 2003), we also tested the reverse hypothesis: that the quality of resource governance is positively correlated with sustainable peace. In a recent study, Sambanis (2007) examined the extent to which post-conflict states sustain a participatory peace, defined as the ability to "resolve the natural conflicts to which all societies are prone by means other than war" (2007, p. 3). Sambanis coded 'peace duration' as a "continuous variable in months, counting from the start of a peace process until the peace fails or up to a censoring point" (2007, p. 17), which in his data was December 1999. Adapting this logic, we hypothesized that, for post-conflict countries, level of resource governance was inversely related to probability of relapse into conflict, as measured by the proxy variable 'peace duration'.

METHODOLOGY AND HYPOTHESES

The present analysis focuses on three meta-variables: natural resources (type, abundance, dependence), conflict (duration and level of intensity), and resource governance (combining general measures of good governance with resource specific governance indicators such as resource regime compliance). Our main premise is that economic-logic-based explanations of the dynamic relationship between resources and conflict are insufficient in explaining the correlation between the occurrence of natural resources and the outbreak and duration of violent conflict. Instead, we suggest that the observed correlations are a result of the quality of the governance of those resources. Our specific contribution to the study of the resource-conflict dynamic lies in the fact that we measure resource governance and its effects on duration and levels of intensity of conflict in resource-rich countries.[8]

Specifically, we tested the following hypotheses, grouped in terms of binary relationships among the meta-variables V1–V4:

- **H1. On the relationship between natural resources (V3) and conflict (V2):**
    - H1.1. Resource abundance increases the risk of violent conflict.
    - H1.2. The higher the resource dependence, the higher the risk of violent conflict.
    - H1.3. The higher the resource dependence, the higher the level of conflict intensity.
    - H1.4. Different types of resources (fuel vs. agriculture) have different impacts on internal conflict.
    - H1.5. Hydrocarbon-rich countries are more prone to violent conflict.

[8] In this context it is important to note that the statistical analysis involving type of natural resource was limited to countries that are rich in fuels/hydrocarbons and agricultural resources8. We explicitly recognize that other types of resources, especially minerals and timber, might have distinctly different effects on conflict onset and escalation. However, due to the limited number of countries (N < 30) that show at least mild dependence on these resources, no valid statistical analysis could be performed. It is therefore recommended to examine the impact of these types of resources on conflict risk and duration in future research using case study methodology.

- H1.6. The level of conflict intensity tends to be higher in hydrocarbon-rich countries.

- **H2. On the relationship between resource governance (V1) and conflict (V2):**
  - H2.1. Good resource governance reduces the duration of violent conflict.
  - H2.2. Good resource governance reduces the level of conflict intensity.
  - H2.3. Good resource governance increases the prospects of peace (duration).
  - H2.4. A history of violent conflict leads to improved resource governance.
  - H2.5. Good resource governance reduces the risk of violent conflict.
  - H2.6. Good resource governance will improve state stability and lead to decreasing military expenditures[9].
- **H3. On the relationship between natural resource (V3) and resource governance (V1)**
  - H3.1. The type of natural resource (fuels, agriculture and hydrocarbon-rich) determines the level of resource governance.
  - H3.2. The higher the resource abundance, the higher the level of resource governance.
  - H3.3. Resource governance tends to be lower in hydrocarbon-rich countries.
- **H4. General contextual relationships:**
  - H4.1. Good (resource) governance improves the living conditions (socio-economic well-being) within a country, as measured by GNI.
  - H4.2. The risk of violent conflict tends to be higher in low-income countries.

The following section describes the statistical methods used to test these hypotheses, and presents the results of the various tests.

DATA ANALYSIS AND RESULTS

The three-way relationship between natural resources, resource governance and violent conflict was analyzed using secondary data ranging from sources including the World Bank, the United Nations, and various research institutes and private foundations (see Appendix). We compiled data on a total of 198 variables for 90 countries that either met the selection criterion of mild resource dependence (a minimum of 10 percent of a country's GDP stem from aggregated primary commodity exports (food and agricultural products, raw materials, fuels, and ores and metals) or were thought to serve as important countries for baseline comparisons (with Australia, Canada, Germany, and Norway serving as best-practice examples). Data were entered separately for each year for the time period 1996–2006[10]. In order to provide data continuity in cases where indicators are not updated annually, we retained the last available value for each subsequent year until an update was available.

