Disentangling Democracy and Development as Determinants of Armed Conflict*

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Abstract

The paper explores the relationship between development, democracy and civil war. I review some contributions to the literature on the bivariate relationships between the three variables, and argue that we should expect the relationship between democracy and civil war to be contingent on development: Poor democracies are unstable and hence should be less efficient as institutions for conflict resolution, democratic institutions may require more resources than autocratic ones to contain insurgencies, and increased development brings with it a pressure for constitutional changes in autocracies that may turn violent. To test this, I estimate a set of different Cox regression models, using Gurr's Executive Constraints, Vanhanen's Polyarchy and Gates et al.'s MIRPS variables as measures of democracy, and GNP per capita, percent literacy in the population, and the value of minerals exports as a share of total exports as indicators of development. I find quite strong evidence that democracy is correlated with civil peace only for developed countries, and for countries with high levels of literacy. Conversely, I find that the risk of civil war decreases with development only for democratic countries.

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The paper explores the relationship between development, democracy and civil war. I review some contributions to the literature on the bivariate relationships between the three variables, and argue that we should expect the relationship between democracy and civil war to be contingent on development: Poor democracies are unstable and hence should be less efficient as institutions for conflict resolution, democratic institutions may require more resources than autocratic ones to contain insurgencies, and increased development brings with it a pressure for constitutional changes in autocracies that may turn violent. To test this, I estimate a set of Cox regression models, using three different measures of democracy, and three operationalizations of development: GNP per capita, percent literacy in the population, and the value of minerals exports as a share of total exports . I find strong evidence that democracy is correlated with civil peace only for developed countries, and for countries with high levels of literacy. Conversely, I find that the risk of civil war decreases with development only for democratic countries. This has implications for some recent theories of the determinants of armed conflict.

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1 Introduction

Democracy is often described as a system for peaceful resolution of political conflict. Democratic political systems are supposed to allow all parties to a conflict to be heard, decisions are made on the basis of rules all parties to the conflict agree to, open debates and a free press ensures that the decision-making is transparent, and the losing party in contentious issues is willing to comply with the outcome because the democratic constitution guarantees that the party may prevail in the future. And indeed, the democracies in the West have avoided lapsing into bloody armed conflicts in the past 50 years, arguably with the exception of Northern Ireland and the Basque conflict. Still, cross-national statistical studies of the relationship between democracy and civil war are not able to reach a consensus on whether this relationship has been a regularity in the last 40-50 years. A number of studies (Muller & Weede, 1990; Ellingsen, 2000; Hegre et al., 2001; Fearon & Laitin, 2002, Reynal-Querol, 2002; Urdal, 2002) find an 'inverted-U' relationship between level of democracy and the probability of civil war: 'consistent' democracies and autocracies have a low probability of civil war, whereas 'inconsistent regimes' or 'anocracies' – political systems that combine autocratic and democratic features[1] – are estimated to have a higher risk of civil war. Hegre et al. (2001) find this 'inverted-U' relationship to hold when controlling for the stability of the political system.

Other studies, however (notably Collier & Hoeffler, 2001; Elbadawi & Sambanis, 2002) do not find a robust relationship between type of political system and the risk of civil war. Collier & Hoeffler takes this as support of the argument that opportunities for rebellion are more important than the grievances that might motivate them. In the same vein, Fearon & Laitin (2002:17) argue that 'given the right environmental conditions, insurgencies can thrive on the basis of small numbers of rebels without strong, widespread, freely-granted popular support – hence even in democracies'.

And, even if the inverted-U regularity holds, this implies that autocracies are equally peaceful as democracies, presumably because they are able to suppress the opposition so that

[1] According to the definition in Gates et al. (2001), inconsistent regimes may have an elected parliament, but very limited franchise (e.g., South Africa under apartheid), or an elected parliament with very limited power relative to an elected executive (e.g., Russia in the 1990s).

no rebel movement can be organized. This is not entirely inconsistent with the picture of democracy as a system for peaceful resolution of political conflict. However, the observation that autocracies are equally successful in maintaining a domestic peace as democracies makes one question the importance of democracy in reducing the risk of civil war. Fearon & Laitin interpret this finding more as due to the poor capability of such inconsistent regimes than a measure of the efficacy of democracy for conflict resolution.

The source of the discrepancy may be related to how one controls for development. A closer look at which democracies have experienced armed conflict is illuminating. According to the Uppsala dataset (Gleditsch et al., 2002), there were 30 armed conflicts in 18 democracies in the 1960–2000 period (democracy defined using the Gates et al. measure, described below). Three of these occured in countries that had an income per capita over the average for democracies (The Northern Ireland conflict, the Algeria conflict in 1961 which is coded as taking place in France,[2] and the Cyprus conflict in 1974). There were 43 conflicts in 32 autocracies in the period, 11 of which took place in countries with income per capita higher than the autocratic average: Argentina 1970, Rumania 1989, Yugoslavia 1991 (two conflicts), Panama 1989, USSR 1988, Liberia 1980, Iraq 1982, Saudi Arabia 1979, Yemen A.R., 1986, and Tunisia 1980. As many as 21 of the armed conflicts – 70% – in democracies took place in countries with income under the 25% quartile for democracies. The corresponding figure for autocracies were 13, or 35%. This suggests that armed conflicts tend to occur disproportionally in low-income democracies and in middle and high-income autocracies.

This is not so surprising. The relationship between development and democracy is well established: Democracies are stable only if they are embedded in developed economies, but this does not apply to autocracies. In this paper, I argue that this relates to armed conflict in two ways: Wide-ranging changes in countries' political institutions are often accompanied by violence, such that institutions that are fundamentally stable are more likely to preserve a civil peace. Moreover, many of the same factors that explain stable democracy have been shown to explain the absence of armed conflict.

In this paper, I test systematically the hypothesis that the impact of democracy on the

[2] The income per capita variable is coded for France without colonies. Since the colonial conflict is included in France, the income variable should have measured the average income in France including colonies, too. This data weakness tends to bias the results in this paper against the main argument.

risk of armed conflict is contingent on development. I find democracy to reduce the risk considerably, but only where the conditions for stable democracy are present: relatively high per capita income, high literacy rates, and (to a lesser extent) a diversified economy. Likewise, I find development only to reduce the likelihood of conflict in democracies.

I will define more precisely what is meant by 'development', and proceed to explore the relationship between development, democracy, and civil war, decomposing 'development' into three components: education, income, and the structure of the economy (e.g., industrialization and the extent to which the economy is dependent on primary commodities). I will discuss a set of contributions to the literature on the relationships between development, democratization, and civil war in terms of this decomposition. Moreover, drawing on the literature originating with Lipset (1959) on the relationship between development and democratization, I will argue that the peace-conducive effect of democracy is contingent on aspects of development.

2 The Relationships between Development, Democracy, and Civil War

2.1 Development and Democracy

The link from development to democracy is a classic in modernization theory dating back to Lipset (1959: 75), who proclaimed that 'the more well-to-do a nation, the greater the chances it will sustain democracy'. These views have found support in several recent empirical studies (Burkhart and Lewis-Beck, 1994; Barro, 1996; Londregan and Poole, 1996; Vanhanen, 1997; Przeworski et al., 2000; Gates et al., 2001, Boix & Stokes, 2002).

Development may be defined in terms of income per capita, education or literacy, or the structure of the economy (e.g. industrialization, dependence on primary commodity extraction). I will look at the relationship between development and democracy distinguishing between these three aspects.

Lipset (1959) argues that higher income and better education for 'the lower strata' would lead to a more compromise-oriented view of politics. Rich countries also have greater sur-

pluses to distribute; this permits modernization through education, occupational mobility, free flow of information, and organizational experience. Taken together, these factors encourage adaptability and compromise, tolerance, and moderation. Increased access to material and thus political resources, together with greater institutional diversity, were seen to act as preconditions for stable democracy.

Higher average income is also associated with a more diversified economy with more alternative economic opportunities. This is important for the emergence or stability of democracy, according to Lipset (1959:84): 'If loss of office is seen as meaning serious loss for major power groups, then they will be readier to resort to more drastic measures in seeking to retain or secure office'. Moreover, wealth is associated with the presence of non-governmental organizations and institutions 'which can act as sources of countervailing power, and recruiters of participants in the political process' (Lipset, 1959:84). Poverty is also associated with nepotism, which again reduces the chances of building an efficient bureaucracy.

Dahl (1989:251ff.) argues that a 'modern dynamic pluralist society' (abbreviated MDP) is particularly favorable for the establishment and stability of democracy, partly because of the attitudes and beliefs such societies foster, and partly because such society disperses power away from any single center toward a variety of individuals, groups, associations, and organizations:

> What is crucial about an MDP society is that on the one hand it inhibits the concentration of power in any single unified set of actors, and on the other it disperses power among a number of relatively independent actors. Because of their power and autonomy, the actors can resist unilateral domination, compete with one another for advantages, engage in conflict and bargaining, and pursue independent actions on their own. Characteristic of an MDP society is a dispersion of *political resources*, such as money, knowledge, status, and access to organizations; of *strategic locations*, particularly in economic, scientific, educational, and cultural affairs; and of *bargaining positions*, both overt and latent, in economic affairs, science, communications, education, and elsewhere. (Dahl, 1989; 252)

Vanhanen (1997) provides rich empirical confirmation of these ideas.

In addition to lacking the political resources mentioned here, poor people don't have the surplus needed to be politically active, and are more risk-averse because of their marginal income. They are more vulnerable to intimidation because a larger share of their property can be physically destroyed.

The link between development and democracy has also been explained in terms of education. Lipset (1959) notes that 'education presumably broadens men's outlooks, enables them to understand the need for norms of tolerance, restraining them from adhering to extremist and monistic doctrines, and increases their capacity to make rational electoral choices' (p. 79). In addition to Lipset's argument for education's beneficial effect on these democratic values, a higher median education level may also stabilize democracies through making it harder for elites to exploit the political system for own benefits: education allows a population to effectively monitor politicians' actions. To take one example: a free press is vital to a functioning democracy, but is not likely to make much of a difference if the vast majority of the population is illiterate. This potential exploitation is likely to undermine and delegitimize the democratic system in the long run, as the electorate slowly realizes how it is misused.

A high average level of education is also important for building an efficient bureaucracy, another vital component of a well-functioning democracy.

Dahl's argument quoted above applies both to income and education. It is hard to distinguish these variables: Income, education and literacy are correlated by around 0.8, and in many of the arguments discussed above it is hard to distinguish between the effects of education and those of income.

The third aspect of development – the structure of the economy – is also related to the likelihood that a country democratizes or remains either autocratic or democratic. Ross (2001) shows empirically that resource wealth is negatively correlated with the level of democracy. He puts forward three causal mechanisms that may explain this correlation:

The first he terms the 'rentier effect' (pp. 333–35): Autocratic governments use the revenues from the abundant resources to relieve social pressures that might otherwise lead to demands for greater accountability and representation, either through low taxes or no taxes at all, or use parts of the income for spending on patronage, or uses the rent-based largesse to prevent the formation of social groups that are independent of the state, either deliberately

or simply through the relative insignificance of private economic actors. The second is called the 'repression effect' (pp. 335–36): The resource wealth allows the governments to spend more on internal security, which allows them to effectively repress the opposition.[3] The third mechanism is referred to as the 'modernization effect' (pp. 336–): In line with the discussion above, Ross notes that economic development is associated with high levels of education, occupational specialization, and urbanization. Resource-led growth, however, may not lead to higher education levels and occupational specialization, and hence fails to increase the probability of democratization.

