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## **Beyond Greed and Grievance: Feasibility and Civil War**

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## **Abstract**

A key distinction among theories of civil war is between those that are built upon motivation and those that are built upon feasibility. We analyze a comprehensive global sample of civil wars for the period 1965-2004 and subject the results to a range of robustness tests. The data constitute a substantial advance on previous work. We find that variables that are close proxies for feasibility have powerful consequences for the risk of a civil war. Our results substantiate the 'feasibility hypothesis' that where civil war is feasible it will occur without reference to motivation.

## 1. Introduction

Until recently the empirical analysis of civil war was undertaken almost exclusively through qualitative studies by political scientists. However, quantitative political scientists based at the University of Michigan, the university that pioneered much quantitative political analysis, were carefully building a comprehensive global data set on civil wars. Using this data set and its variants, economists and political scientists have begun to analyze the factors that might account for the onset of conflict (Collier and Hoeffler, 1998, 2004; Fearon and Laitin, 2003; Miguel *et al.*, 2004). While these studies pioneered the application of quantitative methods to civil war, the present study aspires to be definitive conditional upon the current state of data, which is itself a quantum improvement on that available only a few years ago. The new data are a major improvement on those used in our previous study, both for the dependent and independent variables, in respect of quality, quantity and timeliness. Among other innovations in the present paper, whereas the previous analysis closed in December 1999, the present analysis takes in a further five years. This is important not only as a useful statistical expansion from seven to eight five-year periods. There were important innovations during the period 2000-2004 in international policies towards intervention in civil war. The shift in United Nations policy towards a 'responsibility to protect' is emphasized by Evans and Sahnoun (2002). In Africa the same shift is marked by the dissolution of the Organization of African Unity, along with its fundamental principle of 'non-interference', and its replacement by the African Union with its new principle of 'non-indifference'. These major shifts in sentiment were reflected on the ground in an increase in the number of settlements of civil war that was sufficiently dramatic to suggest a significant break with past behaviour. Hence, it is of particular interest to investigate whether there was a corresponding significant change in the incidence of civil war onsets.

This and other equally substantial improvements in data enable us not merely to test the earlier results for their robustness, but to investigate a new range of social and political variables. Using the technique of stepwise deletion of insignificant variables we arrive at a provisional core regression in which all terms are significant. We then conduct specification tests to ensure that no additional significant variable can be added. The resulting regression has a reasonable claim to be the best characterization

of the data. Since we adopted this same approach in our previous study, albeit on substantially inferior data, a comparison of our results from the two studies provides some indication of how robust the present results are likely to prove to further inevitable improvements and innovations in data sets.

In Section 2 we set out the theoretical framework for our analysis. Since the development of quantitative analysis the theory of civil war has been radically reworked. At present three approaches coexist somewhat uncomfortably. By combining motivation and opportunity, our framework encompasses a range of political science analyses which stress various types of motivation, and economic analyses some of which focus on motives while others focus on opportunities. Our empirical analysis provides important new evidence to discriminate between these families of theories. In Section 3 we discuss the changes in our data that support the new analysis. The dependent variable is considerably revised, reflecting new work by other researchers, as well as being updated by the five most recent years. The independent variables used in the original analysis are all also revised as well as updated. Finally, a new range of independent variables are introduced. In Section 4 we report our results. Although our previous results are broadly confirmed, we find that three new variables are found to be significant using the improved data. Not only are these three variables important in their own right, for the first time they provide a clear basis for discriminating between theories. Section 5 concludes with a discussion of the implications for policy towards promoting civil peace.

## **2. The Economic Theory of Civil War**

Just as the quantitative study of civil war has evolved rapidly, so has its analysis using standard applications of economic theory<sup>1</sup>. Whereas traditional political analyses either assumed or asserted some particular ‘root cause’ of civil war, usually traced to a historical grievance, modern economic theory focuses on the feasibility of rebellion as well as its motivation. The defining feature of a civil war is large scale organized violence on the part of a rebel army. This is not meant to imply that the rebel side is ‘to blame’, but rather that since virtually all governments maintain standing armies,

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<sup>1</sup> The survey in the *Handbook of Defense Economics* provides a fuller discussion of this new literature (Collier and Hoeffler, 2007).

the distinctive feature of civil war is the existence of a non-government army. In most circumstances the establishment of a rebel army would be both prohibitively expensive and extremely dangerous regardless of its agenda. The relatively rare circumstances in which rebellion is materially feasible are therefore likely to constitute an important part of any explanation of civil war. Hirshleifer (2001), who pioneered much of the analytic research on conflict, proposed the Machiavelli Theorem, that no profitable opportunity for violence would go unused. Our variant of this theorem, the *feasibility hypothesis*, proposes that where rebellion is materially feasible it will occur. The agenda of the rebel group is determined by the preferences of the social entrepreneur leading whichever organization is the first to occupy the niche. Sometimes this will be a not-for-profit organization with a political or religious agenda, and sometimes a for-profit organization. Where the niche is sufficiently large several rebel groups may coexist, but the factors that explain rebel agendas are incidental to the explanation of civil war.

The two most obvious material conditions for rebellion are financial and military. A rebel army is hugely more expensive than a political party and faces far more acute organizational difficulties of raising voluntary contributions from within the country. For example, the Tamil Tigers, a relatively small rebel group in the small developing country of Sri Lanka, is estimated to spend between \$200m and \$350m per year, an amount equal to between 20 per cent and 34 per cent of the GDP of Northeast Sri Lanka, the zone it controls and for which it seeks political secession (see Strategic Foresight Group, 2006). In Britain, the leading opposition political party, unusually well-funded because it is pro-business, spends around \$50m per year (see Conservative Party of Great-Britain, 2004), or about 0.002 per cent of GDP. The Tamil Tigers are far short of being the best-funded rebel group in the world: their scale of funding is probably fairly normal for a rebel group, and the Conservative Party is far from being at the impecunious end of the distribution of opposition political parties. Yet the Tamil Tigers are commanding resources at least 10,000 times greater as a share of GDP than one of the world's major political opposition parties. Hence, a rebellion cannot be regarded as a natural evolution from, or alternative to, political protest: it requires a quantum difference in financial resources. Similarly, in most states rebellion is not militarily feasible. Viability is likely to be assisted by

some combination of a geography that provides safe havens and a state that is somewhat ineffective.

