Oil, Drugs, and Diamonds:
How Do Natural Resources Vary in their Impact on Civil War?

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Introduction

According to several recent studies, when states rely more heavily on the export of natural resources, they are more likely to suffer from civil war. But are all types of commercially-valuable natural resources – including oil, hard-rock minerals, gemstones, timber, agricultural commodities, and illegal drugs – equally likely to lead to civil war? Do different types of resources have different effects on conflict?

This paper is a modest effort to both describe how different types of resources have influenced recent conflicts, and to develop hypotheses that can be tested in future studies. It begins by showing that of all major types of natural resources, diamonds and drugs are most strongly associated with the civil wars that occurred between 1990 and 2000. The second section offers seven hypotheses about how three characteristics of natural resources – their lootability, their obstructability, and their legality – are likely to influence civil wars. The hypotheses are illustrated by evidence from 15 recent conflicts in which natural resources played some role [Table 1]. The paper concludes by discussing the implications of these hypotheses for different types of natural resources.

The paper has four main arguments. The first is that resources have sharply different effects in separatist conflicts and non-separatist conflicts. The second is that the type of impact that a resource has largely depends on whether or not it is "lootable" – that is, whether it can be easily appropriated by individuals or small groups of unskilled workers. The third argument is that lootable resources – such as diamonds and drugs – make non-separatist conflicts more likely to start, and once they begin, harder to resolve; but they pose little danger of igniting separatist conflicts. Finally, it suggests that unlootable resources – like oil, natural gas, and deep-shaft minerals – tend to produce

separatist conflicts, but seldom influence non-separatist conflicts. In a nutshell, lootable resources are bad for non-separatist conflicts, and unlootable resources are bad for separatist conflicts.

It is important to note that this paper illustrates but does not test these arguments, and the hypotheses that under gird them. The hypotheses were derived from the 15 cases. To determine whether they are valid beyond these cases – and hence have predictive value, not just descriptive value – they should be tested with a different data set.

1. Civil Wars Among Resource-Rich States

There is good evidence that resources and civil wars are causally linked.[1] Several studies have found a strong statistical correlation between a state's reliance on the export of natural resources, and either the likelihood it will suffer from civil war [Collier and Hoeffler 1998, 2001; de Soysa 2000; Elbadawi and Sambanis 2001], or alternatively, the duration of civil wars once they commence [Fearon 2001].

There is also good evidence at the case study level that natural resources have contributed to the onset, duration, and intensity of civil wars in a large number of instances. A study by Ross [2001], drawing on case studies of thirteen conflicts between 1994 and 2000, finds that natural resources can influence the occurrence, duration, and intensity of war; that lootable resources have different characteristics than unlootable

[1] Like most scholars, I define civil wars as conflicts that a) occur within the recognized boundaries of a single state; b) involve combat between the state and at least one organized rebel force; and c) result in at least one thousand deaths during a single calendar year. I use the database assembled by Collier and Hoeffler [2001] to determine when civil wars have occurred.

resources; and resources tend to influence separatist conflicts in different ways than non-separatist conflicts.

But are all natural resources equally at fault? Are some types of resources more likely to generate, or lengthen, civil conflict than others?

One way to address this question is to observe a sample of civil wars in which resources played some role, and take note of what type of resources were involved. Table 1 summarizes information about 12 civil wars, plus three low-level conflicts, that occurred between 1994 and 2000 and have been causally linked to the exploitation of natural resources in case studies [Ross 2001]. The resources most frequently linked to civil conflict are: diamonds and other gemstones (seven conflicts, all of them civil wars); oil and natural gas (seven conflicts, including six wars); illicit drugs (five conflicts, all of them civil wars); copper or gold (four conflicts, including two wars); and timber (three conflicts, all civil wars). Legal agricultural crops played a role in two conflicts (both civil wars), although in each case other natural resources played larger roles.

While this type of analysis has some value, it is unsatisfying in at least two ways. First, some types of natural resources are more common than others; this alone might explain why there are more civil wars in states that produce oil (which is relatively common) than states that produce copper (which is less common). What we would like to know is whether civil wars occur at anomalously high rates among the producers of a given commodity: for example, do civil wars occur more frequently among oil producers than non-oil producers? And among copper producers than among non-producers? Second, there may be subtle causal links between civil wars and natural resources that are

difficult to observe in case studies; for this reason they may have been wrongly left off the list in Table 1.

One simple way to address these problems is to see if civil wars occur at different rates among states that are highly-dependent, moderately-dependent, or minimally-dependent on the export or production of a given resource. If civil wars occur at higher-than-normal rate among states that are highly-dependent on a given resource, it would imply that the resource is tied to the occurrence of conflict.[2]

Table 2a shows a simple tabulation of civil war rates between 1990 and 2000, by level of resource-dependence. Resources are divided into four categories, as given in World Bank [2001]: oil, gas, and other fuel-based minerals; nonfuel minerals, excluding gemstones; food-based agricultural exports; and nonfood agricultural exports, including timber but excluding illegal drugs. The cross-tabulations show the civil war rate among countries that ranked in the top, middle, or bottom third of all states in the ratio of resource exports to GDP in 1995, the mid-point of the decade.[3]

Between 1990 and 2000, 32 out of 161 countries surveyed had civil wars; this means that for any random country, there was a .199 chance (i.e., about one in five) of

[2] Collier and Hoeffler [2001] suggest that the relationship between resource dependence and civil wars is curvilinear, so that the danger of civil war peaks when resource dependence reaches a relatively high level, but declines at the very highest levels. Other scholars estimate the relationship between resource dependence and civil war to be linear. Both estimates would predict a higher civil war rate among the top one-third of resource-dependent states than the middle and bottom thirds.