Ross' argument predicts that resource-rich autocracies tend to remain stably autocratic, but also implies that resource-rich democracies are relatively unstable. This is the focus of Wantchekon (2000), who argues that destabilization often happens to resource-rich democracies. If the ability of the state to enforce the law is weak, incumbent governments have an informational advantage over the availability of rents to distribute to voters, and/or discretionary power to distribute these rents. To counter an incumbent who spends government resources in ways that maximizes his/hers electoral gains, the opposition will have an incentive to turn to illegal means such as inciting riots or staging coups to counter the incumbency advantage. This mechanism is stronger the more rents there are to distribute. Both Ross (2001) and Wantchekon (2000) report results from cross-sectional statistical studies that confirm that there is a negative correlation between democracy and mineral resource dependence.

It is also possible to phrase this mechanism in terms of Dahl's diffusion of power: The income from natural resources as oil and minerals typically employ very few people and generate enormous taxes. In a country where a large proportion of the income stems from such sources, power is disproportionally concentrated in the state and the few companies and the skilled labor that do the actual extraction. The lack of diffusion of power creates an unfavorable condition for democracy.

Przeworski and Limongi (1997) and Przeworski et al. (2000: 88) point out that the relationship between democracy and development may come about in two ways: either because

[3] Ross also notes that resource wealth may exacerbate ethnic tensions if the resources are geographically concentrated in the region of a minority group which will claim the rights for the monopoly of its extraction. If so, the increased military spending might be a result of the perceived security threat rather than a means to preemptively deter the opposition. Still, increased military spending is not likely to increase the probability of democratization.

democracies 'may be more likely to emerge as countries develop economically, or, having been established for whatever reasons, democracies may be more likely to survive in developed countries.' Modernization theory implies the former process – increases in literacy, income, etc. creates a 'pressure' for democratization, or 'favorable conditions' for successful democratic transitions (Dahl, 1989:239ff.). Przeworski et al. (2000) present results supporting the second of these mechanisms only.

Boix & Stokes (2002) challenge these findings, and show that when reanalyzing Przeworski et al.'s models for a longer time-frame transitions to democracy really becomes more likely when average income rises. In a formalization of Przeworski & Limongi's intuitive explanation, they also challenge the theoretical rationale for their findings: If, as Przeworski & Limongi assume, a lower marginal utility of consumption at higher levels of consumption reduces the gain from winning the struggle for dictatorship, income growth both stabilizes democracy and increases the ruling factions' incentives to democratize. Boix & Garicano (2002) explains this relationship in terms of asset specificity, or the mobility of capital: The mobility of capital places an upper threshold on the tax rate the median voter in a democracy will choose. With a lower expected tax, the wealthy are less likely to block democracy. Since the process of economic development is a story of a shift to more mobile capital, this explains the empirical regularity. Their model is also consistent with the observation that primary commodity-dependent countries are less likely to become and remain democratic, since primary commodities are highly country-specific assets.[4]

2.2 Development and Civil War

The link from aspects of development directly to domestic peace is one of the most robust findings in recent large-N studies on the determinants of civil war. The discussion of these findings can also be decomposed into the three aspects of development discussed here.

Collier and Hoeffler's (2001) 'predation theory' assumes that there will always be someone who has sufficient grievances to be willing to start a rebellion against the government. Hence, whatever the motivation, the rebellion can only be carried out if it is financially viable.

[4] In addition, the model and empirical results in Boix & Garicano (2002) shows that high inequality in the distribution of income also prevents the formation and preservation of democratic institutions.

Average income affects the viability through opportunity costs: The recruits of the rebel groups must be paid, and their cost is likely to be lower the lower their alternative income is. Hence, everything else equal, it is easier to maintain a rebellion in countries or regions with low average income than in richer regions.

Collier & Hoeffler support their argument by estimating a statistical model of the determinants of civil war using three proxies for alternative economic opportunities for potential recruits: GDP per capita, male secondary school enrollment, and the growth of the economy. GDP per capita captures the average income in the country, school enrollment is an alternative occupation to rebellion in the short run and promises improved income in the long run, and the growth rate indicates the amount of new income opportunities.

Moreover, Collier and Hoeffler (2001) and Fearon and Laitin (2002) note that per capita income also is related to the government's military capability. Rich countries with a solid tax base are more able to deter rebellion than poor countries, everything else being equal. Fearon & Laitin further note that a high per capita income is associated with high financial, administrative, and police capabilities, a terrain more 'disciplined' by roads and agriculture (p. 10), and a higher level of penetration by central administration. All this favors the state's ability to counter insurgencies, and thus reduces the probability of civil war.

Although Collier & Hoeffler use a measure of education levels – secondary schooling – as an independent variable in their analysis, they interpret it more as a proxy of opportunity costs for potential recruits than an indicator of a direct effect of education. One possible way that education might have a direct effect on the risk of armed conflict is to extend Dahl's argument that education increases the power resources that lies in the citizens themselves: In most civil wars, the civil population suffers. Ordinary citizens do not want rebel movements to operate in their neighborhood. Rebel groups typically are dependent on the civil population for food and other resources, and use their military power to obtain this. In many civil wars, citizens organize to resist this predation. However, limiting the activity of rebel movements involves a collective action problem (Fearon & Laitin, 1999). In this sense, resistance of rebel groups is analogous to the process of establishing democracy (limiting the power of the incumbent king or sovereign), which also involves a collective action problem (Weingast, 1997). Hence, it is possible that the structural changes/mechanisms that enables citizens to overcome their

collective action problem with respect to limiting the sovereign (e.g. literacy, efficient means of communications, free time, sources of income that are independent of the state, property that is secure from physical destruction) are the same (or rather, related to) as those that enable them to overcome the collective action problem with respect to rebel movements. Education and literacy, then, may affect the risk of civil war directly. A high per-capita income is also likely to work in this way.

In Collier & Hoeffler (2001), the structure of the economy also affects the income side of the rebel groups' finances. They argue that civil war is particularly likely in countries that have certain types of natural resource abundance, since control over such resources provides an attractive source of income for the rebel organization. This is particularly true for commodities that are located in territories a rebel group can easily defend, such as resources that are located far from the capital, e.g. tropical timber in remote regions of the country (Le Billon, 2001:569ff). The resources must also be extractible without much physical investment, since the extraction often takes place in a war zone, and preferably be easy to bring to international markets. Alluvial diamonds is an example of a commodity that satisfies the two last requirements.

Other types of natural resources tend to favor the government, on the other hand. Oil extraction and mining (also of kimberlite diamonds), for instance, is seldom controlled by rebel groups because of the large investment typically required. Moreover, when large oil revenues or loans based on expected revenues start flowing into the state budgets, governments are often able to invest in military capabilites that will effectively deter any armed insurrection (cf. Ross, 2001).[5]

The model in Boix & Garicano (2002) also predicts civil war when capital mobility and inequality is so high that the wealthy always choose to impose authoritarianism, and the cost of war is sufficiently low.

Natural resource dependence or abundance is also found to hamper growth (Sachs & Warner, 1995; Auty, 2001), which again is associated with conflict (de Soysa, 2000).

[5] In countries that have an abundance of this type of resources, government becomes the prize over which fighting takes place. This type of contests are modelled in Skaperdas & Styropoulos (1996) and Skaperdas (2002): They show how the availability of rent increases the intensity of conflict. They also note how that the existence of 'secure resources' – resources that cannot be appropriated – is important, and that the amount of waste or destruction in conflict reduces intensity of conflict.

2.3 Regime Type and Civil War

Democracy is often referred to as a system for peaceful resolution of conflicts. Conflicting claims by rival social groups are solved by majority votes or consensual agreements. Democracies often also guarantee a minimum set of individual rights and minority rights through the constitution, and institutionalize power-sharing mechanisms as two-chamber parliaments, regional self-determination, etc. Democracies both allow discontent to be expressed and have mechanisms to handle discontent. Hence, since peaceful negotiation is feasible and less costly, armed rebellion will be less profitable.

Autocracy is often seen as inviting revolutions. But at the same time, autocracies have mechanisms for repression (and may make use of them without losing legitimacy, in contrast to democracies). Autocracies repress not only armed uprising, but also inhibits the formation of the organizations that protests require before they can reach the stage of armed insurgencies.

Regimes that feature both democratic and autocratic characteristics, are partly open yet lack effective means of solving conflicts. In such political systems, repression is difficult since some organization of opposition groups and some opposition expression of discontent is allowed, but mechanisms to act on the expressed discontent are incomplete (cf. Davies 1962:7, Boswell & Dixon, 1990:543). Hence, repression is ineffective and 'grievance' is not addressed. Moreover, such institutional arrangements are unstable because the institutions that make up the regime are internally inconsistent (cf. Gates et al., 2002), and often reflect an underlying power struggle that may erupt in open violence. Following Gates et al. (2001), I will refer to these as inconsistent regimes.

A number of studies find empirical confirmation of this 'inverted U': Muller (1985), Boswell & Dixon (1990), Muller & Weede (1990), Ellingsen, (2000), Hegre et al. (2001), and Fearon & Laitin (2002). Other studies do not, however. Elbadawi & Sambanis (2002) find some support for the idea that inconsistent regimes are more civil war prone than other regime types, but conclude that the finding is not very robust. Collier & Hoeffler (2001) find no support for this hypothesis at all. One explanation of the discrepancies in the findings is that the estimate for the political system variables tends to become insignificant when controlling for income (GNP per capita) – as done in Collier & Hoeffler (2001) and Elbadawi & Sambanis (2002)

– rather than energy consumption per capita, as done in Hegre et al. (2001). This may not be surprising, given the strong positive correlation between income and democracy discussed above. This correlation is less strong between energy consumption per capita and democracy.

Changes in the political institutions of a country – the introduction or abolishing of elections of a parliament and/or the executive, increasing or decreasing the degree to which the executive is accountable to the parliament or other bodies, or increases or decreases in the franchise, are likely to be accompanied with a heightened risk of civil war (cf. Snyder, 2000). Firstly, changes in a democratic direction are likely to be accompanied with reduced repression, which allows communal groups increased opportunities for mobilization. At the same time, it takes time to establish the new institutions and to make them sufficiently efficient to accommodate the kinds of accommodation typical of established democracy. Moreover, groups that increase their political influence will raise their expectations for real improvements in their living conditions, but these changes can take a long time to realize even with the best intentions. This is likely to lead to protests, perhaps violently (Davies, 1962).

Moreover, the changes in the political institutions – whether in democratic or autocratic directions – by definition alters the power distribution in the system (at least in theory), which again leads to changes in the distribution of resources within the economy. This means that some gain and others lose. Losers then have an incentive to use unconstitutional means or to incite armed insurgencies to reestablish the previous status quo.

Several recent studies find a positive relationship between recent political instability and the probability of civil war: Hegre et al. (2001) find a significant and substantially strong positive relationship between a decaying function of time since the previous regime change in the country. This relationship holds for all kinds of regime change, be they towards democracy or towards autocracy, and comes on top of a significant support for the hypothesis that inconsistent regimes are more civil war prone than consistent regimes. Fearon & Laitin (2002) find that political instability in the three years previous to the year of observation doubles the risk of civil war, and Sambanis (2001) that democratic change increases the risk of revolutionary war. Elbadawi & Sambanis (2002:18) obtain more mixed results. They conclude that recent political instability increases the risk of civil war in many models, but that the finding is sensitive to the choice of lag structure for the political system variable.

2.4 Do Poor Democracies Avoid Civil War?

Changes in political institutions are powerfully associated with a heightened risk of civil war. Factors that increase or decrease the stability or duration of different political institutions hence indirectly increase or decrease the probability of civil war. At the same time, development affects the duration of different types of political institutions differently. Hence, we would expect that the relationship between the type of political institutions and the hazard of civil war to be contingent on the development variables.