This account can be contrasted with the more traditional grievance-based explanation which proposes that objective social exclusion explains civil war. However, the grievance-based account is itself only a subset of accounts based on motivation. While for purposes of propaganda rebel leaders are indeed likely to explain their motivation in terms of grievances, other plausible motivations for organized private violence would include predation and sadism. Indeed, since the typical civil war lasts for many years and rebel victories are rare, if rebellion is rational motivations are likely to reflect benefits during conflict, rather than prospective benefits consequent upon a victory which must be heavily discounted both by time and risk. Further, if the rebellion is rationally motivated it is more likely to be due to benefits that accrue to the rebel leadership itself, rather than to the attainment of social justice for a wider group. Social justice is a public good and so faces acute collective action problems. Even if these collective action problems could be overcome, during civil war civilian suffering is very widespread so that the social groups that rebel leaders claim to be fighting for are likely to lose heavily: rebellion is far more likely to deliver devastation than justice. This opens a further motive-based account of civil war: rebellions may be due to mistakes, or they may even be non-rational. The former possibility has been developed in theories analogous to the winner's curse of auction theory: rebellions occur due to military over-optimism. The latter has not been explored formally, but there is evidence that several rebel leaders have shown signs of insanity. Groups such as the Ugandan Lord's Resistance Army, with its only stated goal being the establishment of rule by the Ten Commandments, may be more closely analogous to freak religious groups such as Waco and Jonestown than to organizations of political opposition.

An implication of the wide range of possible explanations for rebellion is that the factors which potentially cause it cannot be restricted *a priori* to a narrow range of proxies for grievance. Our approach is rather to find proxies for each of the three major perspectives: feasibility, and the two main variants of motivation, greed and grievance. In practice, due to the limitations of data that are available globally for several decades, some concepts can only be proxied by variables that have more than

one possible interpretation. This was, unfortunately, the case with our previous results. In the present analysis we introduce three new variables that have unambiguous interpretations and so enable us to distinguish quite sharply between feasibility and motivation.

### **3. Data and Methodology**

We examine how likely it is for a country to experience an outbreak of civil war. War starts are coded as a binary variable and we analyze this risk by using logit regressions. The risk of a war start is examined in five year periods, from 1965-1969 until 2000-2004. If a war breaks out during the five year period we code this as a one and zero if the country remained peaceful. We code ongoing war observations as missing because we do not want to conflate the analysis of war initiation with the analysis of its duration. Previous research indicates that the duration of a civil war is determined by different factors from their onset (Collier, Hoeffler and Söderbom 2004). In order to code civil war starts we used data provided by Kristian Gleditsch, (Gleditsch, 2004), who has carefully updated the correlates of war (COW) project (Singer and Small, 1982 and Small and Singer 1994).<sup>2</sup> An advantage of using this data set is that it is an update of the data used in our previous work (Collier and Hoeffler, 2004) which makes comparisons between the previous and new results relatively straightforward. We perform robustness checks on an alternative new data set. Our analysis potentially includes 208 countries and 84 civil war outbreaks. We list these wars in Table 1.

The COW definition of civil wars is based on four main characteristics. It requires that there is organized military action and that at least 1,000 battle deaths resulted in a given year.<sup>3</sup> In order to distinguish wars from genocides, massacres and pogroms there has to be effective resistance, at least five percent of the deaths have been inflicted by the weaker party. A further requirement is that the national government at the time was actively involved. Our alternative measure of civil war, which we use for

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<sup>2</sup> Gleditsch (2004) only lists wars until 2002. For the years 2003 and 2004 we used the 'Armed Conflict Dataset' (ACD) by Gleditsch *et al* (2002).

<sup>3</sup> However, the COW researchers made adjustments for long conflicts. For some major armed conflicts the number of battle deaths dropped below the 1,000 threshold but since the country was not at 'peace' the war is coded as ongoing. Without these adjustments many war countries would have multiple conflict spells rather than one long conflict.

robustness checks, is based on the ‘Armed Conflict Dataset’ (ACD) by Nils Petter Gleditsch *et al* (2002). Their definition has two main dimensions. First, they distinguish four types of violent conflicts according to the participants and location: (1) extra-systemic conflicts (essentially colonial or imperialist wars), (2) interstate wars, (3) intrastate wars and (4) internationalized intrastate wars. The second dimension defines the level of violence. *Minor* conflicts produce more than 25 battle related deaths per year, *intermediate* conflicts produce more than 25 battle related deaths per year and a total conflict history of more than 1,000 battle related deaths and lastly *wars* are conflicts which result in more than 1,000 battle related deaths per year. We coded civil wars as all armed conflicts except interstate wars, dating the war start for the first year when the violence level was coded as *war*, and the end as the first year when the armed conflict did not generate any deaths.

There are a large number of factors that may determine what makes a country more prone to a civil war. While we do not consider idiosyncratic characteristics for individual countries, such as trigger events and leadership, we have collected a wide variety of economic, political, sociological, geographic and historical variables for our global cross-country panel. We present the summary statistics in Table 2 and list the data sources in the Appendix.

## **4. Results**

### ***Core results***

Wars tend to occur in situations where data collection has already broken down and so there is a severe trade-off between the number of wars that can be included and the quality of the data on which the analysis is based. Our core regression, presented in Table 3, column 4, includes 71 of the 84 wars and has 1063 observations for 172 countries. This sample is a considerable improvement on the core regression used in Collier and Hoeffler (2004) which was based on 52 wars and 688 observations. Our core sample includes some imputed data. For variables with missing data points we have set missing values to the mean of observed values and added a dummy variable



which takes the value of unity if the data are missing.<sup>4</sup> This tests whether the assumption that missing observations are on average the same as actual observations is correct. When this dummy variable is insignificant, so that the assumption is accepted, the dummy is then dropped from the regression. Potentially data imputation can be taken further than this and in one of our robustness checks we use the AMELIA method of multiple random imputation of all missing values of explanatory variables. This enables us to include all 84 wars and 1472 observations.