[3] I chose 1995 because it is the year for which the greatest quantity of data are available, by far. By comparing 1995 levels of resource dependence to decade-long civil war rates, I am increasing the danger of endogeneity – that is, that causation may be running in both directions. On the problem of endogeneity in assessing the relationship between natural resources and civil conflict, see Ross [2001].

suffering from a civil war at some point in the 1990s [Collier and Hoeffler 2001].[4] As Table 2a shows, civil wars occurred at slightly *lower* rates among states that were highly-dependent on resource exports in all four categories. [5]

One reason why there is no obvious correlation in this table between resource dependence and civil war rates is that other factors – most importantly, income per capita – are not controlled for. A second reason is that these standard four categories exclude (or in the case of timber, fail to isolate) several types of resources that have been most visibly linked to conflict in the media: diamonds, timber, and illicit drugs.

To address the first shortcoming, Table 2b adjusts the figures in Table 2a by dividing the resource-export-to-GDP ratio by each country's income per capita, producing a figure that simultaneously reflects both resource dependence and per capita wealth. In this table resource dependent countries are at a notably higher risk of civil war. There is no obvious difference among resource types: all types of resource dependence seem to make conflicts more likely, once per capita income has been accounted for. [6]

Tables 3, 4, and 5 address the second shortcoming. Table 3 shows the civil war rate among timber-producing states, measured in four different ways – each representing

[4] Of these 161 states, fifteen failed to produce any data on their export of natural resources, leaving a sample of 146 states with 29 civil wars for Table 2a. The rate of civil wars in this smaller sample, however, is identical to the rate in the larger sample: .199.

[5] I use the period 1990-2000 because it is easier to analyze more recent conflicts. The end of the cold war may have produced an unusually large number of resource-related wars during this decade, since it may have forced combatants in some developing countries (such as Cambodia, Afghanistan, and Angola) to replace funding from superpowers with funding from natural resource exploitation. See Keen [1998].

[6] Collier and Hoeffler [2001] find that oil is somewhat more closely tied to conflict than mining and agricultural products – although their data base does not appear to include diamonds or drugs.

an effort to see if timber production or export is in some way correlated with the incidence of conflict. The first column of numbers divides countries by the quantity of commercial timber (i.e., industrial roundwood) they produced from both natural forests and plantations in 1995; if conflict became more likely when more commercial timber was harvested, it might be apparent in this column of numbers. Of course, other things influence the amount of timber produced, such as the size of the country: the U.S. and Russia cut more timber than Gabon or Honduras, but this reflects in part their greater size. Hence, the second column, *timber/capita,* divides states by the volume of timber they produce per capita. Once again, states that are more timber-intensive do not seem to face a higher risk of civil war; in fact, they appear to face a lower risk of civil wars.

Perhaps, however, civil war becomes more likely as states grow more dependent on the export of unprocessed timber. The third column divides states by their ratios of the value of their 1995 unprocessed timber exports to their 1995 GDP – making it comparable to the figures in Table 2a.[7] As in Table 2a, there is no obvious correlation between a country's reliance on the commodity and the likelihood that it suffered from a civil war in the 1990s. Finally, the fourth column adjusts column three by dividing these figures by GDP per capita, to account for the influence of income on civil war. Even here, however, there is no evidence that greater timber dependence is associated with higher rates of conflict. This appears to contradict accounts like those of Klare [2001], which suggest that timber production or exports is linked to civil conflict.

Table 4 shows the civil war rate by production of three other commodities that are commonly faulted for "fueling" civil wars: diamonds, coca, and opium. The first column

[7] Note that the first and second columns measure the *quantity* of timber harvested, while the third and fourth measure the *value* of timber exports, as a fraction of GDP.

of numbers lists the civil war rate among diamond producers and non-diamond producers, while the second column lists separately the civil war rate for states that produced alluvial diamonds – that is, diamonds that can be extracted from riverbeds and alluvial plains, typically at a minimal cost. Although the numbers are small, the civil war rate among diamond producers is anomalously high – and among the producers of alluvial diamonds, it is exceptionally high.

The third column compares the civil war rates of coca and opium producers with the rate among non-producers.[8] I combine opium and coca producers for several reasons: they are an overlapping group of countries; the production of these drugs is highly similar in land use, transportability, and value per weight; and it is easier to make inferences about larger categories of states than smaller categories. The civil war rate is much higher among the drug-producing states than among non-producers.

Finally, Table 5 records the civil war rate among states that, according to Interpol, were "primary producers," "secondary producers," or "non-producers" of cannabis – a drug that is more widely grown, lightly penalized, and has a much lower value-to-weight ratio than coca or opium products.[9] Although the civil war rate is higher among primary producers than secondary producers, this finding appears somewhat fragile statistically: non-producers have a higher civil war rate than secondary producers; and if just a single civil war were dropped from the category, the rate among primary producers would no longer be anomalously high.

[8] I define "non-producers" as states that produced five or fewer tons of opium and coca.
[9] "Primary producers" are the main sources of internationally-traded cannabis, while "secondary producers" export lesser amounts.

The analysis in this section is exceedingly simple in statistical terms, and has several important limitations: it only considers civil wars that occurred in 1990s, not before; it is purely cross-sectional, and does not include a time-series dimension; it does not properly control for other factors that influence civil war rates; it compares civil war rates among top, middle, and bottom thirds of countries rather than examining the continuous effect of resource dependence on civil war risks; and it compares decade-long civil war rates to levels of resource dependence in 1995, the year for which the greatest quantity of data are available.

Despite these limitations, these data suggest three things. First, there is no obvious difference in the civil war rates among states dependent on the four general categories of natural resources. Second, higher rates of timber production and export do *not* appear to be linked to higher rates of civil wars. Finally, there is a strong association between civil war and both the production of diamonds – especially alluvial diamonds – and the production of drugs, especially coca and opium. What accounts for this pattern?