As discussed in Section 2.1, a high level of income is associated with high democratic stability. If the breakdown of a democratic system is commonly associated with organized violence or situations with illegitimate and weak, non-institutionalized governments, this lack of stability is enough to make us expect that poor democracies are more prone to civil war than rich democracies, and even more dangerous than poor non-democracies. There are also other aspects of democracy that makes one suspect that poor democracies are more prone to civil war than rich democracies:

Just as in poor autocracies, the control of the state and of political positions is relatively more important in poor democracies than in rich countries, since there are fewer alternative economic opportunities. Moreover, if the democratic system is perceived to be likely to break down, security dilemma considerations may be important: Allowing particular groups to power will increase their opportunities for persecuting their opposition in the future. Both of these heightens the stakes of the political conflict, which both increases the probability of democratic breakdown and of the conflict turning into a civil war.

The stability and sustainability of different political institutions thus implies that there should be an interactive effect between democracy and development in their effect on armed conflict. Two other aspects may reinforce this: Fearon & Laitin (2002: 15) argue that increases in per capita income decreases the likelihood of insurgencies partly because it strengthens the state's overall financial, administrative, police and military capabilities, and renders the territory more 'disciplined'. This may be particularly true in democracies: Maintaining order in an autocratic state is arguably comparatively inexpensive: Suspected members of the opposition may be arrested without trial. It is not even necessary to locate the precise

members of the opposition group to deter its activities, as long as they perceive a sufficiently high probability of arrest or other forms of persecution. Democracies cannot legitimately use these measures. Conceivably, the lack of legitimate means of repression of the organization of opposition groups and the expression of their views can open up opportunities for rebellion, which only a powerful democratic state can contain.

Even if there is no such difference in the costs of containing insurgencies, the net effect of increasing per capita income differs between democracies and autocracies, since the increased capabilities of autocracies due to increased wealth is counteracted by an increasing pressure for democratization (Davies, 1962; Lipset, 1959; Gates et al., 2001, Boix & Stokes, 2002), possibly delegitimizing and destabilizing the political system. If this pressure is sufficiently strong, one would not expect autocracies to become less prone to violent breakdown with increasing wealth – at least not to the same extent as democracies do.

The relationship between income and democratic civil war proneness possibly depends on the strucutre of the economy. Autocracies with a high GDP per capita with income predominantly from natural resources – rentier states – have sufficient income to buy off or repress protests through absence of taxes, through elaborate patronage systems, and high military spending (Ross, 2001). In democracies with a high GDP per capita largely due to natural resource extraction, on the other hand, democracy is non-sustainable because the income is based on non-mobile capital (Boix & Garicano, 2002) or it may be used to strengthen the position of the incumbent, which will undermine democracy in the long run (Wantchekon, 2000). This implies that autocracies become less civil war-prone the more resource rich they are, whereas democracies become more civil war-prone the more resource rich they are.

2.5 Hypothesis to Test:

This discussion may be summarized in an empirically testable hypothesis:

A. Democracies have a lower probability of armed conflict than autocracies, but only if income is high, literacy rates are high, and/or the dependence on primary commodities is low

An alternative formulation of this is that

B. Income, education, and independence of natural resources are negatively related to

the probability of armed conflict, but more strongly the more democratic is the country

In terms of parameter estimates, these hypotheses predict that the interaction term between democracy and development is negative in models with continuous or ordinal measures of democracy. In models with a categorical, trichotomous measure of democracy, the interaction term between autocracy and development should be positive, and the interaction term between demcoracy and development should be negative. In all the models, the estimates for the democracy and development main terms should both be negative.

Most previous studies have also entered a quadratic term of the democracy variable to test the 'inverted-U' hypothesis. The argument above makes no predictions for the how development should affect the inverted-U relationship between democracy and armed conflict. I will also estimate models with square terms or trichotomous democracy variables to see whether the relationship between democracy and the hazard of armed conflict is non-linear.

To some extent, political instability is an intermediate variable in the argument above. Low-income democracies are unstable bercause they are poor, and this instability often leads to armed conflict. If development – income, literacy, or mineral dependence – is the more fundamental variable, we would expect the magnitude of the estimate for the instability variable to drop, possible to zero. This is likely to happen only if we include an interaction term between democracy and development, since development has different effects on the stability of democracies and autocracies. When controlling for development only without the interaction term, the divergent effects on stability cancel each other out, and the political instability variable becomes a more powerful predictor of armed conflict.

3 Research Design

The hypotheses are tested using a calendar-time Cox regression model as suggested by Raknerud & Hegre (1997) and applied to civil war in Hegre et al. (2001).[6] The analysis in Hegre et al.

[6] The Cox regression model assumes that the effect of any covariate has a proportional and constant effect that is invariant to time (Box-Steffensmeier & Jones, 2001) – the baseline hazard of civil war is allowed to vary freely over time, but any difference between the baseline hazards of individual countries is due to the covariates only. I test whether this proportional hazard assumption is violated in all models presented below, and find it always to hold. (Incidentally, since logit or probit models are discrete-time survival models (Beck, Katz & Tucker, 1998), researchers using this model implicitly also make this assumption.). In the calendar-time Cox regression model, this means that the effect of variables is constant over calendar time – there is nothing to support the view that the democracy variables have changed their impact on the likelihood of armed conflict

(2001) is extended along several lines, in addition to adding the development-democracy interactions. Firstly, the dependent variable is based on the Uppsala dataset, recently extended back to 1946 (Gleditsch et al., 2002). Secondly, the analysis addresses an endogeneity problem inherent in the Polity democracy index, and uses three alternative indicators of democracy to ensure that the results are robust to changes in the definition of democracy. Finally, the analysis controls for a wider set of control variables.

The probability of the outbreak of an armed conflict is likely to be dependent on how long time has passed since there was an armed conflict in the same country. In particular, spells of peace are likely to have a positive duration dependence.[7]. To handle this, I enter a decaying function of the time passed since a previous conflict started into the model. In a decaying function, the value of the function is decreasing at a constant rate, implying that the hazard of armed conflict outbreak is very high just after one has ended, but that this heightened risk is reduced to some stable level after some time. The general form of the decaying function is $2^{-\frac{T}{\alpha}}$ where T is the time since the period started, and α is the half-life parameter – the time after which the value of the decaying function is reduced to one half. This function is also used for two other variables, described below. I ran some of the models presented below for several values for the half-life parameters α, and chose those that maximized the log likelihood of the model. I will refer to the decaying function variables as 'proximity of' variables below.

The Uppsala dataset records all armed conflicts with at least 25 battle deaths per year. This threshold is in one respect lower than the threshold most often used in comparable studies – 1,000 battle deaths over the course of the conflict. If anything, this low threshold is likely to bias the results against the main argument of the paper, since the conflicts registered in developed democracies tend to be relatively minor.

The Uppsala dataset also deviates from the dataset used in Hegre et al. (2001) since it allows multiple conflicts in the same country. In India, for instance, there were up to eight parallell conflicts in the 1990s. This raises some problems for the handling of temporal dependence which is discussed below. To further assess the robustness of the results, I estimate the model using the stricter definition of armed conflict employed in Hegre et al. (2001). This

from 1960 to 2000. The tests reported here imply that this assumption is tenable.

[7] See Raknerud & Hegre (1997) and Beck, Katz, and Tucker (1998) for discussions of such temporal dependence in empirical studies of war outbreak.

dependent variable is based on the Correlates of War civil war dataset (Singer & Small, 1994), and supplemented with a number of conflicts from the dataset in Collier & Hoeffler, 2001.

3.1 Core Variables

Income The Income or GDP per capita variable was taken from World Bank (2002) for the 1960–1998 period. The variable is measured as the natural logarithm of income in constant 1995 US dollars.

Literacy The Literacy variable was taken from World Bank (2002). Missing data points were imputed by means of Stata's imputation algorithm (Stata Corporation, 2001:vol 2, pp. 69–73). The variables used in the imputation are reported in Appendix 1.

Dependence on Mineral Exports The variable measures the value of fuel, ore and metals exports as a share of total merchandise exports. The data were taken from World Bank (2002). Missing data points were imputed by means of Stata's imputation algorithm (Stata Corporation, 2001:vol 2, pp. 69–73). The variables used in the imputation are also reported in Appendix 2.

Collier & Hoeffler (2001) use the exports of all types of primary commodities as a share of GDP in their analysis. I prefer to exclude food and other agricultural products from the measure, since the remaining commoditiese – in particular, oil and minerals – are the ones identified by Ross (2001) to affect the level of autocracy in the country. Moreover, food and agricultural products are less frequently associated with conflict than minerals (Le Billon, 2001:573).[8]

I chose to divide by total merchandise exports rather than by GDP, since exports/GDP is correlated with the size of the economy – in general, small countries trade more relative to their GDP than large countries. Dividing mineral exports by total exports therefore gives a better picture of how important minerals is relative to the rest of the economy.

Regime type Most earlier studies have used the Polity democracy index (Jaggers & Gurr, 1995) and included the square term of the index to model the inverted-U relationship. How-

[8] An exception is drug crops, but these incomes rarely enter official statistics in any case.

ever, the Polity index is problematic to use in studies of civil war and political violence, since the Polity project codes polities with factionalism and violence as imperfect democracies: To achieve the maximum democracy score, the Polity sub-indicators 'Regulation of participation' and 'competitiveness of participation' must be coded as 'regulated' and 'competitive', respectively (Jaggers & Gurr, 1995:XXX). However, 'regulation' is coded as 'factional' if 'there are .... political groups which compete for political influence ... but competition among them is intense, hostile, and frequently violent' (Gurr, 1997: 12). Such polities are also likely to be coded as having 'Factional competition'. Hence, countries with wide-spread political violence are likely to be coded as not-perfect democracies by definition. This can potentially explain why some studies find an inverted-U shaped relationship between level of democracy and civil war.

To solve this problem, I use only the XCONST component of the Polity dataset. This indicator is highly correlated with the overall indicator (Gleditsch & Ward, 1997), but avoids the problem with 'factional participation'. I also estimate the models using a modified version of Vanhanen's (1997) Polyarchy measure. Vanhanen has collected data on 'Participation' – the share of the population actually voting in elections, and 'Competition' – the share of the votes for parties other than the largest party. He combines these two variables by multiplying them. This ensures that political systems with high participation but no competition (only one party) are not coded as democratic. However, Gates et al. (2001) argue that the measure is somewhat biased in favor of political systems with extremely fragmented party systems. According to the measure, countries where the largest party only gets 25% of the votes is considered *twice* as democratic as a country where the largest party received 63% of the votes. This is not necessarily true. To reduce this bias, Gates et al. (2001:10) suggest a modified version of the index developed in Gates et al.: If Competition is less than 30%, Participation is multiplied by (Competition/30%). With this modification, only political systems where the largest party receives more than 70% of the votes are penalized in the index for having low competition. Otherwise, the index uses the Participation component only. The measure is log-transformed to model that the marginal impact of one percent higher participation on level of democracy is diminishing.

Finally, I use the combined Polity-Polyarchy regime type indicator developed in Gates et

al. (2001): The indicator combines the Polity Executive constraints and Regulation of Executive sub-indicators with the (modified) Polyarchy index to classify political systems into four categories: Autocracies, Inconsistent regimes, Democracies, and Caesaristic Regimes. I merged the Caesaristic and Inconsistent regimes into one category labeled 'Inconsistent' to reduce the number of parameters.[9] A political system is coded as autocratic if the executive is recruited through ascription or designation, the executive is unconstrained or only 'moderately constrained' by competing institutions (1<=XCONST<=4), and less than 1.65% of the population participate in elections.[10] A political system is coded as democratic if the executive is recruited through regulated, open elections, the executive is subject to at least substantial limiations (5<=XCONST<=7), and effective participation is over 12% of the population. A political system is coded as caesaristic if the executive is recruited by self-selection by the seizure of power. I also use an ordinal version of this indicator, where Autocracy is coded as -1, Inconsistent and Caesaristic as 0, and Democracy as 1. By setting the inconsistent/caesaristic category to zero, I ensure that this category is the baseline category in all analyses using the Gates et al. measure.