We now turn to the results. The key theme of our previous analysis was that three economic characteristics drive proneness to civil war, namely the level, growth and structure of income. Peaceful observations in our data set are characterized by a per capita income that is more than five times higher than in countries in which wars broke out. To reduce problems of endogeneity we measure income at the start of each five-year period. We find that the risk of a civil war during the period is significantly greater at lower levels of initial income. It is useful to benchmark the risk of conflict in a hypothetical country with characteristics set at the sample mean. The predicted risk for such a country is 4.7 per cent. If the level of per capita income is halved from this level, the risk is increased to 5.4 per cent. The effect of the level of income is also found by the other major global quantitative study, Fearon and Laitin (2003). Potentially, the result is, however, spurious. Post-conflict countries will tend to have lower income than other countries, due to the costly effects of war, and they will also tend to have higher risks of conflict, if only because of unobserved fixed effects. This creates the possibility that the association between low income and high risk is not causal. To control for this possibility we investigate a variant in which only ‘first time’ civil wars are included, with post-conflict countries dropped from the sample (Table 4, column 1). The concept of ‘first-time wars’ is made much easier empirically because for several decades until the wave of decolonisation around the start of the period covered in our analysis peace was maintained through imperial rule in much of the world. With subsequent wars excluded, income remains significant. Although income is indeed endogenous to civil war, typically being reduced by a war by around 20 per cent relative to counterfactual, this is swamped by the sheer enormity of the dispersion of per capita incomes. Thus, we conclude that income is indeed proxying

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<sup>4</sup> On this treatment of missing values see Greene (2003 pp 59-60).

some causal relationship. However, the level of income is extremely difficult to interpret since it is correlated with so many other features of a society. Fearon and Laitin interpret it as proxying the effectiveness of the state, and thus the ability of the government to deter rebellion. In our previous work we interpreted it as proxying the opportunity cost of time and hence the cost of rebel recruitment. These interpretations need not be alternatives. For some purposes distinguishing between such interpretations need not be especially important. If, indeed, whatever factors that are genuinely causal are highly correlated with income, then policies which increase income are likely to reduce the risk of conflict, and countries with low income are likely to be more at risk than those with higher income. Hence, both the strategies that reduce risk, and the allocation of resources that support those strategies may not depend upon more precise identification, although of course were precision increased policies could be more effective.

War start observations often follow growth collapses. To reduce problems of endogeneity we measure the growth rate of GDP per capita over the five-year period prior to that for which we are estimating the risk of conflict. The growth rate during the five years prior to conflict averages -0.5 per cent, compared to 2 per cent in peaceful countries. Growth significantly reduces the risk of conflict. Again at the mean of other characteristics, if the growth rate is increased by one percentage point, the risk of conflict decreases by 0.6 percentage points to 4.1 per cent. The effect of the growth rate of income is also found by Miguel *et al.* (2004) using Africa-only data, on which they are able ingeniously to instrument for growth by means of rainfall. This is not a feasible option for a global sample since Africa is atypical in having rain-fed agriculture as a large component of GDP. Again, growth can be interpreted in several different ways. Our own interpretation stays with the issue of rebel recruitment: growth implies job creation which reduces the pool of labour likely to be targeted by rebels. However, growth could also be an important determinant of government popularity and through this influence the willingness of the population to support rebels, or at least not inform against them.

We also consider the structure of income. There are several ways in which countries rich in natural resources may be more prone to violence. We follow Sachs and Warner (2000) and proxy richness in natural resources by the proportion of primary

commodity exports in GDP, measuring it at the start of each period. Civil war observations are characterized by a slightly lower proportion of these exports in their GDP (0.145) than peaceful observations (0.165). The effect of primary commodity exports has come under question, most notably from Fearon (2005) who argued that the relationship was not quadratic, as we had claimed, but log-linear, and was largely confined to oil. We therefore tested the log-linear specification against the quadratic, but found that the latter dominates: the risk of dependence upon primary commodity exports is at its peak when exports constitute around 25 per cent of GDP. Taking the extremes of 0 per cent and 25 per cent, the implied risks at the mean of other characteristics are 2.2 per cent and 5.2 per cent. We also tested whether the relationship was more general than oil (Table 4, column 3). The addition of a variable for the value of fuel exports was insignificant, while the original specification of primary commodity exports and its square both remained significant. The channels by which primary commodities might relate to the risk of conflict have come under intense scrutiny and debate (Ross, 2004; Humphreys, 2005; Rohner, 2006). Three channels seem likely. One is that primary commodity exports provide opportunities for rebel predation during conflict and so can finance the escalation and sustainability of rebellion. The most celebrated cases are the diamond-financed rebellions in Sierra Leone and Angola. Oil also provides ample opportunities for rebel finance, whether through ‘bunkering’ (tapping of pipelines and theft of oil), kidnapping and ransoming of oil workers, or extortion rackets against oil companies (often disguised as ‘community support’). A second channel is that rebellions may actually be motivated, as opposed to merely being made feasible, by the desire to capture the rents, either during or after conflict. A third channel is that the governments of resource-rich countries tend to be more remote from their populations since they do not need to tax them, so that grievances are stronger (see Tilly, 1975). Evidently, these three channels need not be alternatives, but a study by Lujala, Gleditsch and Gilmore (2005) helps to distinguish between them. They find that conflicts are more likely to be located in the areas of a country in which natural resources are extracted, providing some support for the rebel finance hypothesis.

Two policy implications have often been drawn from our previous results on these three economic variables. One is that economic development is critical for reducing the incidence of civil war. The other is that international trade in primary commodities

carries particular risks and so warrants special measures such as the Kimberley Process and the Extractive Industries Transparency Initiative. As is evident from our above discussion, while these policies are consistent with our results they are not entailed by them: alternative interpretations could be found in which these would not be warranted. However, our present results remain consistent with these policies.