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9 This hypothesis is based largely on the assumption that the level of military spending reflects the risk of civil war and that high military spending in post-conflict situations makes further conflict substantially more likely (see Collier, 2007).

10 Country profiles for each year under analysis are available at www.bicc.de/rcm or at www.resource-conflict-monitor.org.

Measuring resource governance

The Resource Governance Index (RGI) was created by taking the average of the linear normalization of ten indicators for 90 countries across 11 years, from 1996 until 2006. The indicators used in the model refer to six general governance measures (regime type, political rights, civil liberties, press freedom, freedom of assembly and association, and workers' rights) and four specific resource-related measures (nationally protected land as percentage of total land area, resource regime compliance index, wealth redistribution, and resource independence)[11]. Initially, we included 12 variables in the model[12]. RGI was regressed against all 12 in a step-wise regression to determine which variable(s) significantly improved the ability of the model to predict the RGI. We conducted a removal test to determine whether redundant predictors could be deleted. Two variables—GINI and corruption perception index (GCB)—were removed from the model due to missing data for several countries. The resulting RGI model is now explained by 10 variables[13]:

> RGI = regime type + political rights + civil liberties + press freedom + association + workers' rights + RRI + proland + resource independence + wealth redistribution

The Resource Regime Compliance Index (RRI) represents the proportion of international treaties, conventions and agreements that a country has ratified in relation to the total number of treaties applicable to that country. Since the total number of treaties applicable to each country is not the same, RRI was occurrence normalized[14] such that

$$nRRI_c = \frac{\sum_{y=1}^{x} Treaties_{y,c}}{x * [Max(Treaties)]} \qquad (1)$$

where
y= years
c= country
x= total number of years in the dataset

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11 Regime type data was taken from the Polity IV Project (http://www.cidcm.umd.edu/polity/); data on political rights, civil liberties and press freedom came from the Freedom House reports (http://www.freedomhouse.org); data on freedom of assembly and association and workers' rights came from the Cingranelli-Richards human rights data set (http://ciri.binghamton.edu/documentation.asp). Data on nationally protected land areas came from the world development indicators of the World Bank at http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:21298138~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html, last accessed 10 December 2007.

12 The variables included in the RGI were first selected through conceptual relation to resource governance as defined in the present context and data availability for the period of analysis (1996–2006). Because of a lack of previous work on measuring resource governance, we developed and tested a simple quantitative-additive model assuming equal weights for all predictor variables. Most important in the present context is to capture resource governance using a combination of available resource specific and governance-specific parameters. Future research should examine the extent to which different predictor variables determine the quality of resource governance in different ways and magnitude.

13 The 10-variable Resource Governance Index showed high internal validity (Cronbach's alpha = 0.919).

14 Normalization is performed by linearly standardizing each variable to fall between 0 and 1 resulting in an equally weighted set of indicators. To normalize a variable for a certain year over all countries, all column values were divided by the highest occurring value in that same column (this value automatically becomes 1).

Wealth Redistribution was calculated by summing up health and education expenditures as a percentage of total government expenses, per country, per year, and was normalized based on occurrence.

$$Wealth\ \mathrm{Re}distribution = \frac{\sum_{y=1}^{x} Health_{y,c} + Education_{y,c}}{x * [Max(Health + Education)]} \quad (2)$$

We obtained the variable Resource Independence in two steps. First, we calculated resource dependence as the proportion of natural resource revenue from total merchandise exports (in ´000 US-$)[15]. Resource revenues were calculated in terms of published market value and, therefore, do not reflect the actual price obtained in the exchange. Thus, the figures used reflect only an approximation of resource dependence and resource availability. Nevertheless, they are an important proxy for determining the extent to which a country depends on natural resources for socioeconomic well-being, stability and development. After normalizing the results, scoring was reversed using the equation *Resource Independence = 1 – Resource Dependence* to reflect the predicted direction of the relationship.