Few prior studies have addressed this question. An important exception is Le Billon [2001], who makes two key distinctions among resources: between those that are proximate to a national capital (and hence easier for governments to capture) and those that are distant (and hence easier for rebels to hold); and between "point source" resources, which are concentrated in a small area (and therefore more easily controlled by a single group) and diffuse resources, which are scattered over a larger area (and hence harder for any single group to capture). These two categories, he suggests, yield a fourfold typology of conflict: point-source resources near the capital create violent incentives to control the state, and hence produce coup d'etats; point-source resources

that are far from the capital produce secession movements; diffuse resources near the capital lead to rebellions and rioting; and diffuse resources far from the capital lead to "warlordism," areas of de facto sovereignty with economies built around the resource itself. The Le Billon study provides an important precedent for the analysis below.

2. Seven Hypotheses on Resources and Conflict

This section develops seven hypotheses about the ways that natural resources tend to influence civil wars. It suggests that the role played by any natural resource depends largely on its lootability, and to a lesser extent, its obstructability and its legality.

A resource's *lootability* is the ease with which it can be extracted and transported by individuals or small teams of unskilled workers.[10] Drugs, alluvial gemstones, agricultural products, and timber are relatively lootable; deep-shaft minerals and gemstones, oil, and natural gas are relatively unlootable.

A resource is *obstructable* if its transportation can be easily blocked by a small number of individuals with few weapons; it is relatively unobstructable if it can only be blocked with many soldiers and heavy equipment. A resource's obstructability is in part a function its physical characteristics. Resources that have a high value-to-weight ratio, such as gemstones, coca and opium, are usually transported by air and are difficult to obstruct, since they can be flown out of remote areas. Resources with a lower value-to-weight ratio that must be transported by truck or train – like minerals and timber – are moderately obstructable, if they must cross long distances. Resources that are transported in liquid form and travel long distances through above-ground pipelines (e.g., oil and

[10] I am borrowing the concept of lootability from Collier and Hoeffler [2001] and Le Billon [2001], although the definition is my own.

natural gas) are highly obstructable, since pipelines are vulnerable to disruption twenty-four hours a day along their entire length. A resource's location also helps determine its obstructability: if an oil field is in a remote, landlocked location it is highly obstructable; if it is located near a port or offshore, it is relatively unobstructable.

Finally, most resources can be *legally* traded on international markets; drugs – coca, opium, cannabis, and their derivatives – are the main types of illegal natural resources.[11]

Figure One categorizes most types of resources according to these criteria.

These three characteristics yield seven hypotheses about the social and political consequences of resource extraction. They are summarized in Table 6.

Hypothesis One: The more lootable a resource is, the more likely it is to benefit local peoples and the poor.

This first hypothesis does not directly address the issues of conflict, but it provides the basis for the other hypotheses that do. The extraction of highly-lootable resources relies more heavily on the use of unskilled labor; the extraction of unlootable resources relies more heavily on skilled labor and capital. Hence lootable resources are more likely to generate income for local communities, and for unskilled workers – e.g., the poor. Unlootable resources are more likely to produce revenues for skilled workers, for those who provide the requisite capital, and for the government. In developing countries where skilled labor and capital tend to be scarce, these factors are more likely to come from outside the region – possibly from other countries.

[11] There is also an illegal international trade in endangered species and their products; I have found only one instance of their sale by military forces. See Reeve and Ellis [1995].

If true, this hypothesis implies that the extraction of lootable resources like alluvial gems, drugs, timber, and agricultural products, are more likely to have a popular local constituency than the extraction of unlootable resources like oil, gas, and deep-shaft minerals. This also means that efforts to stop the flow of lootable resources are more likely to face opposition from local communities, and to harm low and moderate-income sectors of the economy.[12]

Hypothesis Two: the more unlootable a resource is, the more likely it will lead to separatist conflicts.

This hypothesis follows directly from the previous one. If a resource is highly lootable, it is more likely to generate direct benefits for the poor, and to benefit local peoples; if it is relatively unlootable, it is more likely to generate revenues for skilled workers (who are less likely to be from the region), the extraction firm, and the government – and hence to produce grievances about the distribution of resource wealth.

This has important consequences for separatist conflicts. Separatist conflicts in resource-rich areas are commonly inspired by grievances over the distribution of resource revenue.

Figure Two divides the six separatist conflicts from Table 1 into those involving lootables and those involving unlootables. The nine non-separatist conflicts from Table 1 are similarly divided for comparison. Of the six separatist conflicts, five feature unlootable resources: the Cabinda conflict in Angola (over oil); the Bougainville conflict in Papua New Guinea (over copper); the Aceh conflict (over natural gas) and the West Papua (Irian Jaya) conflict in Indonesia (over copper and gold); and the conflict in Sudan

[12] I am grateful to Karen Ballentine for pointing out this implication.

(over oil).[13] In each of these five cases, grievances over the distribution of resource wealth has helped spark or exacerbate the conflict. Just one separatist conflict features lootable resources: Burma. In that conflict, rebel groups have used opium and gemstones to fund themselves, but the production of those goods has not in itself caused separatist grievances.

Hypothesis Three: The more lootable a resource is, the more likely it is to benefit a rebel group; the more unlootable it is, the more likely it is to benefit the government.

If a resource is highly lootable, which ever party controls the surrounding territory can use it for funding. But if it is unlootable it is more likely to benefit the government, since the government is more able to credibly provide the security guarantees necessary to attract and maintain the requisite skilled labor and capital. Both sides in a conflict can benefit from holding an area that produces alluvial diamonds or drugs, but only the government is likely to benefit from holding an area that produces oil or copper.