A further result of our previous analysis concerned the effect of population size. We again find that larger population size increases the risk of civil war. However, the coefficient on the log of population is significantly below unity (0.28), so that a doubling of population size increases the risk of civil war by only 21 per cent (from 4.7 per cent to 5.7 per cent), which is significantly less than double. The most plausible interpretation of this is that there are economies of scale in certain basic functions of the state, most notably the deterrence of organized violence.<sup>5</sup> An implication is that controlling for other characteristics, a region that is divided into many countries, such as Africa, will have considerably more conflicts than one which is divided into only a few countries, such as South Asia. This result sits uneasily with the recent international fashion for settling conflicts by the creation of new states: Eritrea and prospectively Southern Sudan in Africa, the dissolution of Yugoslavia in Europe, East Timor in Asia, the (now-dissolved) FARC mini-state in Latin America, and Palestine in the Middle East. As the low-income world divides into more countries to settle 'historic grievances' there should be some presumption that unless these societies achieve economic development internal conflict is likely eventually to increase.

Twenty-three countries experienced repeat civil wars. Either this reflects country fixed-effects, or conflict increases the risk of further conflict. To test the latter we introduced a variable for the time that has passed since the previous conflict.<sup>6</sup> This is again highly significant: risks decline as the duration of peace lengthens but the effect is very slow. A country only ten years post-conflict has a risk of 14.8 per cent, and even one that is twenty years post-conflict has a risk of 9 per cent. To check that this

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<sup>5</sup> In support of this, Collier, Hoeffler and Söderbom (2006) find that the effectiveness of international peacekeeping forces is related to their absolute size and not their size relative to population or economic activity.

<sup>6</sup> If the country never experienced a civil war we count the years since the end of World War II.

is not proxying some unobserved fixed characteristic that makes these countries endemically prone to conflict we introduced a dummy variable that took the value of unity if the country had had a previous conflict (Table 3, column 1). The variable is insignificant. Additionally, as part of our robustness checks we ran a fixed-effects regression (Table 5, column 3). The variable for the time since the previous conflict remained significant at the 1 per cent level. The high risk of repeat conflict was one component of our concept of the ‘conflict trap’, in which one a country stumbled into a civil war there was a danger that it would enter a dysfunctional cycle in which the legacy of war was a heightened risk of further conflict, partly because of this time effect, and partly because of the likely decline in income. The principle legacy of a civil war is a grossly heightened risk of further civil war.

These five variables constitute what is common between our previous analysis and our present results. What is different? One difference is in respect of social composition. In our previous work we found that ethnic fractionalization had ambiguous effects. Risks were increased by what we termed ‘ethnic dominance’. By this we meant that the largest ethnic group constituted somewhere between 45 per cent and 90 per cent of the population. Other than this, we found that social and religious fractionalisation tended to reduce the risk of conflict. In combination this implied a quadratic effect of ethnic fractionalization, first increasing risk and then reducing it. With our new data we find a simpler relationship: social fractionalization significantly increases risk. We measure social fractionalization by combining two measures of ethnic and religious diversity. The ethno-linguistic fractionalization index measures the probability of two randomly picked individuals not speaking the same language. The religious fractionalization index is constructed in a similar way. We use a combination of these two variables to capture the possible cross cutting of ethnic and religious diversity. *A priori*, ethnic and religious fractionalization can interact in various ways. If cleavages are coincident either one might be redundant. If cleavages are non-coincident they could be additive, with three ethnic groups and three religious groups generating six differentiated groups, or multiplicative, with cross-cutting cleavages generating nine groups. We found that the multiplicative specification dominated other possibilities and this is the specification adopted in our core

regressions.<sup>7</sup> So measured, doubling social fractionalization from 18 per cent to 36 per cent, for example, raises the risk of conflict from 4.7 per cent to 7 per cent. The change of results from our previous analysis matters most for risk estimates in the most ethnically diverse societies, most notably much of Africa.

Three new variables enter the analysis, surviving stepwise deletion. The first is a dummy for being a former French colony in Africa during the period 1965-1999. During this period analyzed the former French colonies of Africa had a risk of civil war that was less than a third of that which would otherwise have been predicted. They faced a risk of 2.9 per cent (given the estimated coefficient), while they would have suffered a civil war risk of 7.6 per cent if they had had the same characteristics, but without being Francophone. How might this have come about? One possibility is that the distinctive cultural and administrative traditions established by France have left a more peaceable legacy than those societies that were not colonized by France. An alternative interpretation is that during this period Francophone Africa remained under a French military umbrella, with French bases through the region providing *de facto* security guarantees. Since the security guarantees were confined to sub-Saharan Africa, partly for logistical reasons, and to a clearly define period, it is possible to test between these two interpretations by including both a dummy variable for all countries that were former French colonies, a dummy variable for the Francophone sub-Saharan African countries during 1965-99, and a dummy variable for sub-Saharan Africa. When these three are all included (Table 4, column 1) none is significant but stepwise deletion clearly leads to the elimination of the general dummies for *La Francophonie* and for sub-Saharan Africa, leaving that for the former French colonies of sub-Saharan Africa during 1965-99 as significant. Hence, the most reasonable interpretation is that the radically lower risk of conflict was as a result of the French security guarantee. The French policy was in striking contrast to British post-colonial policy which very rapidly ceased to countenance military intervention. As political governance gradually became more of an issue during the 1990s, French military intervention came to be seen as unjustified since it had involved support for tainted regimes (Michailof, 1993, 2005). The decisive departure from the practice of

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<sup>7</sup> Potentially, this implies that if a society is homogenous with respect to either religion or ethnicity then the other dimension of differentiation has no effect. In practice, the only society so characterized in our data is Mauritania.

guarantees was when the French government decided to allow the coup d'état in Cote d'Ivoire of December 1998 to stand despite being in a position to reverse it. This was a controversial decision taken by a new President against the advice of the civil service establishment whose views reflected past practice. This decision enables the shift in policy to be precisely dated. Paradoxically, shortly after the French government decided against further military intervention the British government introduced it, sending a substantial force into Sierra Leone to end the civil war and enforce the post-conflict peace. This British policy is evidently too recent and indeed to date too country-specific to warrant inclusion in a statistical analysis. However, we invite political scientists to construct a variable which rates for each country-year globally over this period the *de facto* security guarantees provided, whether from former colonists, superpowers, or military alliances. The introduction of such a variable into the analysis would provide a useful test of a widespread strategy.