The Resource Governance Index (RGI) is then the average of all normalized values per country such that:

$$RGIc = \frac{\sum_{y=1}^{x}\sum_{v=1}^{w} nI_{y,v,c}}{x * w} \quad ; \ x = 11, \ w = 10 \quad (3)$$

where
c= country
y= year
x= total number of years in dataset
v= variables
nI= normalized indicator

Results were multiplied by a scaling factor of 100 for presentation purposes, so that values fall between 0 and 100.

Initially, countries with missing data for certain years or variables were penalized in the RGI since missing data was interpreted as 0, although the true value is unknown. Therefore, we calculated an Occurrence Normalized RGI where missing data was not considered in the linear averaging. Country rankings in the RGI and the Occurrence Normalized RGI did not vary significantly, because countries with missing data tended to rank low in RGI in the first place. Nevertheless, since the Occurrence Normalized RGI is more exact, we used it for all further analysis.

[15] In the database, we totaled revenues from oil, gas, coal, diamonds, gold, copper, iron, bauxite, lead, nickel, silver, tin, uranium, zinc, gemstones, tantalum, cobalt, sugar, coffee, cocoa, poppy, cotton, rubber, and ivory.

ANALYSIS OF PANEL DATA

The dataset possesses characteristics of panel data where:

Y_{it} = the value of the dependent variable for cross section unit *i* at time *t* where $i = 1,...n\ (n = 92)$ and $t = 1,...T\ (T = 11)$

X_{it}^{j} = the value of the *j*th explanatory variable for unit *i* at time *t*. There are K explanatory variables indexed by $j = 1,...K\ (K = 27)$.

The dataset is balanced, which means that there are an equal number of observations on each cross-section unit, so that the total number of observations is $n * \mathrm{T}$. Therefore, panel data techniques were used to analyze the dataset. Following Johnston and diNardo (1997, p. 389), a standard linear model for a pooled estimator that ignores the panel structure of the dataset can be expressed as:

$$y = \mathrm{X}\beta + \varepsilon \qquad (4)$$

We assume that $\varepsilon_{it} \sim iid\left(0, \sigma^2\right)$ for all *i* and *t*. This means, for a given country, observations are serially uncorrelated, with homoscedastic errors across countries and time. This model is efficiently estimated by stacking the data and using straightforward OLS such that:

$$\text{where } yi = \begin{bmatrix} y_{i1} \\ y_{i2} \\ \mathrm{M} \\ y_{iT} \end{bmatrix} \mathrm{X}_i = \begin{bmatrix} \mathrm{X}_{i1}^{1} & \mathrm{X}_{i1}^{2} & \Lambda & \mathrm{X}_{i1}^{K} \\ \mathrm{X}_{i2}^{1} & \mathrm{X}_{i2}^{2} & \Lambda & \mathrm{X}_{i2}^{K} \\ \mathrm{M} & \mathrm{M} & \mathrm{O} & \mathrm{M} \\ \mathrm{X}_{iT}^{1} & \mathrm{X}_{iT}^{2} & \Lambda & \mathrm{X}_{iT}^{K} \end{bmatrix} \beta = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \mathrm{M} \\ \beta_k \end{bmatrix} \varepsilon_i = \begin{bmatrix} \varepsilon_{i1} \\ \varepsilon_{i2} \\ \mathrm{M} \\ \varepsilon_{iT} \end{bmatrix} \qquad (5)$$

To exploit the panel nature of the data, we estimate further using a random effects model beginning with the following structure:

$$y_{it} = \mathrm{X}_{it}\beta + \varepsilon_{it} \qquad (6)$$

where $\varepsilon_{it} = \alpha_i + \eta_{it}$

Basically, the random effects model deals with the fact that *T* observations on *n* countries are not the same as observations on *nT* different countries. We assume that the unobserved effect η_{it} is uncorrelated with X_{it}. Using the random effects model as compared to OLS is more efficient and results in consistent β estimates with normally distributed standard errors. Note that the random effects estimator reduces to the pooled estimator with a single cross section when the variance of the individual components is zero.