In all models, I used information the political system at a date six months before the date of observation to reduce endogeneity problems.

Interaction terms I created interaction terms between GNP per capita, Literacy, and Mineral Exports, and the various regime type variables. To minimize collinearity, all variables entering interaction terms were centered around their means by subtracting the mean for each variable from each observation.

3.2 Control Variables

In addition to the variables listed here, I estimated models controlling for a number of additional variables that never were significant or too closely related to the variables above. These and the results from models including these are reported in Appendix 1.

[9] All models reported in the paper were also estimated without merging these two categories. In none of the models were the hazard of civil war of the Caesaristic regimes significantly different from the Inconsistent baseline.

[10] More precisely, the adjusted Polyarchy index is lower 1.65%. A system where 99% of the population vote, but the largest party obtains 99.5% of the votes is also under this threshold.

Growth Growth is operationalized as the difference between ln(GNP per capita) in the year before the observation and ln(GNP per capita) two years before the observation. Data sources are the same as for GNP per capita.

Primary Commodity Exports/GDP To supplement the Mineral exports/total exports variable, I enter a Primary commodity exports variable which includes all types of primary commodities and measure the dependence as a share of GDP. The variable was taken from Collier & Hoeffler, 2001.

Mountaineous Terrain The variable measures the share of the country's terrain that is mountaineous. The variable was taken from Collier & Hoeffler, 2001.

Ethnic Dominance The Ethnic dominance variable is a dichotomous indicator which is 1 if 45-90% of the population belongs to a single ethnic group. The variable was taken from Collier & Hoeffler, 2001.

Proximity of Regime Change For each observation, I computed the time in days since the last regime change, operationalized as a change that leads from one of the four regime types described above, or since the country became independent. The time was transformed into the 'Proximity of' function by means of the decaying function $prc = 2^{-\frac{T_{rc}}{0.25}}$ where T_{rc} is the number of years since the last regime change in the country, and the halflife α is 0.25 years.

ln(Population) Population is one of the most robust predictors of armed conflict. In small countries, a conflict with a given low intensity (measured as number of persons killed per capita) is not likely to reach the 25 battle deaths criterion. In a large country, a conflict with the same intensity has a greater chance of exceeding the threshold. Another way to put this is to think of people's motivations for inciting or contributing to an armed conflict are uniformly distributed among individuals. Only individuals with a motivation over a certain fractile of this distribution are likely to join a rebel group. With a uniform distribution, rebel groups of the required size is more likely to form the higher the number of individuals to recruit form.

A similar argument might be made for the government's incentives to use force against any citizen.

Population data were taken from World Bank (2002). The variable was log-transformed to reduce the impact of very large countries.

Proximity of Armed Conflict For each observation, I computed the time in days since the last armed conflict in the country started. The time was transformed into the 'Proximity function' by means of the formula $p_{ac} = 2^{(-\frac{T_{ac}}{2})}$ where T_{ac} is the number of years since the last conflict and the half-life is 2 years. If the country has had no armed conflict since 1946, the variable is coded as zero.

In Armed Conflict The coding of the dependent variable allows multiple armed conflicts simultaneously (as in India and Myanmar, cf. Gleditsch et al. 2002:630–631). The 'In Armed conflict' variable denotes whether a conflict is going on in the country at the time of observation.

Proximity of Armed Conflict * In Conflict Interaction If a conflict is going on in a country, the Proximity of Armed conflict variable will be close to the maximum 1: An earlier outbreak of conflict is very recent or proximate. However, this is a situation which is different from the situation normally controlled for with a temporal dependence variable (e.g., as in Raknerud & Hegre, 1997 or Beck, Katz & Tucker, 1998); the fact that the risk of (renewed) armed conflict is dependent on how long time has elapsed since an armed conflict *ended* in the country. Multiple and overlapping conflicts in the same country are quite rare, and may even be impossible by construction in small countries: In such countries, there is only 'room for' one conflict at a time – rebel groups are likely to be sufficiently close to each other to merge or coordinate their actions, such that their activity would be coded as one conflict in the Uppsala dataset. This also applies to new rebel groups joining the conflict, or the diffusion of the conflict to new geographical areas that are close to the original conflict. Hence, the probability of a second conflict is likely to be much lower than the probability of the first conflict, and we should expect the Proximity of Armed Conflict variable to have

another estimate in in-conflict situations than in after-conflict situations. To account for this, I included the interaction between the Proximity of armed conflict and In conflict variables.

4 Results

4.1 Income as Indicator of Development

Tables 1 and 2 report the results from estimating a calendar-time Cox regression model of the hazard of armed conflict as a function of democracy, development measured as income (GDP per capita), and a set of control variables. The rationale for selecting just this subset is given in Appendix 1. A robust estimator of variance (StataCorp 2001a:254–580) was used to produce estimates for standard errors.

Table 1 estimates the model using the Polity 'Executive Constraints' variable. Model 1 replicates the results in Collier & Hoeffler (2001): controlling for income, there is no significant relationship between regime type/executive constraints and the risk of armed conflict. The model includes the square term of the constraints variable to capture any inverted-U relationship. This lack of relationship between democracy and the probability of conflict is also replicated using the two other indicators of democracy. The estimate for the income variable, on the other hand, is negative and significant.

Models 2 and 3 test whether there is an interaction between development and democracy. Model 2 includes the square term for Executive constraints, whereas Model 3 excludes it. In both models, the estimates for the interaction terms are negative and significant. Model 3 is more parsimonious than Model 2, and the log likelihood drops only with 1.66 points relative to Model 2, so I will limit the discussion of the interpretation of the parameters to the model without the square term.[11] In Model 3, all the three terms of interest are negative and statistically significant as predicted by Hypotheses 1 and 2. The log likelihood increases from -536.27 to -529.44, which is significant at the .0001 level. This chi-square statistic for the

[11] A likelihood-ratio test fails to reject the hypothesis that democracy squared and the democracy squared-development interaction are both 0, with a p-value of 0.19. Interpreted together with the other estimates, the estimates reflect that countries with intermediate constraints on the executive have a risk of armed conflict close to those with low constraints for all values of GNP per capita rather than the inverted-U relationship found in other studies.In a plot corresponding to Figure 1 below, the estimated line for a polity with moderate constraints is just below and parallell to that for no constraints.

	Model 1	Model 2	Model 3
Indicator of democracy	Executive constraints	Executive constraints	Executive constraints
Explanatory Variable	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$
Democracy index	-0.013 (0.050)	-0.084^{**} (0.047)	-0.091^{**} (0.042)
$(\text{Democracy index})^2$	0.0048 (0.022)	-0.0041 (0.026)	
ln(GNP per capita)	-0.34^{***} (0.083)	-0.14 (0.11)	-0.32^{***} (0.069)
Democracy index* ln(GNP per capita)		-0.10^{***} (0.032)	-0.11^{***} (0.030)
$(\text{Democracy index})^2$* ln(GNP per capita)		-0.032^{**} (0.016)	
$\text{Growth}_{\text{previous year}}$	-2.31^{***} (0.47)	-2.20^{***} (0.48)	-2.28^{***} (0.49)
Mountaineous Terrain	0.0029 (0.0032)	0.0055^{**} (0.0036)	0.0055^{**} (0.0036)
Ethnic Dominance	0.16 (0.18)	0.11 (0.18)	0.13 (0.18)
Proximity of Regime Change	-0.20 (0.85)	-0.27 (0.83)	-0.33 (0.84)
ln(Population)	0.22^{***} (0.078)	0.19^{***} (0.061)	0.21^{***} (0.063)
Proximity of Armed Conflict	1.57^{***} (0.46)	1.48^{***} (0.46)	1.54^{***} (0.47)
In Armed Conflict	0.015 (0.40)	0.018 (0.39)	-0.0045 (0.40)
Proximity of A.C * In Armed Conflict	-1.29^{***} (0.74)	-1.42^{**} (0.74)	-1.37^{***} (0.75)
$2\,(LL_{int} - LL_{\text{-}int})$ $(d.f.)$		16.97 (2)	13.69 (1)
χ^2 $(p\text{-value})$		(0.0002)	(< 0.0005)
No. of countries	127	127	127
No. of conflicts	122	122	121
Time at risk (days)	$1,585,120$	$1,585,120$	$1,585,120$
p. h. a test $\chi^2, (d.f.)$	5.39 (11)	6.89 (13)	4.89 (11)
p-value	0.91	0.91	0.94
LL_o	-573.67	-573.67	-573.67
LL_{model}	-536.27	-527.78	-529.44
Robust standard errors in parentheses. $^{*}: p < 0.10,\ ^{**}: p < 0.05, ^{***}: p < 0.01$ (one-sided tests)			

Table 1: Risk of Armed Conflict, Income as Indicator of development, All Conflicts

change in log likelihood relative to a model without interaction term(s) is reported in the row labeled $2\left(LL_{int} - LL_{\tilde{}int}\right)$ in this and all other tables, where LL_{int} is the constrained model and $LL_{\tilde{}int}$ is the less constrained model.[12]

In an interaction model, the main term estimates should be interpreted as the effect of the term when the other variable is zero (Friedrich, 1982). Since all variables entering the interaction terms in this model are centered around their means, the interpretations of the main terms are the effect of each variable when the other is at the mean. For an average-income country, with GNP per capita at 1800 US dollars, an increase in executive constraints significantly reduces the risk of armed conflict. And at the average level of constraints (XCONST=3.9), increasing income significantly decreases the likelihood of conflict. The interaction term is also negative, implying that income and constraints reinforce each other: The higher is the income level in a country, the more does an increase in democracy reduce the risk of conflict. Vice versa, the more democratic is a country, the more does an increase in income reduce the probability of conlict.

This relationship is illustrated in Figure 1, which plots the estimated risks of armed conflict relative to the baseline based on the estimates of Model 3, Table 1. The estimated risk is plotted as a function of GDP per capita for the two extreme levels of Executive constraints: The gray line represents a polity with no constraints (XCONST= 0), and the black line a polity where the executive or at par with or subordinated to another institutions (a legislature) (XCONST=7).[13] Corresponding lines for polities with constraints between these extremes would fall between the two plotted lines. The y-axis is the estimated risk relative to the baseline, which is a polity with mean constraints (XCONST just under 4) and mean GNP per capita (US$1797). The thin dotted and gray lines indicate 95% confidence intervals for the estimated lines.[14] The baseline risk (the risk of a country with average income and average

[12] The reported likelihood-ratio test statistics refer to estimation of identical models, but with ordinary (non-robust) variance estimates.

[13] 25% of the observations have the lowest level of constraints, and 29% have the highest level.

[14] The confidence interval lines are plotted using the formulae for conditional standard errors derived in Friedrich (1982:810, see also Franzese et al., 2002). The relevant part of the estimated linear component of the model is $\widehat{Z} = \widehat{\beta}_1 dem + \widehat{\beta}_2 dev + \widehat{\beta}_3 dem * dev$ (this is the estimated log relative risk when holding the other variables constant). The standard error for the *dem* estimate as a function of *dev* is then $s_{\left(\widehat{\beta}_1 + \widehat{\beta}_3 dev\right)} = \sqrt{var\left(\widehat{\beta}_1\right) + dev^2 var\left(\widehat{\beta}_3\right) + 2cov\left(\widehat{\beta}_1, \widehat{\beta}_3\right)}$. Using the estimated variance-covariance matrix, I plotted the confidence intervals as $\widehat{Z} \pm t_{.025} * s_{\left(\widehat{\beta}_1 + \widehat{\beta}_3 dev\right)}$.