A second new variable that survives stepwise deletion is the proportion of the population made up of males in the age range 15-29. In our previous work this was insignificant but the expansion of sample and improvement in data quality bring it into significance. A doubling in the proportion of the population in this category increases the risk of conflict from 4.7 per cent to 31.9 per cent. As with criminality, rebellion relies almost exclusively upon this particular segment of the population. The most reasonable explanation for this extreme selectivity is that some young men have both an absolute advantage and a taste for violence. Some rebel groups undertake forced recruitment from among boys. A common tactic, employed for example by the Lord's Resistance Army in Uganda, is for boys to be kidnapped from schools and then required to commit an atrocity that makes it impossible for them to return to their community. Another tactic, employed for example by the Revolutionary United Forces in Sierra Leone, is to target young male drug addicts who can then be controlled through drug supplies.

A third new variable is the proportion of the terrain of a country that is mountainous. War start observations are characterized by a higher proportion of mountains (20.87 per cent) than peaceful observations (15.71 per cent). As with the proportion of young men in the population, in our previous work this variable was insignificant. Mountainous terrain is a difficult concept to measure empirically because it is not

well-proxied by crude objective indicators such as altitude: a high plateau is not particularly ‘mountainous’. For the measure used in our previous work we commissioned a specialist geographer, John Gerrard, to code terrain globally. This has since been extended by Fearon and we use these extended data. The effect is large. Were Nepal flat its risk of civil war would have been 3 per cent based on its other characteristics. Given that 67.4 per cent of its terrain is mountainous, its risk was 7.8 per cent. This variable replaces our previous geographic variable, which measured the dispersion of the population over the country, which is no longer significant.

### ***Robustness checks***

In Tables 4 and 5 we subject these results to a range of robustness checks. In Table 4 we conduct specification tests. Kaplan (1994) hypothesises that the fall of the iron curtain has made the world more unstable while Gleditsch *et al* (2002) suggest that the incidence of war has decreased since 1989. We find that the end of the Cold War did not have lasting effects on the risk of civil war, although consistent with Kaplan’s thesis, there was a temporary surge of conflict in the first half of the 1990s. In addition to the Cold War, we find that the degree of democracy, an Africa dummy, being a former French colony, population density, having had a previous war, a range of variants of ethnic diversity, the number of years since Independence, fuel exports, and income inequality are all insignificant.

In Table 5 we investigate a range of more methodological issues. As reported, in column 1 we drop all war observations other than the first to eliminate endogeneity. As noted, the key variable of concern, per capita income, actually becomes more significant as a result of this deletion. In column 2 we change the definition of the dependent variable to the new Armed Conflict Dataset (ACD). This is quite a radical step since the ACD constitutes a complete rethinking of the definition of a civil war. For this regression we make a corresponding change in our measure of the time since the previous civil war, basing the estimate on the ACD. All our results survive this fundamental change of variable with only minor changes upwards and downwards in the levels of significance. In column 3 we introduce fixed effects. The only variables that are eliminated by fixed effects are population, and the proportion of young men. The former tells us that the effect of population is coming from the cross-section



comparison of societies of different size rather than by population growth. The latter is less informative since the proportion of the population in any particular age-sex group is very slow-changing so that variations arise largely due to differences in cross-section. The fourth column introduces random effects. The core results all remain significant. The fifth column introduces time dummies. These have no effect on the core results and only one of them is individually significant: there was a temporary increase in the risk of civil war in the first half of the 1990s. In the sixth column of Table 5 we make the standard adjustment for rare events (King and Zeng, 2002). This slightly increases the significance level of all our variables, bringing them all comfortably over the threshold of 10 per cent. In column 7 we expand the sample to its maximum by using the AMELIA program of multiple imputation of all missing values of explanatory variables (King *et al.* 2001). This increases our coverage of civil wars from 71 to the full 84. Most variables become considerably more significant as a result of this imputation. In particular, per capita income and growth are now both significant at 1% and their coefficients are increased. Two variables lose significance, although their coefficients do not change sign. These are primary commodity exports and mountainous terrain. One characteristic of these previously omitted conflicts is that they tend to be in countries in which official data on exports radically underestimate actual transactions. For example, in Afghanistan and Cambodia, two of the omitted conflicts, there is considerable evidence that the conflict was financed partly by substantial illegal exports of drugs, gems and timber. Hence, the loss of significance for primary commodity exports may well be the result of introducing severely biased data.

### ***Implications***

We now return to our core results and focus on the implications of the three new variables. The variables, countries under the French security umbrella, the proportion of young men in the population, and the proportion of the terrain which is mountainous, all have substantial effects. Consider two hypothetical countries whose characteristics were at the mean of all the other variables but which differed substantially in respect of these three. One was under the implicit French security umbrella, had only half the average proportion of young men in its society, and had no mountainous terrain. The other was not under the security umbrella, had double the

average proportion of young men in its society, and was as mountainous as Nepal. The respective risks in these two otherwise identical societies are 0.5 per cent and 52.8 per cent.

However, the key significance of these new variables is not that they have such substantial effects but that they are far easier to interpret than any of the variables that were previously found to be significant. They are particularly good proxies for distinguishing between the two key branches of the theoretical models: motivation versus feasibility. While the three economic variables, the level, growth and structure of income, can all be interpreted as either feasibility or motivation, the three new variables cannot readily be interpreted as proxying motivation. By contrast, they all have very ready interpretations as important aspects of feasibility. The Francophone security guarantee made rebellion more dangerous and less likely to succeed. Mountainous terrain provides an obvious safe haven for rebel forces, and the proportion of young men in the society is a good proxy for the proportion of the population psychologically predisposed to violence and best-suited for rebel recruitment. Our two hypothetical countries are thus by construction identical in respect of motivations for conflict, and differ only in these three aspects of feasibility.