Theoretical model for multiple regression

Multiple regression analysis was used to test several relationships between the dependent variable *y* and several explanatory variables $x_1, x_2, ...x_k$ in the database. Shown in Table 1 are the tests conducted, where H represents the hypothesis between the dependent variable(s) and their corresponding explanatory variables. The predicted relationships are shown in parentheses.

For example, the basic single equation multiple regression model for testing the relationship of conflict intensity against resource governance, resource dependency, type of resource, military expenditures and a dummy variable for hydrocarbon-rich countries is expressed as:

$$Conflict\ Intensity_t = \beta_1 + \beta_2 RGI_2 + \beta_3 \text{Re}source\ Dependency_3 + ... \\ + \beta_k Type\ of\ \text{Re}source_{kt} + military\ \text{exp}enditures + dummy\ hydrocarbon\ rich + u_t \quad (7)$$

Theoretical model for logistic regression

We used binary logistic regression to test the probability of the onset of violent conflict (values of '1' and '2' from the HIIK data were collapsed and coded as '0' = "non-violent conflict" and values of '3'-'5' were collapsed and coded as '1' = "violent conflict") against several explanatory variables. The onset of conflict is said to be the unobservable latent variable y_i^* which is a linear function of conditioning variables so that:

$$yi^* = x'_i \beta + u_i = \sum_j x_{ji}\ \beta_j + u_i \quad where \quad u_i \sim \ (0, \sigma^2) \qquad (8)$$

Since yi* is not observable, what is observed is

$$when\ y_i^* > 0,\ y_i = 1$$

$$when\ yi^* < 0,\ y_i = 0$$

Notice that the probability of (y_i = 1) = probability (y_i* >0) = probability (u_i > -$x_i'\beta$). The Logit model that constrains the estimated probabilities to lie between 0 and 1 is as follows:

$$prob\ (y_i = 1) = \frac{e^{x'\beta_i}}{1 + e^{x'\beta_i}}$$

$$and \qquad (9)$$

$$prob\ (y_i = 0) = 1 - \frac{e^{x'\beta_i}}{1 + e^{x'\beta_i}}$$

In addition to the OLS analysis, we also conducted a logistic regression examining the probability of violent conflict as influenced by RGI, resource abundance, resource dependence, dummy for hydrocarbon-rich countries, and gross national income (GNI) *per capita* . The logit model operates under the assumption that the cumulative distribution function for the disturbance term is normally distributed. The parameters βk can be determined by maximizing the value of the log likelihood function.

Table 1: OLS Regression Results

Independent variables:	Dependent variables:					
	Conflict intensity	Conflict duration	Peace duration	Socioeconomic well-being (proxy: GNI)	State stability (proxy: Military expenditures)	Resource Governance Index (RGI)
RGI (0-100)	-0.007**	-0.677**	1.160***	0.003***	-0.001**	
Resource abundance						0.001
Resource dependence	0.283					
Type of resource						
▪ fuels (as % of merchandise exports)	0.053	14.333				-11.304
▪ agricultural (as % of merchandise exports)	-0.559*	-50.352*				29.060**
Military expenditures (as % of total government expenditures)						
Dummy for hydrocarbon rich	0.196*					-13.754**
History of conflict						-13.712***

*** significant at $p<0.001$; ** significant at $p< 0.01$; * significant at $p<0.05$.

Note: Cell shading in light gray indicates direction as hypothesized; medium gray indicates hypothesized direction as significant; dark gray indicates direction opposite of hypothesized relationship

We further hypothesized that different types of resources would affect internal conflict differently (H1.4.). The analysis showed this to be the case. Fuels tended to increase the risk of conflict and, once conflict started, its duration. Here we can only report a tendency but not a significant relationship. By contrast, we found significant positive effects on lowering conflict intensity and duration with respect to agricultural resources. Moreover, the quality of resource governance appeared to be lower for fuels than for agricultural resources, as indicated by the direction of each respective relationship. In addition and as hypothesized, we found that hydrocarbon-rich countries were significantly more prone to risk of conflict (H.1.5., see Table 2), and conflicts tended to be more violent (H.1.6., see Table 1).[16]

[16] Attempts to compare resource-rich countries in terms of 'diffuse' vs. 'point-source' resource extraction and lootability rendered sub-samples too small (N < 30) for subsequent statistical analyses. Therefore, these important factors could not be examined empirically in the present context.