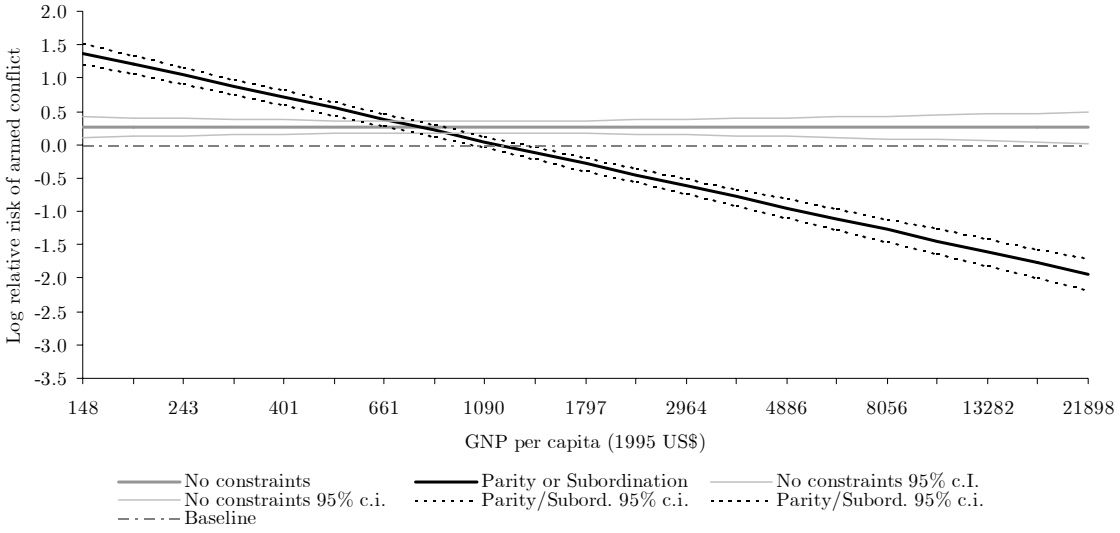

Figure 1: Estimated Relative Risk of Armed Conflict By Income and Executive Constraints (Model 3)

constraints) is represented by a gray dashed line.

The figure shows that increasing income only reduces the risk of armed conflict for high-constraints countries, according to these estimates. In countries with non-constrained executives, increasing income does not change the probability of conflict. Likewise, the figure shows that democracy reduces the risk of armed conflict only for high-income countries. For low-income countries, democracy appear even to *increase* the hazard of conflict.

The estimated lines for constrained and non-constrained polities cross at approximately 800 US$ per capita, or the level of Zimbabwe and Honduras in the 1990s. A conditional test of significance can be read out of the figure: for values for Income higher than that where the upper confidence interval for high-constraints polities crosses the baseline, democracies have a significantly lower risk of armed conflict than the baseline. For this model, this happens around 1350 US$, or the value of Morocco or Bulgaria in the 1990s. This value is close to the median for the world in the 1960-2000 period.

The estimates for the control variables in Tables 1 and 2 are consistent with other studies. Growth is negatively related to the probability of armed conflict onset. A country with 5% per capita growth is estimated to have approximately 11% lower risk of conflict than one with zero per-capita growth. The estimate for ln(Population) is positive and significant: Large

countries have more conflicts than small countries. The estimates for these two variables vary only little in Models 1–14. Mountaineous terrain and ethnic dominance are also positively related to conflict, but these results are not very robust.

Proximity of regime change is not significantly related to conflict in this model. This contrasts with the results in Hegre et al. (2001) and Fearon & Laitin (2002). The difference may be due to a stricter definition of regime change in this paper than in the other two papers, and a more inclusive dependent variable.[15] As will be seen in Section 4.4, institutional changes seem to be more robustly associated with civil wars than with the low-intensity conflicts analyzed in Models 1–12. Finally, the control for development and the development-democracy interaction may explain the difference: If low income largely accounts for political instability (but only in democracies), political instability is an intervening variable, and we would expect its importance to diminish when including the income variable and the interaction term.

As expected, the Proximity of armed conflict main term is positive and strongly significant: Armed conflicts are more likely just after another conflict has started. The Proximity - In conflict interaction term, on the other hand, is negative and smaller in magnitude than the main term, and also significant. The sum of these estimates are plotted as a function of time since conflict onset in Figure **??**, for a country that has an armed conflict that lasts for five years. After a conflict has started in a country, the estimated probability of a (new) conflict is slightly higher than before the conflict started. As soon as the conflict ends, the probability increases, to a level higher than before the conflict. This heightened probability then gradually decays, with the additional risk being halved every second year.

Models 4–6 in Table 2 report the results when estimating the model for two other measures of democracy. In Model 4, Gates et al.'s tricothomous measure is used. The estimates indicate that the risk of armed conflict decreases with increasing income. The estimate for the Autocracy*Income term is positive, and that for the Democracy*Income is negative, as hypothesized. Both estimates are significant at the 5% level (one-sided tests). The regime type main term estimates are not significant, implying that regime type does not significantly

[15] In this paper, regime change is defined as a change between any of the four Gates et al. regime types described in Section 3.1. In Hegre et al. (2001), change was defined as any institutional change that lead to a minimum of two points change in the Polity Democracy-Autocracy index. Fearon & Laitin (2002) set the threshold at three points change.

	Model 4	Model 5	Model 6
Indicator of democracy	Gates et al. categorical	Gates et al. ordinal	Modified Polyarchy
Explanatory Variable	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$
Inconsistent (0)	$(ref.cat.)$	$(ref.cat.)$	$(ref.cat.)$
Autocracy (1)	0.24 (0.28)		
Democracy (2)	-0.085 (0.28)		
Democracy index		-0.16 (0.13)	-0.11^{**} (0.064)
ln(GDP per capita)	-0.33^{***} (0.14)	-0.32^{***} (0.069)	-0.33^{***} (0.065)
Autocracy (cat.)* ln(GDP per capita)	0.36^{**} (0.18)		
Democracy (cat.) * ln(GDP per capita)	-0.34^{**} (0.18)	-0.35^{***} (0.086)	-0.15^{***} (0.044)
$\text{Growth}_{previous.\ year}$	-2.36^{***} (0.52)	-2.33^{***} (0.50)	-2.20^{***} (0.47)
Mountaineous Terrain	0.0067^{**} (0.0035)	0.0066^{**} (0.0034)	0.0056^{*} (0.0035)
Ethnic Dominance	0.14 (0.17)	0.14 (0.18)	0.10 (0.16)
Proximity of Regime Change	-0.34 (0.84)	-0.37 (0.85)	0.55 (0.63)
ln(Population)	0.21^{***} (0.054)	0.21^{***} (0.054)	0.23^{***} (0.059)
Proximity of Armed Conflict	1.54^{***} (0.46)	1.53^{***} (0.47)	1.55^{**} (0.45)
In Armed Conflict	0.030 (0.39)	0.018 (0.38)	0.042 (0.35)
Proximity of A.C * In Armed Conflict	-1.50^{***} (0.71)	-1.46^{***} (0.73)	-1.57^{***} (0.71)
$LL_{int} - LL_{\tilde{}int}$ $(d.f.)$ χ^2 (p-value)	16.13 (2) (0.0003)	16.12 (1) (0.0001)	12.52 (1) (0.0004)
No. of countries	127	127	127
No. of conflicts	122	122	135
Time at risk (days)	$1,585,120$	$1,585,120$	$1,623,765$
Test of prop. haz. ass. $\chi^2, (d.f.)$ p-value	13.92 (13) 0.38	10.11 (11) 0.52	7.67 (11) 0.74
LL_o	-573.67	-573.67	-638.33
LL_{m_3}	-527.96	-528.03	-589.41
$*: p < 0.10,\ **: p < 0.05,^{***}: p < 0.01$ (one-sided test)			

Table 2: Risk of Armed Conflict, Income as Indicator of development, All Conflicts

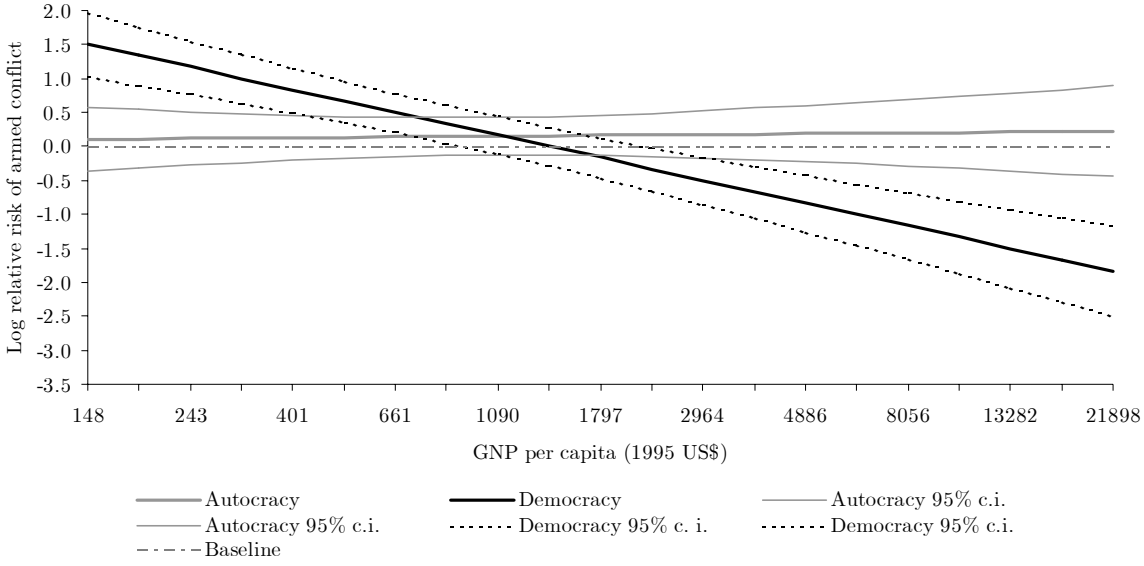

Figure 2: Estimated Relative Risk of Armed Conflict by Income and Ordinal Gates et al. Measure (Model 5)

affect the probability of conflict when income is at the mean. Since the estimates indicate that the line for the inconsistent regimes largely fall in the middle between autocracies and democracies, I used a recoded version of the model that assumes ordinality: Autocracies were given the value -1, inconsistent 0, and democracies $+1$. The results from estimating this Model 6 yield a clearer picture: The interaction term is now significant at the 0.01 level.

This model's estimated risks of armed conflict are plotted in Figure 2. As in the previous figure, democracies are represented with a black line and autocracies with a gray line. As above, increasing income decreases the probability of armed conflict more the more democratic is the country: For democracies, the curve is strongly downward-sloping. For autocracies, the level of income affects the probability of civil war only marginally. The curves cross at slightly higher income level, approximately at US$ 1,100. The estimated confidence intervals show that the results are less clear when using this measure of regime type than when using the Executive constraints variable: In this model, democracies are significantly less likely to experience armed conflicts when GNP per capita is higher than US$ 3,300, and significantly more likely under US$ 400.