Two other variables are most readily interpreted as proxying feasibility, although they could be interpreted in other ways. These are population size and primary commodity exports. Population size probably proxies the scale economies in security provision. Primary commodity exports probably proxy the scope for rebel financial predation. We conclude with a refinement of our two hypothetical countries in which these two variables are added as further differences. In the former, in which rebellion is already difficult, we set the population to be 50 million, and set primary commodity exports as a share of GDP to zero. Note that all these five features that make rebellion less feasible are within the observed range. All the other characteristics of the country are at the sample mean. In the other territory, in which rebellion is easy, there are five identical countries each with a population of 10 million. Each has primary commodity exports equal to 25 per cent of GDP and also the other three features that make rebellion easy, as specified previously. Other than these characteristics each is identical to the country in which rebellion is difficult. By design, each territory has the same total population although one is divided into five small countries, and the

characteristics that might affect the motive for rebellion have been kept constant at the mean of all observations. What is the risk of civil war in each of these territories? In the territory in which rebellion is difficult the risk of civil war in any five-year period is now only 0.3 per cent. In other words, rebellion does not occur because it is infeasible. In the territory in which there are fewer impediments to rebellion the risk that a civil war will erupt somewhere in the territory is now an astonishing 97 per cent.<sup>8</sup> Thus, where rebellion is feasible, it will occur without any special inducements in terms of motivation. While our five variables have broadly captured the important aspects of feasibility, namely finance, military deterrence, and the availability of suitable recruits, we have not set up an extreme situation. For example, we have not introduced anything about the level or growth of per capita income, or about the time since a previous civil war. Low per capita income, slow growth, and the organizational and armaments legacies from a previous civil war all make rebellion more feasible even though they may also increase the motivation for rebellion.

Thus, the new evidence goes considerably beyond confirming the key results of our previous work about the primacy of economic variables in the risk of civil war. For the first time it provides results that unambiguously support the proposition that feasibility rather than motivation is decisive for the risk of rebellion.

## **5. Conclusion**

In this paper we have analyzed empirically the causes of civil war. This is our third paper on the topic. Our first, (Collier and Hoeffler, 1998) was the first quantitative study of the topic. Our second, (Collier and Hoeffler, 2004) though a major advance on our first study, still omitted many civil wars and has been subject to considerable challenge and debate. We have attempted to make the results in this paper definitive. The sample has nearly doubled to over 1000 observations, the period of analysis has been brought up to end-2004, and the quality of the data has been considerably improved. Our results are important in two respects. First, despite the challenges, the core results of our previous analysis all survive. In particular, economic characteristics matter: namely, the level, growth and structure of income. Secondly, three new

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<sup>8</sup> In each small country separately it is 47.9%

variables are found to be both significant and quantitatively important. These are whether the country was under the implicit French security umbrella, the proportion of its population who were males in the age range 15-29, and the extent to which the terrain is mountainous. Not only are these three variables important in their own right, from our perspective their key significance is that for the first time variables are significant which have unambiguous interpretations in terms of the major theoretical divisions. As we discuss in our review of theory, the basic division between theories of civil war is those that focus on feasibility, and those which focus on motivation, which in turn has two variants, 'greed' and grievance. The three new variables decisively point to the primacy of feasibility over motivation, a result which is consistent with the *feasibility hypothesis*. The feasibility hypothesis proposes that where rebellion is feasible it will occur: motivation is indeterminate, being supplied by whatever agenda happens to be adopted by the first social entrepreneur to occupy the viable niche.

An implication of the feasibility hypothesis is that if the incidence of civil war is to be reduced, which seems appropriate given the appalling consequences, it will need to be made more difficult. This is orthogonal to the rectification of justified grievances, the case for which is implied directly by the concept of 'justified grievance' without any need to invoke perilous consequences from the failure to do so.

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**Table 1: List of Civil Wars**

Country	War	Country	War	Country	War	Country	War
Afghanistan	1978-2001	DRC	1960-1965	Liberia*	1989-1990	Serbia*	1991-1992
Algeria	1962-1963	DRC*	1993	Liberia*	1992-1995	Serbia	1998-1999
Algeria*	1992-2000	DRC*	1996-2000	Liberia*	1996	Sierra Leone*	1991-1996
Angola*	1975-1991	CongoRep.*	1997-1999	Liberia	2003	Sierra Leone*	1998-2000
Angola*	1992-1994	Côte d'Ivoire*	2002-ongoing	Mozambique*	1979-1992	Somalia*	1982-1997
Angola*	1998-2001	Dom. Rep.*	1965	Myanmar*	1968-1980	South Africa*	1989-1993
Azerbaijan	1991-1994	El Salvador*	1979-1992	Myanmar*	1983-1995	South Africa*	1999-2002
Burundi*	1972	Ethiopia*	1974-1991	Nepal	2002-ongoing	Sri Lanka*	1971
Burundi*	1988	Guatemala*	1966-1972	Nicaragua*	1978-1979	Sri Lanka*	1983-1993
Burundi*	1991-1992	Guatemala*	1978-1984	Nicaragua*	1982-1990	Sri Lanka*	1995-2001
Burundi	1993-1998	Guinea-Biss.*	1998	Nigeria*	1967-1970	Sudan	1963-1972
Burundi	2000-2002	India*	1985-1993	Nigeria*	1980-1981	Sudan*	1983-1992
Cambodia	1970-1975	India*	2002-ongoing	Nigeria	1984	Sudan*	1995-ongoing
Cambodia	1978-1991	Indonesia	1956-1960	Pakistan*	1971	Thailand*	1970-1973
Cambodia	1993-1997	Iran*	1978-1979	Pakistan	1973-1977	Turkey*	1991-2002
Cameroon	1959-1961	Iran*	1981-1982	Pakistan*	1994-1995	Uganda	1966
Chad*	1966-1971	Iraq	1961-1963	Peru*	1982-1995	Uganda*	1980-1988
Chad	1980-1988	Iraq*	1974-1975	Philippines*	1972-1992	Uganda*	1996-2001
Chad*	1990	Iraq*	1985-1993	Philippines*	2000-2001	Uganda*	2004- ongoing
Chile*	1973	Iraq	1996	Romania*	1989	Vietnam	1960-1965
China*	1967-1968	Jordan*	1970	Russia*	1994-1996	Yemen	1962-1969
Colombia*	1984-1993	Lao PDR	1960-1962	Russia*	1998-ongoing	Yemen	1986
Colombia*	1998-ongoing	Lao PDR	1963-1973	Rwanda	1963-1964	Yemen	1994
		Lebanon	1975-1990	Rwanda*	1990-1993	Zimbabwe*	1972-1979
				Rwanda	1994		
				Rwanda*	1998		

Note: Source Gleditsch (2004), war observations marked with an asterisk are included in our core model (Table 3, column 4). If two wars broke out in the same five year period we only coded one war start.