Although resource abundance (H1.1.) and resource dependence (H1.2.) showed the hypothesized effects (increase in the likelihood and intensity of violent conflict), these relationships were not statistically significant. Since our results here are non-conclusive, further research should retest these hypotheses using more precise measures for resource dependence and abundance (see above).

Table 2. Determinants of violent conflict

Independent variables	**Dependent variables: violent conflict**	
	Model 1	Model 2 (Collier et al. retest)
Resource abundance	-0.001	
Resource availability (average of fuel and agricultural exports)		-0.314
Resource dependence (proportion of natural resource revenue from total merchandise exports, in ´000 US$)	1.359	1.359
RGI (0-100)	-0.036**	
Dummy for hydrocarbon rich (=1, if yes)	0.914*	
Gross National Income *per capita* (in US$)	-26.523**	-26.523**

*** significant at $p<0.001$; ** significant at $p< 0.01$; * significant at $p<0.05$.

Note: Cell shading in light gray indicates direction as hypothesized; medium gray indicates hypothesized direction as significant; dark gray indicates direction opposite of hypothesized relationship.

Conducting a binary logistic regression to examine the effects of resource abundance, resource availability, resource dependence, RGI, hydrocarbon-rich, and GNI *per capita* on the occurrence of violent conflict (coded as a dummy variable, see above), revealed very similar results to those of the OLS regression (see Table 2)[17]. Good resource governance (i.e. high RGI), higher income, and low corruption significantly reduced the propensity of violent conflict, while resource dependence tended to increase conflict risk, although our test results were not statistically significant. In addition to the basic logit model (Model 1), we also retested some of Collier's (Collier et al., 2003; Collier and Hoeffler, 2000) earlier assumptions in a second model (see Table 2, Model 2). Our results show that low GNI significantly increases the propensity of violent conflict, which confirms Collier et al.'s findings that low-income countries are at higher risk of civil war (see H4.2.). In addition, we also found that resource dependence tended to correlate positively with violent conflict. Although this finding was also consistent with Collier's, the relationship was not statistically significant for our sample. Interesting to note is that in our model both resource abundance and resource availability tended to reduce the likelihood of violent conflict. While this result was not statistically significant, its direction nonetheless contradicted both our own hypothesis (H1.1.) as well as Collier et al.'s (2003) earlier findings.

[17] In addition to the binary logisitc regression on the determinants of violent conflict, we also tested the marginal effects for probability of violent conflict (i.e., testing the effect that a one-unit change in each independent variable has on the dependent variable). The results mirrored the results shown in Table 4 both in direction and significance.

CLUSTERING RGI

In addition to the panel data analysis, we also conducted a cluster analysis based on grouping countries together according to their level of resource governance. Rank-ordering countries according to RGI scores is highly subjective implying that the mathematically calculated resource governance scores reflect actual differences between countries and allow for determining the exact position of each country within a hierarchy of resource governance. Of course, we can neither claim this level of precision nor do we want to imply exact judgments about the standing of individual countries. Therefore, we decided to group countries into clusters reflecting a statistical assessment of the quality of resource governance. For this purpose we conducted hierarchical cluster analysis using *average linkage between groups* to check for interdependent relationships between countries. The primary objective was to group countries into homogenous clusters based on their resource- and governance-specific parameters across time.[18]

After *average linkage clustering*, four clusters were formed which were comprised of two big groups and two smaller groups. The two smaller clusters partitioned early at cluster distance 5, therefore, increasing the partition distance to 15 resulted in the merging of the two smaller clusters into one relatively bigger group. This resulted in three groups with a more balanced distribution of countries. Then, using the stricter *K-means* cluster analysis specifying three groups, three final country clusters were formed: Group 1 with 16 countries exhibiting low RGI, Group 2 with 45 countries exhibiting medium RGI, and Group 3 with 30 countries exhibiting high RGI. Table 3 shows the country clusters.