Model 6 reports the estimates for the model including Vanhanen's Polyarchy measure of

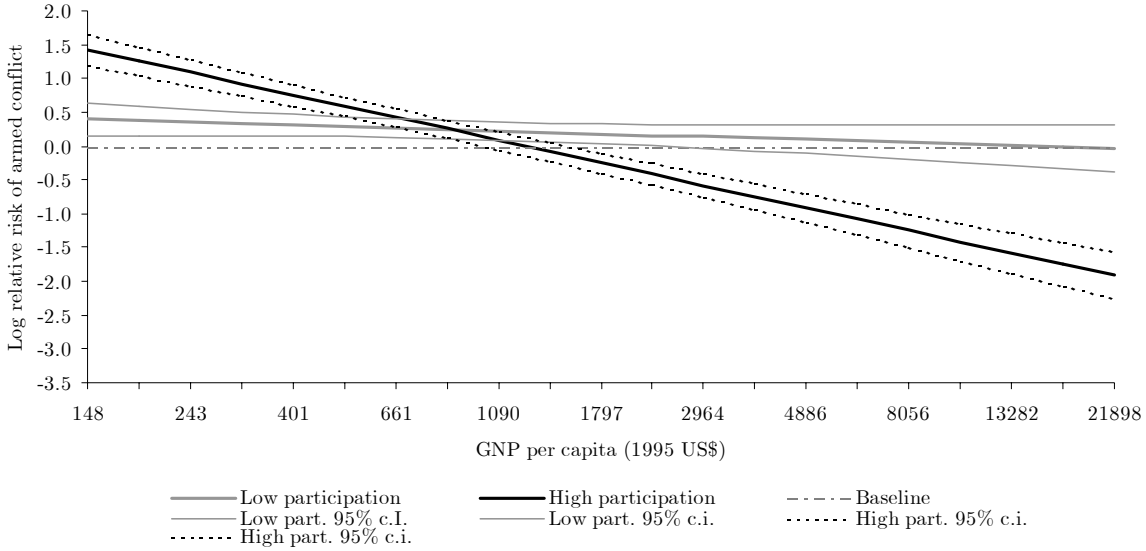

Figure 3: Estimated Hazard of Armed Conflict by GNP per capita and Polyarchy Score (Model 6)

democracy.[16] All the three terms are significant, and the interaction term is significant at the 0.01 level. Figure 3 plots the estimated log relative risk of armed conflict as a function of GNP per capita for two values of Polyarchy: The gray line plots the function for a polity with 0 (effective) participation. 42% of the observations has this value. The black line refers to the 95% percentile which corresponds to an effective participation of 54%. The picture here is very similar to that in Figure 1 : The two lines cross each other at roughly the same income level as in Figure 1, and the confidence intervals are quite similar.

In all these models, the estimated differences in hazard of civil war are substantially important: A difference of 1 in log relative risk – the unit along the y axis – is equivalent to having a 2.7 times higher probability of civil war. Comparing the extreme observations (the 5- and 95-percentiles) in terms of income for democracies implies that low-income democracies are 15-20 times more likely to have civil war as high-income democracies. Low-income democracies have approximately a three times higher estimated risk of civil war than low-income autocracies, whereas high-income democracies are eight times less civil war-prone than high-income autocracies.

[16] I also estimated a model including the square of Participation. The square terms were not statistically significant.

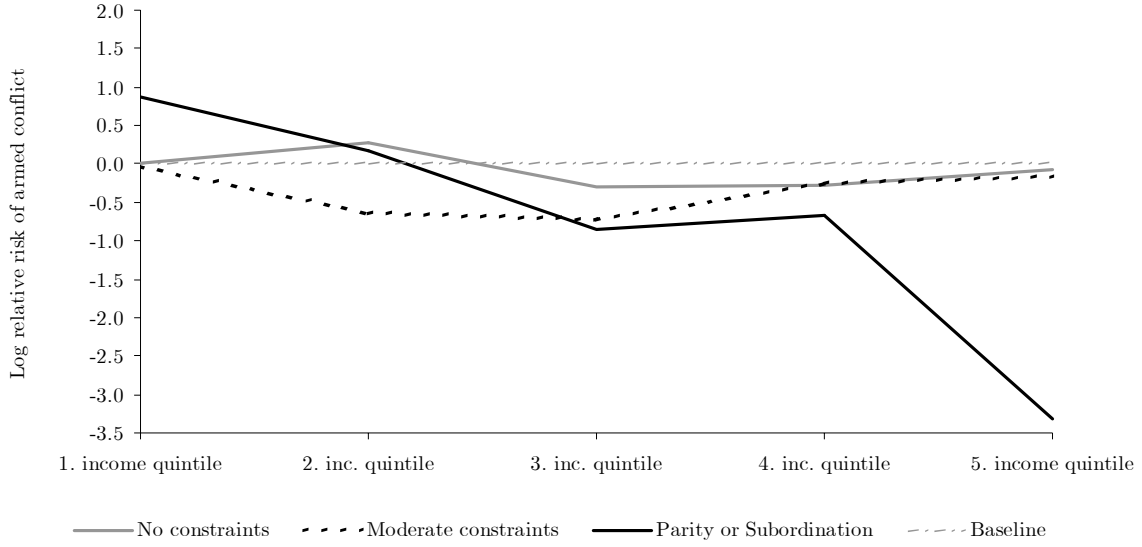

Figure 4: Estimated Relative Risk of Armed Conflict By Income and Executive Constraints, Categorical Indicators

The estimate for the democracy square term in Model 4 indicates that the relationship between democracy, development, and the log relative risk of armed conflict may not be linear. To assess this, I recoded the Income variable as a five-step categorical value, and the Executive Constraints variable as a trichotomous variable. The cut-off points for the Income variables were the quintiles. Controlling for the same factors, I then estimated the model with these terms and the interaction terms they form. The results are reported in Figure 4. As before, the most democratic countries are represented with a black line, the autocratic with a gray line, and the inconsistent with a black dotted line. The figure shows that the interaction effect is most marked for the highest Income quintile, where the 'Parity or Subordination' group has a clearly lower risk of armed conflict than any others. The democracies in the fourth quintile are more conflict-prone than the linear model implies.

4.2 Literacy

Table 3 presents the results from the corresponding model using Literacy as the indicator of development. In Model 7, Executive constraints is the democracy indicator. Both the main terms and the interaction term are negative and significant. The estimated risk of

	Model 7	Model 8	Model 9
Indicator of democracy	Executive constraints	Gates et al. (categorical)	Modified Polyarchy
Explanatory Variable	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$
Inconsistent (0)	$(ref.cat.)$	$(ref.cat.)$	$(ref.cat.)$
Autocracy (1)		-0.18	
		(0.34)	
Democracy (2)		-0.20^{**}	
		(0.25)	
Democracy index	-0.070^{*}		-0.062
	(0.048)		(0.070)
Literacy	-1.74^{***}	-1.12^{***}	-1.72^{***}
	(0.30)	(0.45)	(0.31)
Autocracy (categorical)*		0.13	
Literacy		(0.97)	
Democracy (categorical.) *		-1.99^{***}	
Literacy		(0.69)	
Democracy index*	-0.50^{***}		-0.54^{***}
Literacy	(0.15)		(0.21)
$\text{Growth}_{previous\ year}$	-2.39^{***}	-2.25^{***}	-2.30^{***}
	(0.51)	(0.48)	(0.47)
Mountaineous Terrain	0.0046^{*}	0.0051^{*}	0.0048^{*}
	(0.0034)	(0.0035)	(0.0032)
Ethnic	0.11	0.12	0.076
Dominance	(0.19)	(0.19)	(0.18)
Proximity of	-0.17	-0.16	0.69^{*}
Regime Change	(0.83)	(0.84)	(0.63)
ln(Population)	0.26^{***}	0.27^{***}	0.28^{***}
	(0.070)	(0.066)	(0.068)
Proximity of	1.62^{***}	1.58^{***}	1.64^{***}
Armed Conflict	(0.48)	(0.47)	(0.45)
In Armed	0.056	0.038	0.088
Conflict	(0.37)	(0.40)	(0.33)
Proximity of A.C *	-1.74^{***}	-1.71^{***}	-1.91^{***}
In Armed Conflict	(0.76)	(0.76)	(0.73)
$LL_{int} - LL_{\tilde{}int}$ $(d.f.)$	10.08 (1)	6.52 (2)	6.05 (1)
χ^2 (p-value)	(0.001)	(0.038)	(0.014)
No. of countries	126	126	126
No. of conflicts	118	118	131
Time at risk (days)	$1,546,607$	$1,546,607$	$1,585,117$
Test of prop. haz. ass. $\chi^2, (d.f.)$	8.31 (11)	11.08 (13)	8.14 (11)
p-value	0.69	0.60	0.70
LL_o	-554.80	-554.80	-619.32
LL_{m_3}	-515.75	-516.86	-576.97
Robust standard errors in parentheses $*: p < 0.10,\ \ **: p < 0.05,^{***}: p < 0.01$ (one-sided test).			

Table 3: Risk of Armed Conflict, Literacy as Indicator of development, All Conflicts

armed conflict relative to the baseline is plotted in Figure 5. The pattern is similar to that in Figure 1: The risk of armed conflict is decreasing in literacy for high-constrained regimes, but not for non-constrained regimes. The confidence intervals indicate that these results are even more clearly defined than in the income-constraints model. The two estimate lines cross each other at a literacy level of 52% – the level of Egypt and India. In this model, illiterate high-constraints countries are estimated to have a significantly higher risk of armed conflict than illiterate low-constraints countries. There are not many such democracies with low literacy rates – in the late 1990s, Benin and Nepal were the only examples. Other cases include Nigeria in the early 1960s and early 1980s, Uganda, Sudan, Somalia, and Burma in the 1960s, and India, Pakistan, and Bangladesh in the 1970s.[17] Countries with high literacy levels and low constraints include several Latin American countries and Spain and Portugal before democratization. Examples from the late 1990s are Congo, Swaziland, Vietnam, and some countries in the Middle East.

In Model 8, the Gates et al. categorical democracy variable was used as indicator of democracy. Here, too, the democracy, literacy and literacy-democracy interaction terms are negative and statistically significant.

Model 9 was estimated using the modified Polyarchy variable. The estimates indicate a similar pattern as that of Models 7 and 8, and the estimates have the same level of significance.

4.3 Mineral Dependence

Table 4 presents the results from the corresponding models using exports of minerals (fuels, ores, and metals) as share of merchandise exports as the indicator of development. In all the models, the democracy indicator is negative and significant. Consistent with the results of Fearon & Laitin (2002), Reynal-Querol (2002), and (with some caveats) Elbadawi & Sambanis (2002), I do not find the minerals variable to be significant in any of the models. This contrasts the findings in Collier & Hoeffler (2001).[18] This is puzzling, given the good theoretical reasons

[17] All these examples have literacy levels under 36%, the value under which the confidence intervals do not overlap in Figure 5, and were coded as having an executive that was at par with or subordinate to a constraining body.

[18] I also tried using mineral exports as share of GDP and all primary commodities exports (including agricultural goods) as share of GDP. This did not change the results substantially, neither in terms of statistical and substantive significance. I also tried estimating the models without the Proximity of regime change and growth variables that arguably are intervening variables in this model (cf. Ross, 2001, Auty, 2001), and tried

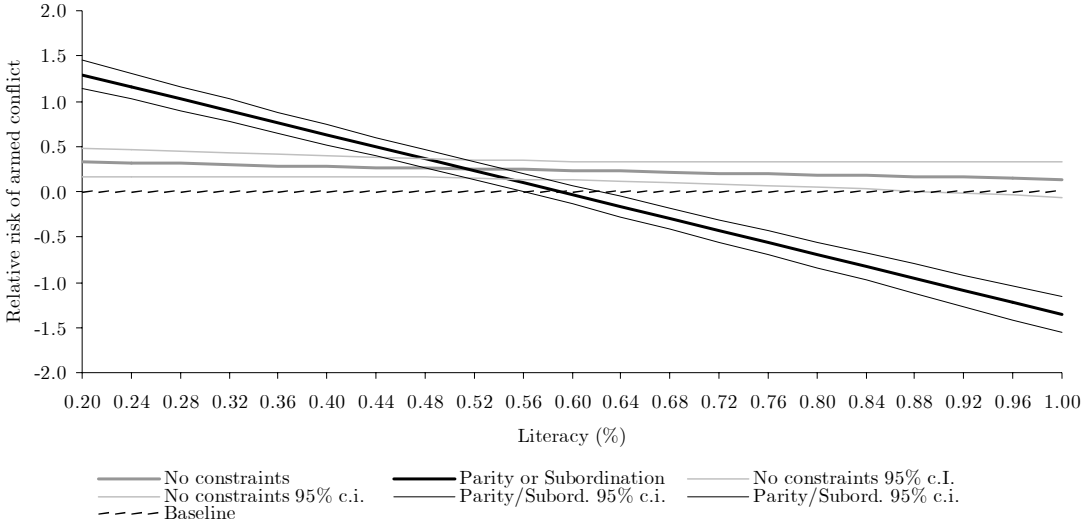

Figure 5: Estimated Hazard of Armed Conflict by Literacy and Executive Constraints (Model 7)

and lots of case study evidence (cf. Ross, 2002) to expect there to be a relationship between mineral resources and conflict. The reason might be that the variable is too crudely measured to capture the hypothesized relationship. It fails to distinguish between natural resource revenues that favor rebel groups and thus increases the risk of armed conflict and revenues that favor the government and hence deters armed conflict. Moreover, in large countries, natural resource abundance may be so local that it only marginally affects the country's overall exports statistics, but still incites conflict locally that is registered when coding the dependent variable. Finally, in many cases the goods that are the source of conflicts are not included in official statistics because they are exported illicitly. This is particularly true of drugs, but also applies to diamonds (for the case of Sierra Leone, see Davies & Fofana, 2002).