**Table 2: Means of Key Variables**

	Sample	Peaceful Observations	Warstart Observations	Former French African Colonies
War Start (dummy)	0.067	0	1	0.037
GDP per capita (US \$, base year 1997)	5452	5764	1100	681
GDP per capita growth (t-1)	1.844	2.011	-0.486	0.204
primary commodity exports (proportion of GDP)	0.164	0.165	0.146	0.178
Years of Peace	32	33	16	32
Former French African Colony (dummy)	0.101	0.104	0.056	1
Social Fractionalisation (index 0-1)	0.179	0.130	0.280	0.287
Proportion of Young Men (proportion of age 15-29 in total population)	0.129	0.129	0.131	0.128
Total Population	30.2	28.3	56.5	9.104
Mountainous (proportion of total land area)	16.054	15.710	20.865	4.538
number of observations	1063	992	71	107

Note: Based on the sample used for our core model, Table 3, column 4.



**Table 3: Feasibility of Civil War**

	(1)	(2)	(3)	(4)
<b><i>Economy</i></b>				
lnGDP per capita	-0.246 (1.82)*	-0.247 (1.83)*	-0.242 (1.80)*	-0.203 (1.63)*
GDP per capita growth (t-1)	-0.147 (3.65)***	-0.147 (3.65)***	-0.144 (3.65)***	-0.145 (3.70)***
Primary commodity exports (PCE)	7.406 (1.82)*	7.212 (1.84)*	7.273 (1.86)*	7.133 (1.84)*
PCE squared	-14.290 (1.76)*	-13.906 (1.78)*	-14.088 (1.80)*	-14.058 (1.82)*
<b><i>History</i></b>				
Post Cold War	-0.111 (0.29)	-0.137 (0.39)		
Previous War	-0.091 (0.19)			
Peace	-0.060 (3.92)***	-0.058 (5.93)***	-0.058 (5.99)***	-0.057 (5.96)***
Former French African Colony	-0.961 (1.61)	-0.961 (1.61)	-0.954 (1.60)	-1.020 (1.74)*
<b><i>Social Characteristics</i></b>				
Social Fractionalisation	2.310 (2.85)***	2.325 (2.88)***	2.328 (2.88)***	2.323 (2.88)***
Proportion of Young Men In Population	17.198 (1.63) 0.291 (2.87)***	16.999 (1.62) 0.286 (2.92)***	17.287 (1.64) 0.280 (2.89)***	17.423 (1.67)* 0.284 (2.93)***
<b><i>Geography</i></b>				
Mountainous	0.015 (1.98)**	0.015 (1.98)**	0.016 (2.00)**	0.015 (1.94)*
<b><i>Polity</i></b>				
Democracy	0.035 (0.75)	0.036 (0.80)	0.033 (0.74)	
Observations	1063	1063	1063	1063
Pseudo R <sup>2</sup>	0.28	0.28	0.28	0.28
Log Likelihood	-187.22	-187.24	-187.31	-187.58

Note: Logit regressions, dependent variable: war start. Absolute value of z statistics in parentheses. Asterisks (\*, \*\*, \*\*\*) indicate significance at the 10%, 5% and 1% level, respectively. All regressions include an intercept (not reported).

**Table 4: Specification Tests**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b><i>Economy</i></b>							
lnGDP per capita	-0.148 (1.04)	-0.143 (1.01)	-0.227 (1.62)	-0.229 (1.79)*	-0.199 (1.59)	-0.205 (1.64)	-0.203 (1.63)
GDP per capita growth (t-1)	-0.144 (3.63)***	-0.145 (3.65)***	-0.144 (3.62)***	-0.144 (3.67)***	-0.145 (3.70)***	-0.143 (3.61)***	-0.145 (3.70)***
Primary commodity exports	7.248 (1.85)*	7.127 (1.84)*	6.761 (1.74)*	6.965 (1.80)*	7.046 (1.81)*	6.787 (1.71)*	7.040 (1.74)*
Primary commodity exports squared	-14.117 (1.81)*	-13.862 (1.79)*	-13.597 (1.76)*	-13.599 (1.77)*	-13.935 (1.80)*	-13.523 (1.73)*	-13.974 (1.79)*
Fuel exports							0.001 (0.08)
<b><i>History</i></b>							
Peace	-0.057 (5.94)***	-0.057 (5.94)***	-0.056 (5.80)***	-0.056 (5.87)***	-0.057 (5.95)***	-0.057 (5.96)***	-0.057 (5.95)***
Former French African Colony	-0.888 (0.91)	-1.114 (1.88)*	-1.058 (1.80)*	-1.009 (1.72)*	-1.031 (1.75)*	-1.040 (1.76)*	-1.021 (1.74)*
Former French Colony	-0.228 (0.29)						
Years since Independence			0.001 (0.37)				
<b><i>Social Character.</i></b>							
Social Fractionalisation	1.796 (1.84)*	1.839 (1.90)*	2.392 (2.85)***	2.623 (2.95)***	2.086 (1.68)*	2.300 (2.84)***	2.332 (2.87)***
Ethnic Fractionalisation					0.217 (0.25)		
Ethnic Dominance				0.300 (0.83)			
Proportion of Young Men in Population	17.912 (1.73)*	18.023 (1.74)*	17.427 (1.68)*	17.455 (1.68)*	17.455 (1.67)*	17.808 (1.69)*	17.385 (1.67)*
	0.317 (2.98)***	0.319 (2.99)***	0.244 (2.25)**	0.292 (2.98)***	0.278 (2.80)***	0.280 (2.88)***	0.282 (2.89)***
<b><i>Geography</i></b>							
Mountainous	0.015 (1.96)*	0.015 (1.99)**	0.014 (1.67)*	0.014 (1.77)*	0.015 (1.95)*	0.015 (1.89)*	0.015 (1.94)*
Sub Saharan Africa	0.398 (0.85)	0.414 (0.89)					
Population density						-0.000 (0.34)	
Observations	1063	1063	996	1063	1063	1063	1063
Pseudo R <sup>2</sup>	0.28	0.28	0.27	0.28	0.28	0.28	0.28
Log Likelihood	-187.14	-187.18	-186.90	-187.24	-187.55	-187.50	-187.58

Note: Logit regressions, dependent variable: war start. Absolute value of z statistics in parentheses. Asterisks (\*, \*\*, \*\*\*) indicate significance at the 10%, 5% and 1% level, respectively. All regressions include an intercept (not reported).