Table 3. Resource Governance Index: Country clusters

High RGI (N = 30)	Medium RGI (N = 45)	Low RGI (N = 16)
Argentina, Australia, Benin, Bolivia, Botswana, Canada, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Estonia, Germany, Guyana, Honduras, Hungary, Latvia, Lithuania, Malawi, Mali, Mauritius, Moldova, Mongolia, Namibia, Nicaragua, Norway, Slovak Republic, Trinidad and Tobago, Uruguay, Venezuela.	Algeria, Angola, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Burundi, Cameroon, Chad, Republic of the Congo, Cote d'Ivoire, Cuba, Eritrea, Fiji, Gabon, Ghana, Guinea, Guinea-Bissau, Indonesia, Kazakhstan, Kenya, Kyrgyz Republic, Lesotho, Liberia, Madagascar, Malaysia, Mauritania, Mozambique, Nepal, Niger, Nigeria, Peru, Russian Federation, Sao Tome and Principe, Senegal, Sierra Leone, Swaziland, Tanzania, Thailand, Timor-Leste, Togo, Ukraine, Yemen, Zambia, Zimbabwe.	Afghanistan, Burma, Congo, Dem. Rep., Equatorial Guinea, Iran, Iraq, Democratic Peoples Republic of Korea, Lao People's Democratic Republic, Libya, Oman, Somalia, Sudan, Syria, Turkmenistan, Uzbekistan, Vietnam.

Apart from sharing similar RGI scores, countries in the same cluster display a range of other common characteristics (all comparisons discussed here pertain to between-cluster differences only). Countries with low RGI tend to display typical features of state fragility: low GDP, GNI, RRI, and regime authority (as measured by polity data). At the same time, low RGI countries tend to score higher on indices measuring political

[18] In average linkage clustering, the distance between one cluster *x* and another cluster *y* is considered to be the mean of all pair-wise distances between items contained in *x* and *y*. Objects belonging to a cluster group are said to be relatively similar in terms of the variables considered in clustering them and different from the objects in other groups.

instability, corruption, and military expenditures. By contrast, countries with high RGI are characterized by high political stability, regime authority, GDP, GNI, RRI and low corruption and military expenditures. Countries with medium RGI fall mostly in between in all categories, except they tend to be mostly mineral-rich and had experienced the highest occurrence of conflict in the past ten years.

Multivariate Analysis of Variance (MANOVA) for all clusters revealed statistically significant between-group differences for all but one (mineral rich) of the predictor variables. As expected, within-group differences were insignificant. Table 4 shows the results of the means difference tests between clusters for the normalized variables. In general, the analysis corroborates the findings of the OLS and logistic regressions and confirms the importance of good resource governance as a possible means to prevent or overcome the resource-conflict trap. Countries with good resource governance (high RGI) tend to have higher regime authority and be significantly more stable politically (H2.6.), less corrupt and more compliant with international norms. Economically, their income levels were significantly higher and they spent less on the military, which in turn may indicate higher political stability/lower state fragility.

As expected, countries with good resource governance had also experienced less violent conflict in the past. The fact that countries with medium RGI tended to have the most violent recent history, may indeed suggest that a history of violent conflict will lead to improved resource governance (H2.4.). However, further analysis in the form of in-depth country case studies is needed to substantiate this assumption further. As hypothesized (H3.1.), and consistent with the literature (cf. Siegle, 2007), hydrocarbon-rich countries displayed low RGI.