The democracy-minerals interaction term is weakly significant only in Model 11 – the model using the Gates et al. measure. Although the estimates are not sharply defined, all models reflect the same general relationship as in Tables 1–3. The estimated risks of armed conflict from model 12 are plotted in Figure 6. As in the previous figures, the estimated risk for democracies is decreasing more strongly in development (e.g., in decreasing mineral

including a square term for mineral exports (cf. Appendix 1). This did not affect the results much either. Finally, omitting the interaction term does not render the Minerals main term any more significant.

	Model 10	Model 11	Model 12
Indicator of democracy	Executive Constraints	Gates et al. (categorical)	Vanhanen modified
Explanatory Variable	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$
Inconsistent (0)	$(ref.cat.)$	$(ref.cat.)$	$(ref.cat.)$
Autocracy (1)		-0.14 (0.27)	
Democracy (2)		-0.47^{**} (0.30)	
Democracy index	-0.10^{**} (0.052)		-0.17^{***} (0.070)
Minerals as share of merchandise exports	-0.24 (0.32)	0.61 (0.59)	-0.25 (0.30)
Autocracy* Minerals		-0.90 (0.72)	
Democracy * Minerals		-1.86^{***} (0.78)	
Democracy index * Minerals	-0.16 (0.14)		-0.20 (0.19)
$\text{Growth}_{previous\ year}$	-2.34^{***} (0.60)	-2.43^{***} (0.61)	-2.24^{***} (0.54)
Mountaineous Terrain	0.0058^{*} (0.0040)	0.0053^{*} (0.0041)	0.0053^{*} (0.0037)
Ethnic Dominance	0.054 (0.22)	0.072 (0.22)	0.049 (0.20)
Proximity of Regime Change	-0.076 (0.87)	-0.21 (0.87)	0.77 (0.65)
ln(Population)	0.28^{***} (0.072)	0.29^{***} (0.096)	0.27^{***} (0.092)
Proximity of Armed Conflict	1.71^{***} (0.44)	1.53^{***} (0.52)	1.58^{***} (0.50)
In Armed Conflict	0.052 (0.37)	0.15 (0.36)	0.21 (0.32)
Proximity of A.C * In Armed Conflict	-1.99^{**} (0.71)	-1.52^{**} (0.88)	-1.79^{**} (0.85)
$LL_{int}-LL_{int}$ $(d.f.)$	0.88 (1)	4.64 (2)	0.92 (1)
χ^2 (p-value)	(0.35)	(0.098)	(0.34)
No. of countries	126	126	126
No. of conflicts	115	115	128
Time at risk (days)	1,495,203	1,495,203	1,532,333
Test of prop. haz. ass. $\chi^2, (d.f.)$	11.45 (11)	11.26 (13)	8.98 (11)
p-value	0.41	0.59	0.62
LL_o	-537.34	-537.34	-601.36
LL_{mdl}	-511.79	-510.88	-570.20
$*: p < 0.10$, $**: p < 0.05$,$***$: $p < 0.01$ (one-sided test). Robust standard errors.			

Table 4: Risk of Armed Conflict, Mineral Exports as Indicator of development, All Conflicts

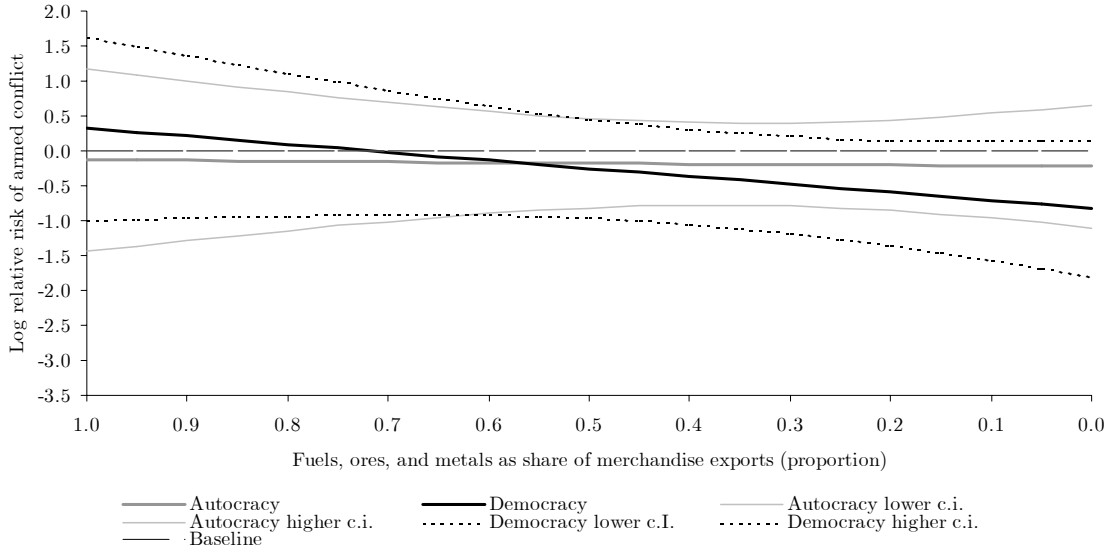

Figure 6: Estimated Relative Hazard of Armed Conflict by Mineral Exports and MIRPS Democracy Measure (Model 11)

dependence) than for autocracies. The difference in slopes is not statistically significant, however. Note that high mineral exports dependence is associated with low development, such that the figure is reversed along the horizontal axis.

In contrast to the previous tables, Model 11 replicates the 'inverted-U' results, and the estimate for the democracy main terms in Models 10 and 12 indicate a monotonically negative and significant relationship between democracy and the risk of conflict. The reason for the change in results from Model 1 is that the minerals variable fails to function properly as a control for development.

4.4 Civil War as Dependent Variable

Previous cross-country studies of the relationship between democracy, development, and civil war have used a more restrictive definition of the dependent variable. To show that the results found above also hold for more serious conflicts, I estimated a subset of Models 1–9 above using another dependent variable: civil wars with at least 1,000 killed in the course of the war, as defined by the Correlates of War dataset (Singer & Small, 1994). The list of wars is based on that reported in Hegre et al. (2001: 47), but supplemented with a number of wars

from Collier & Hoeffler (2001).[19]

The results are presented in Table 5. Even though the number of conflicts in the sample is less than half than in the previous analyses, the resulting estimates for the interaction terms are nearly as significant as in the analyses of the less restrictive conflict definition. The substantial interpretation of the estimates are very similar to those presented above.

Moving to a more restrictive definition of conflict changes the estimates for the control variables, however. Firstly, the Collier & Hoeffler primary commodity exports variable is significant in analyses of civil war, and has therefore been retained as a control variable in these models. The growth variable, which was remarkably robust in Models 1–12, has a smaller impact in this analysis, and is statistically significant at the .05 level in only one of the models in Table 5. Conversely, the Proximity of Regime Change variable has a larger magnitude and statistially significant in one of the models. This seems to indicate that poor growth rates and economic collapses such as the recent one in Argentina seldom leads to more than relatively minor political violence. Institutional changes, on the other hand, tend to be followed by serious, large-scale conflicts if they lead to conflict, but seems less often to lead to minor political violence.

5 Conclusion

The relationships between democracy, development, and armed conflict are not independent of each other. This paper shows that empirically there is a strong and robust interaction between the two variables: Increasing the level of economic development reduces the risk of armed conflict only for democratic countries, and increasing the level of democracy only for developed countries.

The results are very robust. I used three alternative operationalizations of both democracy and development: Polity's Exeutive Constraints variable, Vanhanen's Polyarchy and Gates et al.'s MIRPS variable as measures of democracy, and GNP per capita, percent literacy in the population, and the value of minerals exports as a share of total exports as indicators

[19] These were: : India, starting in January 1965; Iran, March 1974; Cyprus, July 1974; Iraq, July 1974; indonesia, June 1975; Angola, November 1975; Sierra Leone, August 1991; Algeria, May 1991; Liberia, January 1992; Afghanistan, May 1992; Russia, December 1994; Congo, Januar 1997; Sierra Leone, May 1997; Democratic Republic of Congo, May 1997.

	Model 2b	Model 6b	Model 8b	Model 9b
Indicators of development and democracy	Income XCONST, square term	Income Gates et al. ordinal	Income Polyarchy	Literacy XCONST
Expl. Variable	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$
Dem. index	-0.081 (0.11)	-0.23 (0.26)	-0.098 (0.12)	-0.022 (0.072)
Democracy index squared	-0.064 (0.055)			
Development	0.11 (0.22)	-0.53^{***} (0.16)	-0.28^{**} (0.12)	-1.58^{***} (0.67)
Democracy* Development	-0.12^{**} (0.065)	-0.29^{***} (0.14)	-0.17^{***} (0.063)	-0.45^{**} (0.24)
Dem. squared* Development	-0.075^{**} (0.035)			
$\text{Growth}_{prev.year}$	-1.10 (1.54)	-1.11 (1.45)	-1.87^{**} (1.09)	-0.45 (2.15)
Primary comm./ GDP	5.59^{***} (2.03)	5.53^{***} (2.04)	5.20^{***} (1.80)	6.72^{***} (2.1)
Primary comm./ GDP squared	-24.0^{**} (10.6)	-23.9^{**} (10.8)	-18.4^{***} (7.6)	-27.4^{***} (11.8)
Mountaineous Terrain	0.015 (0.0089)	0.017^{**} (0.0090)	0.016^{**} (0.0084)	0.014^{*} (0.0098)
Ethnic Dominance	0.48 (0.38)	0.51^{*} (0.36)	0.38 (0.35)	0.59^{*} (0.43)
Proximity of Reg. Change	0.62 (0.78)	0.64 (0.79)	1.23^{**} (0.68)	0.75 (0.82)
ln(Population)	0.36^{***} (0.014)	0.39^{***} (0.13)	0.39^{***} (0.12)	0.47^{***} (0.15)
Proximity of Armed Conflict	-0.22 (0.54)	$-.31$ (0.55)	0.087 (0.45)	-0.064 (0.53)
$2\Delta LL$ $(d.f.)$ χ^2 $(p\text{-value})$	11.61 (2) (0.0030)	10.93 (1) (0.0009)	5.20 (1) (0.0226)	2.31 (1) (0.13)
No. of countries	127	127	127	126
No. of conflicts	45	45	50	45
Time at risk	$1,520,233$	$1,520,233$	$1,550,928$	$1,508,245$
p. h. a test p-value	10.66 (13) 0.64	8.35 (11) 0.68	7.79 (11) 0.73	7.01 (11) 0.80
LL_o	-212.93	-212.93	-237.42	-207.85
LL_{mdl}	-188.97	-191.31	-213.07	-187.78
Robust standard errors in parentheses. *: $p < 0.10$, **: $p < 0.05$,***: $p < 0.01$ (one-sided tests)				

Table 5: Risk of Civil War, Various operationalizations of democracy and development, 1960–97

of development. The contingent effect was modeled by means of multiplicative interaction terms. The model was also estimated on two different versions of the dependent variable: Armed conflicts from the Uppsala project including all conflicts with at least 25 dead per year, and a civil war dataset largely based on the Correlates of War data.