Skeptics may point out that a rebel army still profits from gaining control of an unlootable resource, since it will deny resource revenues to the government. This is true, but an unlootable resource will nonetheless still be of less value to the rebels than a lootable resource. Imagine that a rebel army captures from the government an unlootable resource, which annually produces X in revenue. The net change in revenue from this event is the amount of annual revenue lost by the government (X) plus the amount of annual revenue gained by the rebels (zero, since they cannot extract the resource) for a

[13] Other prominent examples from earlier decades are the Biafra rebellion in Nigeria, and the Katanga rebellions in the Democratic Republic of Congo.

total of *X*. Now imagine that the rebel army captures a lootable resource from the government, which also produces *X* in revenue. In this case, the net change in revenue is 2*X,* including both the revenue lost by the government (*X)* and the revenue gained by the rebels (*X)*. Hence lootable resources should be more valuable than unlootable resources to the rebels; unlootable resources should be more valuable than lootable resources to the government.

Figure Three shows that the cases in Table 1 are consistent with this pattern.[14] In all ten cases with lootable resources, resource revenues flowed to either the rebels exclusively, or to both sides. In the eight cases with unlootable resources, revenues went exclusively to the government in four cases, to both sides in four cases, and to the rebels exclusively in none. Of the four conflicts in which unlootable resources produced revenues for both sides, in two cases (Colombia and Sudan) it was because long oil pipelines made the resource obstructable, and hence susceptible to hold ups – a topic I address below (Hypothesis Six).

It is also notable that in the three conflicts with both lootable and unlootable resources – Angola (UNITA), Colombia, and the Democratic Republic of Congo – in two cases (Angola and the Democratic Republic of Congo), the government has continuously controlled the unlootable resources, while the rebels have periodically controlled the lootable resources. In the third case (Colombia), the leftist guerrillas and the right-wing paramilitaries have both raised money from both resources.

[14] Note that for conflicts in which both lootable and unlootable resources mattered (Afghanistan, Angola, Colombia, and the Democratic Republic of Congo), I have listed separately which party generated money from which resource.

Hypothesis Four: The more lootable the resource, the more likely it is to create discipline problems inside the army that controls it.

If a resource is unlootable – such as oil or natural gas – then it will most likely help fund the military of the side that controls it through a centralized process. Unlootable resources must be managed by large firms or state-owned enterprises, which will generate revenues for the government; these in turn will be appropriated to military forces through some type of budgetary mechanism. This centralized process should help give commanding officers fiscal tools to help them maintain control over lower-ranking officers and soldiers.

If a resource is lootable, however, it is less likely to generate funds for the government. It also creates opportunities for soldiers of all ranks to earn money by extracting or transporting the resources themselves, or extorting money from others who do.[15] The result is likely to be a reduced level of discipline and central control in the armed forces of the party that controls the resource.

There is only sporadic data on discipline problems within government and rebel forces. It is noteworthy, however, that of the fifteen cases in this sample, there were five cases in which a breakdown of military cohesion was so severe that some units defected to the other side, or did battle with each other. Four cases involved lootable resources: Cambodia (among the rebels), the Democratic Republic of Congo (among the rebels), Liberia (among the rebels), and Sierra Leone (on the government side). The fifth case, Sudan (among the rebels) involved oil, an obstructable resource.

[15] Le Billon [2001] makes a similar point.

Hypothesis Five: The more lootable the resource, the more likely it is to prolong non-separatist conflicts.

There are three rationales behind this hypothesis. The first is based on Hypothesis Three. When resource revenue flows to the rebels, it is likely to prolong a conflict, since the rebels are typically the weaker party, and without this funding they are more likely to be forced to the negotiating table or extinguished. Conversely, if resource revenue accrues to the government, it is likely to shorten a conflict by bringing about a quicker victory or settlement – provided that the government is the stronger party. [16] If both parties carry out resource looting, the net effect should be to lengthen the conflict, since combat is likely to continue as long as the weaker party does not run out of money. Hence unlootable resources are more likely to shorten a war, by strengthening the stronger side; lootable resources are more likely to lengthen one, by strengthening the weaker side, or both sides.

The second rationale is based on Hypothesis Four. Discipline problems – which should be more strongly associated with lootable resources – are also likely to lengthen conflicts by making it harder for commanding officers to impose the terms of a settlement on their own forces [Fearon 2001, Ross 2001].

There is also a third possibility: that wartime resource exploitation will become so profitable for rebels that they prefer war to peace. Again, this is more likely if resources are lootable – and hence can generate profits for rebels – than if they are unlootable.

[16] An important assumption is that conflicts will tend to last longer when the two sides have more equal resources. This assumption is supported by evidence from interstate conflicts [Bennett and Stam 1996].

This hypothesis only applies to non-separatist conflicts. As Fearon [2001] points out, separatist and non-separatist conflicts appear to have substantially different characteristics: separatist conflicts tend to last longer, and often continue even when the separatist movement is at an overwhelming financial disadvantage. This may be because separatist movements can often sustain themselves indefinitely in a territory dominated by members of their own ethnic group, where government forces are considered alien.

This is a difficult hypothesis to investigate empirically, in part because so many of the conflicts in this sample are ongoing – meaning that we do not know much about their ultimate duration. One way to examine the hypothesis is to put this problem aside and compare the duration of non-separatist conflicts with lootable resources to those with unlootable resources. Table 7 shows this comparison. The only non-separatist conflict with unlootable resources – the 1997 war in the Congo Republic, which lasted just four months – is also the briefest conflict.

This hypothesis can also be examined indirectly by determining whether any of these three causal processes – resource exploitation by the weaker side, discipline problems that impede a settlement, and resource profiteering that impedes a settlement – have occurred in the fifteen cases. While this will not tell us if these conflicts have *actually* been lengthened by resources, it can tell us if any of the three process, which I argue *are likely to* lengthen the conflicts, have occurred.