Table 4. Means difference test for clusters by level of resource governance (RGI)

Variables	**Low RGI**		**Medium RGI**		**High RGI**		**Means differences**		
	Mean	*Std Dev*	*Mean*	*Std Dev*	*Mean*	*Std Dev*	*Low/ medium*	*Medium/ high*	Low/high
Regime type	0.388	0.121	0.623	0.260	0.997	0.017	0.235***	0.374***	0.609***
Corruption perception	0.099	0.076	0.159	0.111	0.408	0.263	0.060*	0.249***	0.309***
RRI	0.391	0.166	0.625	0.151	0.728	0.119	0.234***	0.103***	0.337***
GNI	0.019	0.035	0.022	0.023	0.153	0.232	0.003	0.131**	0.134**
Military expenditures	0.166	0.195	0.127	0.134	0.074	0.039	0.039	0.053**	0.092*
Conflict history	0.563	0.512	0.667	0.477	0.200	0.407	0.104	0.467***	0.363**
Hydrocarbon-rich	0.625	0.500	0.244	0.435	0.167	0.379	0.381**	0.077	0.458**
Mineral-rich	0.125	0.341	0.200	0.405	0.133	0.346	0.075	0.067	0.008
Political stability	0.449	0.266	0.529	0.173	0.755	0.174	0.800	0.226***	0.306***
GDP	0.008	0.014	0.013	0.030	0.067	0.191	0.005	0.054	0.059

*** significant at $p<0.001$; ** significant at $p< 0.01$; * significant at $p<0.05$.

Surprising at first is the fact that GDP seemed unrelated to RGI. However, much of the missing significance of this correlation can be explained by the large standard deviation in the high RGI cluster, which comprises countries ranging from the highest (Australia, Germany, Norway) to among the lowest GDP (Mali, Malawi). Interesting in this context is the fact that resource governance is not a determinant of a state's economic power. Of course, the observed result could be due again to the type of resources prevalent,

especially in developing countries (see H3.1.). For the purpose of the present analysis, for example, Malawi's sole resource was coal; Mali reported diamond, copper and iron as relevant resources for 2006. Thus, only very few resource regimes exist. Consequently, signing on to those boosts a country's RRI which, in turn, enhances RGI. Future research should examine more closely the relationship between type of resource and general/resource specific governance. Here again country case studies might be necessary.

In sum, the results of the present analysis confirm the overall premise of this research: that the governance of natural resources is an important and, to date, largely unexamined intervening variable that can effectively contribute to the prevention of resource-related conflict especially in poor developing countries.

DISCUSSION AND CONCLUSIONS

For many developing countries, the extraction of natural resources has been a blessing, as their export can provide urgently needed development capital. For others, however, resource wealth has been a curse, as their population still faces extreme poverty, and they have been haunted by corruption, government failure and violent conflict. The present analysis has shown that the relationship between natural resources and violent conflict is shaped to a large extent by the quality of the governance of those resources, which in turn is a correlate of good governance in general. While political and institutional deficits have been widely cited as sources for economic failure and violent conflict (cf. Auty, 2007; Bleischwitz and Bringezu, 2007; Collier, 2007; Siegle, 2007; Collier et al., 2003; Collier and Hoeffler, 2000), there has not yet been any systematic empirical analysis of the impact of governance factors on the resource-conflict dynamic. With the present study, we have intended to close this gap by examining the impact of resource governance on the risk, duration and intensity of violent conflict for a sample of 90 countries for the period 1996–2006.

The analysis confirms that resource abundance as well as resource dependence positively correlate with both the risk and the duration of violent conflict. The analysis also shows that the risk of violent conflict is significantly higher in hydrocarbon-rich countries than in countries rich in other natural resources and that good governance—both in general and resource-specific—diminishes the risk of violent conflict.

Successful countries tend to invest their revenues from the extraction and export of natural resources in physical and human capital and improving their social services and legal systems (Bleischwitz and Bringezu, 2007; Gallagher and Rozner, 2007). Our results confirm the assumption that good (resource) governance increases state stability and, in countries that had experienced violent conflict, the duration of peace. This suggests that the redistribution of resource wealth to improve living conditions/social well-being is a necessary, though not sufficient, condition for peaceful and sustainable development.