**Table 5: Robustness Checks**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	First war only	ACD data set	Fixed effects	Random effects	Time effects	Rare events	Amelia
<b>Economy</b>							
lnGDP per capita	-0.297 (1.97)**	-0.269 (1.91)*	-0.565 (1.22)	-0.203 (1.63)*	-0.197 (1.58)	-0.195 (1.93)*	-0.295 (2.56)***
GDP per capita growth (t-1)	-0.077 (1.46)	-0.168 (3.80)***	-0.204 (3.49)***	-0.145 (3.70)***	-0.149 (3.46)***	-0.143 (4.31)***	-0.084 (2.83)***
PCE	5.571 (1.24)	4.762 (1.10)	10.722 (1.47)	7.133 (1.84)*	6.915 (1.76)*	6.026 (1.68)*	0.615 (0.33)
PCE squared	-10.015 (1.17)	-10.729 (1.27)	-18.464 (1.33)	-14.058 (1.82)*	-13.705 (1.75)*	-11.236 (0.100)*	-1.538 (-0.69)
<b>History</b>							
Peace	-0.007 (0.57)	-0.024 (2.20)**	0.065 (3.27)***	-0.057 (5.96)***	-0.059 (5.97)***	-0.055 (5.58)***	-0.057 (6.36)***
Former French African Colony	-1.044 (1.34)	-1.348 (1.73)*	-13.847 (0.02)	-1.020 (1.74)*	-1.019 (1.72)*	-0.906 (1.62)*	-0.967 (1.68)*
<b>Social Characteristics</b>							
Social Fractionalisation	1.751 (1.70)*	1.750 (1.88)*	6.114 (1.12)	2.323 (2.88)***	2.270 (2.77)***	2.277 (3.05)***	2.078 (2.85)***
Proportion of Young Men In Population	17.664 (1.51)	24.890 (2.52)**	-4.357 (0.26)	17.423 (1.67)*	17.856 (1.67)*	19.097 (2.04)**	10.528 (1.71)*
	0.257 (2.22)**	0.293 (2.58)**	0.826 (1.35)	0.284 (2.93)***	0.279 (2.80)***	0.272 (3.38)***	0.304 (3.83)***
<b>Geography</b>							
Mountainous	0.016 (1.73)*	0.008 (0.85)	0.057 (1.25)	0.015 (1.94)*	0.015 (1.92)*	0.015 (1.88)**	0.006 (0.85)
Time dummy 1970-1974					0.796 (1.48)		
Time dummy 1975-1979					0.198 (0.33)		
Time dummy 1980-1984					0.700 (1.27)		
Time dummy 1985-1989					0.088 (0.14)		
Time dummy 1990-1994					0.970 (1.71)*		
Time dummy 1995-1999					0.436 (0.75)		
Time dummy 2000-2004					0.325 (0.49)		
Observations	1026	1045	242	1063	1063	1063	1658
Pseudo R <sup>2</sup>	0.12	0.19			0.29		
Log Likelihood	-131.97	-145.60			-184.77		
No of countries			39	172			

Note: Logit regressions, dependent variable: war start. Absolute value of z statistics in parentheses. Asterisks (\*, \*\*, \*\*\*) indicate significance at the 10%, 5% and 1% level, respectively. All regressions include an intercept (not reported).

## **Data Sources:**

### **Democracy**

We measure democracy with the democracy indicator from the Polity IV data set. It ranges from 0 (autocratic) to 10 (fully democratic). Data source: <http://www.cidcm.umd.edu/inscr/polity/>

### **Economic growth**

Using WDI 2005 data for GDP per capita we calculated the annual growth rates.

### **Former French African Colony**

This dummy takes a value of one for the following countries: Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Rep., Cote d'Ivoire, Djibouti, Gabon, Guinea, Madagascar, Mali, Mauritania, Niger, Senegal, Togo. This variable is zero for all countries for the last period 2000-04.

### **GDP per capita**

We measure GDP per capita annually. Data are measured in constant 1995 US dollars and the data source is WDI 2005.

### **Peace**

The number of years since the end of the last civil war. If the country never experienced a civil war we count all years since the end of World War II.

### **Population**

Population measures the total population, in our regressions we take the natural logarithm. Data source: World Bank World Development Indicators 2005.

### **Primary Commodity Exports**

The ratio of primary commodity exports to GDP proxies the abundance of natural resources. The data on primary commodity exports and GDP were obtained from the World Bank. Export and GDP data are measured in current US dollars.

### **Social, ethnolinguistic and religious fractionalization**

We proxy social fractionalization in a combined measure of ethnic and religious fractionalization. Ethnic fractionalization is measured by the ethno-linguistic fractionalization index. It measures the probability that two randomly drawn individuals from a given country do not speak the same language. Data are only available for 1960. In the economics literature this measure was first used by Mauro (1995). Using data from Barrett (1982) on religious affiliations we constructed an analogous religious fractionalization index. Following Barro (1997) we aggregated the various religious affiliations into nine categories: Catholic, Protestant, Muslim, Jew, Hindu, Buddhist, Eastern Religions (other than Buddhist), Indigenous Religions and no religious affiliation.

The fractionalization indices range from zero to 1. A value of zero indicates that the society is completely homogenous whereas a value of 1 would characterize a completely heterogeneous society. We calculated our social fractionalization index as the product of the ethno-linguistic fractionalization and the religious fractionalization.

**Warstarts**

Our main measure is based on Gleditsch (2004) and can be downloaded from <http://weber.ucsd.edu/~kgledits/expwar.html> (12 July 2006). Our alternative measure comes from the Armed Conflict Database (Gleditsch *et al* 2002) and can be found on [http://www.prio.no/page/CSCW\\_research\\_detail/Programme\\_detail\\_CSCW/9649/45925.html](http://www.prio.no/page/CSCW_research_detail/Programme_detail_CSCW/9649/45925.html) (12 July 2006).

**Young Men**

We define this variable as the proportion of young men aged 15-49 of the total population (%). Data Source: UN Demographic Yearbook.