Table 8 codes the fifteen conflicts according to whether or not the three processes have occurred. Since three conflicts include both lootable and unlootable resources, these conflicts are each listed twice, and the effects of each type of resource is coded independently. I included both the separatist and non-separatist conflicts in this table to

provide additional data on the incidence of these three processes, even though the hypothesis only applies to non-separatist conflicts.

Table 8 shows that resource revenues went to the weak side in nine out of nine cases with lootable resources, but only five of nine cases with unlootable resources. In two of these five cases, the unlootable resource still benefited the government (Hypothesis Three), but at junctures when the government was the weaker party.[17] In two other cases (Colombia and Sudan), the weak side profited from an unlootable resource (oil) due to its obstructability.

Major discipline problems were observed in five of the nine cases with lootable resources, but none of the cases with unlootable resources.[18] The evidence is somewhat harder to interpret regarding the third process. Resources appeared to create an economic incentive that undermined peace treaties in Liberia and the Democratic Republic of Congo [Ellis 1999; UN Panel of Experts 2001]. In the former case, the resources were lootable; in the latter, they were both lootable and unlootable. In two other cases, Burma and the Congo Republic, resource wealth appeared to create incentives that hastened a settlement [Lintner 1999]. It is difficult to draw any general conclusions about this final dynamic.

In short, there is indirect evidence that both lootable and unlootable resources may trigger at least two processes that prolong conflicts; and that – as Hypothesis Five

[17] These were the conflicts in Angola (in 1993-94) and the Democratic Republic of Congo (in 1997-98).

[18] Note, however, that in the case of Cambodia, these discipline problems led to an earlier end to the conflict when a rebel faction defected to the government side in order to retain its access to timber and gems.

suggests – lootable resources tend to trigger these processes more frequently than unlootable resources.

Hypothesis Six: If a resource is obstructable, it is more likely to increase the duration and intensity of conflicts.

There are two reasons why this may be so. First, obstructable resources are subject to hold-ups, a tactic that benefits a weaker party in its campaign against a stronger opponent, and hence will tend to lengthen a conflict. The most easily obstructed resource, oil, has been a factor in five of the fifteen conflicts in the sample. In three cases the oil has been offshore and hence impervious to hold-ups (Angola-Cabinda, Angola-UNITA, and Congo Republic); but in the other two cases (Colombia and Sudan), rebels have bombed pipelines to extort money from the government or oil firms, and to disrupt the government's revenues.[19]

In Colombia, for example, the country's oil must be transported to the coast from the unstable interior through two exceptionally long pipelines.[20] In 2000, the pipelines were bombed 98 times. Colombia's rebel groups have used these attacks to extort an estimated $140 million annually; this windfall has enabled one group, the National Liberation Army (ELN), to grow from fewer than 40 members to at least 3,000 [Dunning and Wirpsa 2001].

Obstructable resources can also have a second effect: a government may anticipate that its resources will be subject to hold-ups by aggrieved local peoples, and decide to act pre-emptively by using terror and repression against them. Here we might

[19] Obstructable resources are similar to lootable resources, since small bands of unskilled troops can use them to generate revenues.
[20] One pipeline, operated by BP Amaco, is 444 miles long; the other, operated by Occidental Petroleum, is 485 miles long.

not witness a full-blown civil war – if the repression is "successful" in the government's eyes – but nonetheless have a large number of resource-related casualties. Such pre-emptive campaigns have occurred in the Indonesian province of Aceh, where a natural gas facility was threatened by a pro-separatist movement; and even more lethally, in the Sudan.

The Sudan has witnessed both hold-ups by the rebel group and pre-emptive repression by the government. Sudan's oil reserves are located in the country's south, a region with longstanding separatist aspirations. The north's efforts to gain access to the south's oil has been a major source of grievance, which has been evident in both the rhetoric and the actions of the Sudan People's Liberation Army (SPLA): it has issued complaints that the north is stealing the south's resources, and between 1983 and 1999, repeatedly demanded that work cease on a pipeline that would take oil from wells in the south to a refinery in the north. It also periodically attacked the workers and equipment associated with pipeline construction. These attacks helped the SPLA to fund itself by extorting money from western oil firms that wished to protect their equipment [O'Ballance 2000, Anderson 1999].

To counter the rebels, the government has tried to forcibly create a *cordon sanitaire* around the pipeline, and to clear whole populations from the oilfields. Clearances in the upper Nile region began in 1980, halted in the mid-1980s when oil development temporarily ceased, then resumed in the late 1990s when oil development resumed. Since early 1999, the government has used summary executions, rape, ground attacks, helicopter gunships, and high-altitude bombing to force tens of thousands of people from their homes in the oil regions. It has also razed houses, destroyed crops, and

looted livestock to prevent people from returning [Amnesty International 2000]. Although foreign observers have often been prevented from entering the affected areas, the pattern of displacements has been documented by both a special rapporteur for the UN Commission on Human Rights [2001] and several NGOs [Christian Aid 2001].[21]

Hypothesis Seven: If the resource is illegal, it is more likely to benefit the rebels – unless the government is willing to endure international sanctions.

There are strong international sanctions against the production of illegal natural resources – e.g., coca, opium, and cannabis; these sanctions are more effective against states than against non-state entities, like rebel movements. If illegal substances are cultivated in a country suffering from a civil war, it will be hard for the government's forces to profit from their presence, since they are likely to be subjected to international sanctions; a rebel group should be less responsive to international sanctions and hence should be more likely to seek funding from drug sales. This should not hold true, however, for governments that are willing to endure international sanctions, and pursue autarkic economic policies.