The present analysis also indicates that the effectiveness of resource governance can be improved through the development of measures to reduce/safeguard against corruption as well as the transparent management of revenues and their partial allocation for purposes of sustainable and diversified development. International resource regimes such as the Kimberly Certification Scheme and the Extractive Industries Transparency Initiative (EITI) have already improved resource governance and lowered conflict risk. Our analysis clearly shows a positive correlation between the resource regime

compliance index (RRI) and resource governance and peace duration. Thus, initiatives to regulate resource trade are demonstrating effectiveness, supporting calls for expanding regulatory measures to the extraction of and trade with all types of natural resources. A number of recent studies have advocated the establishment of resource funds for resource-rich countries with a focus on transparency in the distribution of those funds for sustainable development with the specified goal to benefit the most needy (Collier, 2007; see also Auty, 2007; Bleischwitz and Bringezu, 2007). Based on the results of the present analysis, we fully endorse measures that will further improve resource governance and, subsequently, living conditions and socioeconomic well-being.

In particular, this could mean creating "resources for development" programs, which promote resource management, revenue management and environmental protection (cf. Bleischwitz and Bringezu, 2007, p. 7). Targeted development assistance, focusing for example on such objectives as promoting good governance, transparency, the rule of law, or resource conservation could fairly quickly result in tangible improvements in specific resource governance sectors. For instance, development assistance could aim at avoiding the overexploitation of natural resources, protect the regional environment and/or improve socioeconomic, political or institutional conditions. All factors comprising the Resource Governance Index (RGI) were statistically significant in their impact on overall resource governance. Consequently, development assistance targeting any or any combination of these factors is likely to contribute to the desired impact(s): improving state stability, reducing the risk of violent conflict, and facilitating sustainable peace and development.

The present research has demonstrated empirically that improving resource governance should be a key focus of development assistance, particularly to resource-rich countries. But effective resource governance requires cooperation at the international, regional, national and local levels. Any regulation is only as effective as it is implemented and adhered to in the local context. Therefore, it is critically important to accompany development aid to national governments with assistance programs that also address the concerns of, for instance, small-scale enterprises and artisinal mining. Promoting effective resource governance also means supporting responsible local ownership. This, in turn, requires being cognizant of and avoiding enhancing asymmetries between small local firms and large and multinational corporations. But it also requires avoiding "a 'gold-digger mentality' which yields short-term profits and devastates large tracts of the country" (Bleischwitz and Bringezu, 2007, p. 7). Recent studies have shown the importance of taking into account the specifics of the local context (Böge, 2007). Given the results of the present analysis, we also endorse a careful combination of top-down and bottom-up approaches to resource management and governance.

While our research succeeds in its primary objective, namely to measure resource governance and to demonstrate its impact on the resource-conflict dynamic, it also raises a number of important questions that point to the need for subsequent substantive research. For instance, statistical analysis of risk and duration of violent conflict as a correlate of resource type (other than for fuels and agricultural commodities), lootability, or resource-specific extraction methods was not possible due to insufficient sub-sample sizes. Nevertheless, these are important factors determining propensity to escalate or continue violent conflict and should, therefore, be examined more closely either through in-depth country/conflict case studies or the employment of specific small-sample statistical techniques.

The present analysis also suffers from data availability restrictions, since data for a number of important variables was not available across countries and years, including GINI, corruption perception index, unemployment, and actual resource revenues. It is hoped that the availability of the World Bank's CPIA data since 2005 will enable a more precise analysis of the effects of resource governance in the future.

This study set out to explore the impact of resource governance as a variable intervening in the resource-conflict dynamic. The analysis demonstrated the importance of good (resource) governance for prevention and de-escalation of resource-related conflicts. As a result of the present analysis, strengthening good governance in general and good resource governance in particular are concrete measures the international community must take to reverse the resource curse and build sustainable peace and development. Our findings indicate that steps currently under-way internationally to boost the governance of natural resources are encouraging and that efforts to improve resource governance at all levels are important steps to break the resource-conflict trap and improve the living conditions for those in most need.

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