I found strong and robust evidence that democracy is correlated with civil peace, but only for middle- and high-income countries. The same applies for countries with high levels of literacy. The relationship between democracy, primary commodity dependence, and civil war was not significant, but pulls in the same direction: democracies with low primary commodity dependence have a lower probability of civil war than autocracies and inconsistent regimes with low primary commodity dependence, but the opposite is the case for countries with high primary commodity dependence. The converse of this result is that development, measured as income or as literacy, reduces the probability of conflict, but only if the country has a democratic political system.

Recent studies explain the relationship between low levels of economic development and civil war as due to low opportunity costs for potential rebel recruits, and to governments with low capacity for countering insurgencies (Collier & Hoeffler, 2001; Fearon & Laitin, 2002). The results presented here calls for a qualification of these explanations: If development decreases the probability of civil war only for democratic countries, this must mean either that the risk-reducing effect of increased income in autocracies is countered by a risk-increasing effect„ or that the effects of increasing opportunity costs and state capacity due to economic development is much stronger in democracies than in autocracies. One possible explanation for the first of these is increased pressure for democratization when autocracies become more developed, a pressure that may or may not turn violent (Huntington, 1968; Boix & Carigano, 2002). A possible explanation for the latter is that maintaining order in democracies requires much more resources than in autocracies, requiring well-functioning legal systems and efficient, non-partisan and non-corrupt law enforcement. Moreover, the literature on the determinants of democracy and democratic stability shows clearly that democracy is unstable in low-income countries. Democratic institutions that are perceived to be unstable are not likely to be efficient in maintaining domestic peace, and the breakdown of any political institutions are often accompanied by violence. Of course, many of the same factors that explain the stability

of democracy also explain the absence of civil war: The parallell to low opportunity costs for rebel recruits is that the value of having political offices is relatively larger. This increases the stakes of the political struggle, which again decreases the chances of stable democracy (Przeworski, 1991). Likewise, the availability of large rents from the extraction of natural resources both increase the incentives of fighting over the control for them and reduces the incentives for institutionalizing a system where power and hence also revenues are distributed widely.

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7 Appendix 1. The Control Model

I first estimated a model including all the control variables introduced in Section 3.2 in addition to the Executive Constraints and GDP per capita variable. In addition, I included some additional variables presented below to minimize omitted variable bias. The results from this estimation are presented in Model A1 in Table 6. Among the control variables, only 'Growth', 'Proximity of Armed Conflict', and 'Ethnic Dominance' are statistically significant (one-sided tests), in addition to the 'Development-Democracy' interaction term.

'Diaspora' has a particularly high number of missing values, so omitting it will considerably increase the size of the sample, as done in Model A2. This increases the number of conflicts in the analysis from 48 to 73, and addes four variables to the list of signficant terms: 'Democracy', 'ln(Population)', 'Secondary Schooling', the 'Proximity of Armed Conflict – In Conflict' interaction term.

'Geographic Dispersion' and 'Income Inequality' are not close to significance, and have many missing values. These were excluded in Model A3. Although the number of conflicts in the analysis increases to 110, the estimates for the significant variables barely change. Note that the 'Development-Democracy' interaction term is significant in all three analyses, independent of controlling set and the number of cases in the sample.

The 'Mineral exports' variable is not significant, nor is its square term. I also tried other variants of this pair of variables, such as mineral exports as a share of GDP and all primary commodities as a share of GDP. None of these were significant when low-level armed conflicts were the dependent variable.

I made three simplifications to Model A3 in the analyses presented in the main text: Since 'Mineral exports' and 'Literacy' are used as separate indicators of development in the analyses, I never enter them together with 'Income' and vice versa. Moreover, Model A3 has three indicators of ethnic composition. I use the variable that obtains the highest level of significance, 'Ethnic Dominance', and drop the rest. Finally, I drop 'Proximity of Independence' which is never signficant.

Proximity of Independence For each observation, I computed the time in days since the country became independent. The time was transformed into the 'Proximity of' function by means of the formula $p_i = 2^{-\frac{T_i}{6}}$, where T_i is the number of years since independence, and the half-life parameter is seven years.

Diaspora This variable was taken from Collier & Hoeffler. It measures the number of persons born in the country registered as resident in the U.S. by the U.S. Bureau of Census.

Ethnic Polarization The Polarization measure, developed in Reynal-Querol (2002), measures the degree to which the population distribution over ethinic groups are polarized. The measure takes its largest value if there are two groups of equal size in the country. The variable was taken from Collier & Hoeffler, 2001.

Ethnic Fractionalization The Ethnic fractionalization variable measures the probability that two individuals randomly drawn from a country do not belong to the same ethnic group. The variable was taken from Collier & Hoeffler, 2001.

Income Inequality I use the GINI index as a measure of income inequality. The variable was taken from World Bank (2002).

Secondary School Enrollment The Secondary School Enrollment variable was taken from World Bank (2002). Missing data points were imputed by means of Stata's imputation algorithm (StataCorp, 2001b:69–73). This procedure and the variables used in the imputation are reported in Appendix 2.

Geographical Dispersion of Population The variable is a gini coefficient of geographic population distribution. A value of 1 indicates that the population is concentrated in one area, a value of 0 that all areas have equal population density. The variable was taken from Collier & Hoeffler, 2001.

	Model A1	Model A2	Model A3
Explanatory Variable	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$	$\widehat{\beta}$ $(s.e.)$
Democracy	-0.019 (0.064)	-0.081^{*} (0.059)	-0.064^{*} (0.048)
ln(GNP per capita)	-0.13 (0.20)	-0.063 (0.15)	-0.12 (0.11)
Democracy * ln(GNP per capita)	-0.19^{***} (0.040)	-0.12^{***} (0.041)	-0.11^{***} (0.028)
$\text{Growth}_{previous\ year}$	-2.94^{***} (1.10)	-2.76^{***} (0.83)	-2.78^{***} (0.64)
Mountaineous Terrain	-0.0049 (0.0075)	-0.0016 (0.0055)	0.0026 (0.0036)
Proximity of Regime Change	0.93 (0.95)	0.16 (0.98)	-0.062^{*} (0.88)
Ethnic Fractionalization	0.42 (0.73)	0.73 (0.75)	0.53 (0.65)
Ethnic Dominance	0.63^{**} (0.37)	0.28 (0.28)	0.30^{*} (0.22)
Proximity of Independence	-2.93 (3.59)	-0.56 (0.97)	-0.71 (0.74)
ln(Population)	0.17 (0.099)	0.38^{***} (0.076)	0.30^{***} (0.067)
Minerals in Exports (%)	-0.99 (1.15)	-0.52 (0.85)	-0.22 (0.60)
Square of Minerals in Exports (%)	-2.26 (1.98)	-1.39 (1.56)	-0.64 (1.18)
Secondary Schooling	-0.012 (0.013)	-0.014^{*} (0.0091)	-0.013^{**} (0.0074)
Geographic Dispersion	0.27 (0.83)	-0.58 (0.57)	
Income Inequality (GINI index)	0.0028 (0.015)	-0.0053 (0.012)	
Diaspora	-2332 (1980)		
Polarization	0.68 (0.79)	0.44 (0.57)	0.015 (0.44)
Ethnic Dominance	0.53 (0.42)	0.28 (0.28)	0.30^{*} (0.22)
Proximity of Armed Conflict	1.33^{**} (0.78)	1.75^{***} (0.62)	1.06^{**} (0.63)
In Armed Conflict	0.17 (0.60)	-0.20 (0.39)	0.017 (0.35)
Proximity of A.C * In Armed Conflict	-2.59 (1.44)	-2.31^{***} (0.90)	-1.62^{***} (0.91)
$2\,(LL_{int} - LL_{\text{-}int})$ $(d.f.)$ χ^2 $(p$-value)	11.41 (1) (0.0007)	7.10 (1) (0.008)	11.16 (1) (0.0008)
No. of countries	71	82	124
No. of conflicts	48	73	110
Time at risk (days)	682,4640	997,517	1,429,204
LL	-199.35	-314.78	-512.75

8 Appendix 2. Creation of Literacy and Mineral Exports Variables

The 'Literacy' and 'Mineral exports' variables have more missing values than the GDP per capita variable in the World Bank dataset. To ameliorate this problem, I filled in missing variables by means of interpolation and imputation. The imputation algorithm does the following (StataCorp, 2001b: 73): If an observation j is missing value for the imputed variable y, the algorithm runs a regression with y as the dependent variable and all x_i for which that observation is not missing values as regressors. All observations in the dataset without missing values for y and x_i are used in this estimation. The missing observation y_j is replaced with the predicted value $\widehat{y}$ for j from this estimation. Observations where the value for y is not missing were not changed.

Before imputation, I filled in missing values by interpolation. I then selected a set of relevant variables from the World Bank World Development Indicators. Only variables that are theoretically related to the imputed variable and that did not miss to many values themselves were selected. The set of regressors used in the imputation of the variables are given in Table 7.

For the Secondary school enrollment variable, the number of observations with data for the 1960-2000 period was increased from 3,139 to 7,585. Since more data are missing for developing countries, the imputation caused the mean and median of the variable to decrease from 52 to 45 and from 50 to 42, respectively.

In both imputations, some potential predictors that are highly correlated with GDP per capita were excluded, such as education expenditure data.

Secondary school enrollment (%)
Youth illiteracy rate, females 15-24 years (% of cohort)
Youth illiteracy rate, males 15-24 years (% of cohort)
Youth illiteracy rate, all 15-24 years (% of cohort)
Adult illiteracy rate, females 15- years (% of cohort)
Adult illiteracy rate, males 15- years (% of cohort)
Adult illiteracy rate, all 15- years (% of cohort)
Primary school enrollment (% gross)
Persistence to grade 5, all (% of cohort)
Secondary school enrollment, female (% gross)
Secondary school enrollment, male (% gross)
Tertiary school enrollment (% gross)
Tertiary school enrollment, male (% gross)
Tertiary school enrollment, female (% gross)
Mortality rate, infant (per 1,000 live births)
Life expectancy at birth, total (years)
Rural population (% of total population)
Urban population (% of total population)
Minerals as share of merchandise exports (%)
Nontax revenue (% of GDP)
Nontax revenue (% of current revenue)
Taxes on int'l trade (% of current revenue)
Tax revenue (% of GDP)
Health, education, housing etc. expenditure
Land use, irrigated land (%)
Exports of goods and services (% of GDP)
Agriculture, value added (% of GDP)
Manufacturing, value added (% of GDP)
Mining and quarrying, value added (% of GDP)
Industry, value added (% of GDP)
Services, value added (% of GDP)
GDP per capita (constant US$)
Employment in agriculture (% of total empl.)
Employment in industry (% of total empl.)
Employment in services (% of total empl.)
Agricultural raw materials exp. (% of merch. exp.)
Food exports (% of merchandise exp.)
Manufactures exports (% of merch. exp.)
High-technology exports (% of manuf. exp.)

Table 7: Variables used in imputation