There are just four drug-producing states in the sample, which makes it difficult to know if this is a valid generalization. Table 9 lists these four states, along with the side that benefited from the drug trade. In one case (Peru) the rebels were the only ones who systematically raised money from the drug trade. In the other cases, both sides earned

[21] It is important to acknowledge that the Sudanese civil war does not conform to simple "separatist" or "Muslim versus non-Muslim" or "north-south" descriptions. Often these divisions have been blurred: the (northern Muslim) government has sometimes made alliances with non-Muslim Dinka or Nuer militias in the south, while the rebels have sometimes been allied with northern Muslim groups that have fallen out with the government. According to a report by Amnesty International [2000, 3], "during the last few years, more people have lost their lives in inter-factional fighting amongst Southerners than in armed encounters with government forces."

money from drugs – in two cases because the government was willing to endure international sanctions (Afghanistan and Burma), and in the third case (Colombia) because drug revenues were collected by paramilitary forces, who were allied with the government, but sufficiently independent from it (at least nominally) to allow the government to avoid international sanctions.

3. Implications and Conclusions

This paper's aim is to help determine whether some types of natural resources are more closely tied to civil wars than others, and if so, why.

The first section, using simple cross tabulations, showed that alluvial diamonds and illegal drugs appear to be more strongly linked to civil war than other resources; that timber is not associated with civil war; and that other categories of natural resources are about equally tied to civil wars.

The second section uses evidence from fifteen recent civil wars to develop hypotheses about why this pattern may hold. It argues that three qualities of any natural resource – most importantly, its susceptibility to low-cost extraction, or "looting" – tends to influence the incidence and duration of civil wars. It also suggests that different types of resources have different consequences for separatist wars than for non-separatist wars.

Here I describe the implications of these seven hypotheses for both lootable and unlootable resources.

Unlootable Resources

Unlootable resources include oil, natural gas, and all types of deep-shaft minerals.[22] The six hypotheses have both good and bad implications for states with unlootable resources; in general, the good news concerns non-separatist conflicts and the bad news concerns separatist conflicts.

The good news is that unlootable resources should make non-separatist conflicts briefer, since they tend to be of greater benefit to the government. If the government is the stronger party – which is usually but not always true in these fifteen cases – this should hasten the end of the conflict by bringing about a quicker government victory. On the other hand, if the government is the weaker party, but still receives revenues from unlootable resources – as in the case of Angola in 1993-94, and the Democratic Republic of Congo in 1997-98 – it may prolong the conflict by averting the government's defeat.

The bad news about unlootable resources is that they are more likely than lootable resources to cause separatist conflicts; moreover, separatist conflicts tend to last longer than non-separatist conflicts. Five separatist conflicts in this sample were in part caused by grievances over the distribution of resource wealth; such grievances appear more likely to arise over unlootable resources than lootable resources.

In cases where the resource is obstructable – in particular, when it must travel through a long, above-ground pipeline – it creates a further class of problems, by presenting rebel groups with an unceasing flow of extortion opportunities.

These two dangers – that unlootable resources will be a source of grievance (in separatist conflicts), or a source of finance (if they are obstructable) – are depicted in

[22] This includes diamonds that are deposited far underground – often called kimberlite diamonds.

Figure Four. The upper right quadrant is for non-separatist conflicts with an obstructable resource; in this cell, natural resources should be a source of rebel finance (because they are obstructable) but not a source of rebel grievance (because they are not separatist conflicts). The Colombia case fits this description closely.

The lower left quadrant contains cases where the resource cannot be used for finance (since it is relatively unobstructable) but where it is a source of grievance (since it is found in a province with separatist aspirations). Each of the four cases in this cell are persistent, long running conflicts in which violence has been minimal – generally producing fewer than 100 deaths per year. This pattern is consistent with a conflict over a longstanding grievance (the perceived maldistribution of resource revenues), in which the separatist group does not have a major source of finance, and hence is unable to fight a war that produces a large number of casualties.

The conflict in the Indonesian province of West Papua (formerly Irian Jaya) provides an illustration. Indonesia invaded the former Dutch colony in 1962, and later annexed it; a small pro-independence army, OPM (*Organisasi Papua Merdeka*) has been active since around 1965. In the early 1970s an American firm, Freeport-McMoran, began to operate a major copper mine in the southern part of the island; since then, the mine has been a further source of grievance for the island's indigenous population. The mine has intermittently been the target of OPM attacks. Pro-separatist propaganda, including OPM propaganda, argues that West Papua's resource wealth is wrongfully appropriated by the central government, and that Papuans would be wealthier if the province were independent. The government's military operations around the mine site, in turn, have led to human rights violations and further heightened anti-Indonesia

sentiment. There is no indication, however, that OPM has used resource looting or extortion around the mine site to fund itself. Moreover, resource wealth has helped the stronger side in the conflict – the Indonesian military – not the OPM, which remains small and ill-equipped. OPM has perhaps several hundred "hard core" members, and several dozen firearms – mostly old and rusted weapons from World War II. The conflict generates fewer than 100 casualties a year.

The upper left quadrant contains the most troubled category of conflicts: separatist conflicts over obstructable resources, in which a unlootable resource becomes both a source of grievance and a source of finance. There is, fortunately, just one state from the sample that fits in this cell: Sudan.

The lower right quadrant includes states with unlootable, unobstructable resources, that are engaged in non-separatist conflicts. These three cases – Angola (UNITA), Congo Republic, the Democratic Republic of Congo – feature conflicts in which the resource is neither a source of grievance, nor a source of finance *via extortion.* Two of these conflicts (Angola and the Democratic Republic of Congo) have both lootable and unlootable resources, and it has largely been their lootable resources that have made these conflicts long and bloody. The only case that has unlootable, unobstructable resources exclusively – the Congo Republic – was an unusual conflict, in which the opposition group received funding from a foreign oil firm, which expected (and hoped) it would soon take over the government. After a four month war, financed in part by this payment, they were proven right.

Lootable Resources

Alluvial gemstones and agricultural crops, including drugs, are all lootable resources. Diamonds and drugs were strongly associated with civil conflict in the 1990s, and are commonly viewed as the most troublesome resources. But this paper suggests there is another side to these commodities: they also tend to produce more widespread benefits for local peoples, and the poor, than unlootable resources.

The seven hypotheses have good and bad implications for countries with lootable resources. In this case, the good implications are for separatist conflicts, and the bad ones for non-separatist conflicts.

The good news is that lootable resources do not seem to generate separatist conflicts. Since lootable resources produce more revenues for unskilled workers, and for local peoples, they also seem to generate fewer grievances. There are six separatist conflicts in the sample. Five entail grievances over unlootable resources [Figure Two].

The bad news about lootable resources is that they appear to prolong non-separatist conflicts, due to two factors: their tendency to benefit rebel groups, and their tendency to cause discipline problems in the army that exploits them. These two effects have helped produce long, chaotic civil wars in eight of the fifteen cases in the sample: Afghanistan, Angola, Cambodia, Colombia, the Democratic Republic of Congo, Liberia, Peru, and Sierra Leone. If the resource is also illegal, this makes it even more likely to favor the rebel side.

For these reasons, lootable resources appear to create more complicated civil wars, with greater fragmentation and shifting alliances among the armies that control the resource. They may also be harder to resolve, due to this fragmentation, and because the

widespread benefits they produce may make sanctions harder to implement and more costly for poor and local peoples.

In short, this study suggests that some resources are more dangerous to exploit than others; and that different resources are associated with different types of conflicts: unlootable resources are more likely to produce separatist conflicts, and lootable resources are more likely to produce non-separatist conflicts. These patterns appear to hold true for the fifteen conflicts in the sample; to know whether they are true for a larger set of conflicts, they would have to be subjected to further testing, especially with out-of-sample data. Still, they may hint at the complicated and contradictory effects that a country's natural resource endowment may have on violence inside its own borders.

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Table 1: Civil Conflicts Linked to Resource Wealth, 1994-2001

Country	Duration	Type	Resources
Afghanistan	1978-2001	Lootable	Gems, opium
Angola (UNITA)	1975-	Both	Oil, diamonds
*Angola (Cabinda)**	1975-	Unlootable	Oil
Burma	1949-	Lootable	Timber, gems, opium
Cambodia	1978-97	Lootable	Timber, gems
Colombia	1984-	Both	Oil, opium, coca
Congo, Rep.	1997	Unlootable	Oil
Congo, Dem. Rep.	1996-98	Both	Copper, coltan, diamonds, gold, cobalt, coffee
Indonesia (Aceh)	1975-	Unlootable	Natural gas
*Indonesia (W Papua)**	1969-	Unlootable	Copper, gold
Liberia	1989-96	Lootable**	Timber, diamonds, iron, palm oil, cocoa, coffee, marijuana, rubber, gold
*Papua New Guinea**	1988-	Unlootable	Copper, gold
Peru	1980-1995	Lootable	Coca
Sierra Leone	1991-2000	Lootable	Diamonds
Sudan	1983-	Unlootable	Oil

Separatist conflicts are listed in italics. Figures on conflict duration are taken from Collier and Hoeffler [2001].

*conflict did not generate 1000 battle deaths in any twelve month period

**since the resources in Liberia's conflict were overwhelmingly lootable, I classify it as "lootable" rather than "both."

Table 2a: Civil War Rates 1990-2000 By 1995 Resource Exports-to-GDP Ratios

	Oil and Gas	Minerals*	Food Crops	Nonfood Crops
Top Third	.146	.122	.133	.1
Middle Third	.208	.146	.166	.1
Bottom Third	.188	.195	.133	.233

*Nonfuel minerals, not including gemstones.
Sources: for civil war occurrences, Collier and Hoeffler [2001]; all other data from World Bank [2001].

Table 2b: Civil War Rates 1990-2000, Adjusted for GDP per capita

	Oil and Gas	Minerals*	Food Crops	Nonfood Crops
Top Third	.207	.172	.241	.207
Middle Third	.166	.133	.166	.166
Bottom Third	.1	.138	.033	.067

*Nonfuel minerals, not including gemstones.
Sources: for civil war occurrences, Collier and Hoeffler [2001]; all other data from World Bank [2001].

Table 3: Civil War Rates 1990-2000 By 1995 Timber Production and Exports

	Timber Prod	Timber/capita	Timber Exports/GDP	Adjusted for GDP/capita
Top Third	.116	.047	.111	.194
Middle Third	.25	.273	.243	.189
Bottom Third	.25	.318	.27	.243

Sources: for civil war occurrences, Collier and Hoeffler [2001]; for timber production and export figures, FAOSTAT [2002]; for GDP figures (measured in purchasing power parity), World Bank [2001].

Table 4: Civil War Rates 1990-2000 By 1995 Diamond and Drug Production

	Diamonds	Alluvial Diamonds	Opium and Coca
Producers	.278 (5/18)	.5 (4/8)	.444 (4/9)
Non-Producers	.188 (27/143)	.183 (28/153)	.184 (28/152)

Sources: for civil war occurrences, Collier and Hoeffler [2001]; for diamond production, USGS [1998]; for opium and coca production, ODCCP [1999].

Table 5: Civil War Rates 1990-2000 By Cannabis Production

Primary Source Countries	.3 (3/10)
Secondary Source Countries	.132 (9/68)
All Other Countries	.241 (20/83)

Sources: for civil war occurrences, Collier and Hoeffler [2001]; for cannabis production, ODCCP [1999], based on data from Interpol.

Table 6: Hypotheses on Resources and Civil War

1. The more lootable a resource is, the more likely it is to benefit local peoples and the poor.

2. The more unlootable a resource is, the more likely it will lead to separatist conflicts.

3. The more lootable a resource is, the more likely it is to benefit a rebel group; the more unlootable it is, the more likely it is to benefit the government.

4. The more lootable the resource, the more likely it is to create discipline problems inside the army that controls it.

5. The more lootable the resource, the more likely it is to prolong non-separatist conflicts.

6. If a resource is obstructable, it is more likely to increase the duration and intensity of conflicts.

7. If the resource is illegal, it is more likely to benefit the rebels – unless the government is willing to endure international sanctions.

Figure 1: Natural Resources, by lootability, obstructability, and legality

	Lootable	Unlootable
Highly Obstructable	-	Onshore, remote oil and gas
Moderately Obstructable	Agricultural products Timber	Deep-shaft minerals
Unobstructable	**Coca, Opium** Alluvial gems	Deep-shaft gems Offshore oil and gas

Illegal resources are listed in bold.

Figure 2: Lootability and Separatism

	Separatist	Non-separatist
Lootable	Burma	Afghanistan Angola (UNITA)* Cambodia Colombia* Dem Republic Congo* Liberia Peru Sierra Leone
Unlootable	Angola (Cabinda) Indonesia (Aceh) Indonesia (W Papua) Papua New Guinea Sudan	Angola (UNITA)* Colombia* Congo Republic Dem Republic of Congo*

*Conflict entails both lootable and non-lootable resources

Figure 3: Which Side Earns Revenues from Resource Wealth?

	Rebels	Government	Both Sides
Lootable	Afghanistan (gems) Cambodia Liberia Peru Dem Rep Congo*	-	Afghanistan (opium) Angola (gems) Burma Colombia (drugs) Sierra Leone Dem Rep Congo
Unlootable	-	Angola (oil) Angola-Cabinda Indonesia-Aceh Indonesia-W Papua	Colombia (oil) Congo Republic Sudan Dem Rep Congo**

* including coltan, gold, coffee, and timber
** including cobalt and kimberlite diamonds

Table 7: The Duration of Non-separatist Conflicts

Country	Type	Period	Duration (years)
Afghanistan	Lootable	1978-2001	23
Cambodia	Lootable	1978-97	19
Peru	Lootable	1980-1995	15
Sierra Leone	Lootable	1991-2000	9
Liberia	Lootable	1989-96	7
Angola (UNITA)	Both	1975-	26+
Colombia	Both	1984-	17+
Congo, Dem. Rep.	Both	1996-	5+
Congo, Rep.	Unlootable	1997	<1

Table 9: Which Side Profits from Illegal Drugs?

Country	Substance	Beneficiary
Afghanistan	Opium	Both
Burma	Opium	Both
Colombia	Coca, Opium	Both
Peru	Coca	Rebels

Figure 4: Conflicts Involving Unlootable Resources

	Separatist (→ grievance)	Non-separatist (→ no grievance)
Obstructable (→ finance)	Sudan	Colombia*
Unobstructable (→ no finance)	Indonesia (Aceh) Indonesia (West Papua) Papua New Guinea Angola (Cabinda)	Angola (UNITA)* Congo Republic Dem Republic of Congo*

* has both lootable and unlootable resources

Table 8: Resources and the Duration of Conflict

	Weak Fund	Discipline	Incentive
Lootable Resources			
Afghanistan (opium, gems)	Yes	No	No
Angola-UNITA (gems)	Yes	No	No
Burma (gems, opium)	Yes	No	Yes*
Cambodia (gems, timber)	Yes	Yes*	No
Colombia (coca)	Yes	Yes	No
Congo, DR (gems, coltan, gold)	Yes	Yes	Yes
Liberia (gems, etc.)	Yes	Yes	Yes
Peru (coca)	Yes	No	No
Sierra Leone (gems)	Yes	Yes	No
Unlootable Resources			
Angola-UNITA (oil)	Yes	No	No
Angola-Cabinda (oil)	No	No	No
Colombia (oil)	Yes	No	No
Congo, Rep. (oil)	Yes	No	Yes*
Congo, DR (cobalt, copper)	Yes	No	Yes
Indonesia-Aceh (gas)	No	No	No
Indonesia-WP (copper)	No	No	No
Papua New Guinea (copper)	No	No	No
Sudan (oil)	Yes	No	No

*Made the conflict shorter

Separatist conflicts are listed in italics. The conflicts are coded "yes" for **Weak Fund** if the weaker side received revenues from the extraction, transport, or sale of resources, and "no" otherwise; "yes" for **Discipline** if the presence of resources created substantial discipline problems within the military force that controlled it, and "no" otherwise; and "yes" for **Incentive** if the resource created an economic incentive for one side or the other that undermined a proposed peace agreement. Note that in two cases, Burma and Congo Republic, the resource appeared to create an economic incentive in favor of a peace settlement; and in the case of Cambodia, the discipline problems created by the resources led to a quicker end to the conflict.

Appendix: Diamond and drug producers, 1995

Diamond producers, 1995: **Angola,** Australia, Botswana, Brazil, Central African Republic, China, **Democratic Republic of Congo,** Côte D'Ivoire, Ghana, Guinea, **Liberia,** Namibia, **Russia, Sierra Leone,** South Africa, Venezuela, Zimbabwe. States with civil wars are in bold. Source: USGS 1998.

Alluvial diamond producers, 1995: **Angola,** Brazil, Central African Republic, **Democratic Republic of Congo,** Côte D'Ivoire, Ghana, **Liberia, Sierra Leone.** States with civil wars are in bold. Source: USGS 1998; other things.

Opium producers, 1995: **Afghanistan, Burma, Colombia,** Laos, Mexico, Pakistan, Vietnam. Coca producers, 1995: Bolivia, **Colombia, Peru.** States with civil wars are in bold. Source: ODCCP 1999.

Cannabis primary source countries: **Afghanistan, Cambodia, Colombia,** Jamaica, Morocco, Mexico, Nigeria, Pakistan, South Africa, Thailand. Source: ODCCP 1999.

Countries that experienced civil wars in the 1990s are in bold.