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Murder by Numbers:

Socio-Economic Determinants of Homicide and Civil War

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Comparisons and Inter-Relationships between Homicide and Civil War

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Abstract

Deliberate killing is a common part of the defining features of both homicide and civil war. Often, the scale of killing is also similar: most countries have homicide rates that exceed the threshold of one thousand combat-related deaths during a year that is the standard criterion for civil war. What is clearly different is the organization of killing: the perpetrators of homicide are usually individuals or small groups, whereas rebellion – the direct cause of a civil war - requires a cohesive group of at least several hundred killers. Beyond this, the motivation for the two types of killing may differ systematically, although evidently both homicide and rebellion have many different motivations, including error and irrationality.

In this paper we investigate whether the socio-economic determinants of homicide and civil war are similar, and then explore potential inter-relationships between them. We compare our existing model of the risk of civil war with a new model of the homicide rate. We find that there is a 'family resemblance' between the two types of killing, but surprising differences. Furthermore, we turn to the inter-relationships between homicide and the risk of civil war. Specifically, we ask whether a high rate of homicide makes a country more prone to civil war, and whether a civil war makes a country more prone to homicide. Our results indicate that higher homicide rate do not increase the risk of war but that civil wars generate a legacy of increased post-conflict homicide rates.

1. Introduction

Deliberate killing is a common part of the defining features of both homicide and civil war. Often, the scale of killing is also similar: most countries have homicide rates that exceed the threshold of one thousand combat-related deaths during a year that is the standard criterion for civil war. Indeed, for the 31 countries for which we have recent data, all have an annual number of murders that exceeds the civil war threshold. What is clearly different is the organization of killing: the perpetrators of homicide are usually individuals or small groups, whereas rebellion – the direct cause of a civil war -requires a cohesive group of at least several hundred killers. Beyond this, the motivation for the two types of killing may differ systematically, although evidently both homicide and rebellion have many different motivations, including error and irrationality.

In this paper we first investigate whether the socio-economic determinants of homicide and civil war are similar, and then explore potential inter-relationships between them. In Section 2 we compare our existing model of the risk of civil war with a new model of the homicide rate. We find that there is a 'family resemblance' between the two types of killing, but surprising differences. In Section 3 we turn to the inter-relationships between homicide and the risk of civil war. Specifically, we ask whether a high rate of homicide makes a country more prone to civil war, and whether a civil war makes a country more prone to homicide. We also investigate whether Africa displays any distinctive patterns in these inter-relationships or simply conforms to global behaviour. Section 4 concludes.

2. A Comparison of Causes

In previous work (Collier and Hoeffler, 2004) we have modeled the risk of civil war. Using global data for the period 1965-99 we find that the risk of civil war during a five-year period is significantly related to a few socio-economic variables. The three most important variables are the level, growth, and structure of GDP. Higher per capita GDP and faster growth both substantially reduce the risk of civil war, whereas a higher share of primary commodities in GDP increases the risk except when primary commodity dependence becomes extreme. Social variables have little effect, except that if the largest ethnic group in a society constitutes a small majority of the population ('ethnic dominance'), the risk of war is substantially increased. The list of variables that have no significant effect is quite striking: neither income inequality nor the degree of democratic rights have any effect, and ethnic and religious diversity is mildly beneficial, (other than for ethnic dominance). We now investigate whether the homicide rate is similarly determined.

The causes of homicides have recently been studied by Fajnzylber, Lederman and Loayza (2002a,b) – hereafter FLL - and Neumayer (2003). We first revisit the work by FLL, expand their data set and revise the explanatory variables according to the work by Neumayer (2003). FLL find that the explanation of homicide rates has a very different pattern to the explanation of civil wars – the level of GDP has no significant effect whereas income inequality is the most important explanatory variable.

Panel data on homicides are available from three main sources: The United Nations (UN), the World Health Organization (WHO) and from the International Criminal Police

Organization (Interpol). FLL (2002a) use as their main source UN Crime Surveys. In these surveys homicide is defined as 'death purposely inflicted by another person, including infanticide'. These data are only irregularly collected and an update was not available to us. We used mainly WHO data to update the data set because they are widely regarded as the most reliable (see for example La Free, 1999). The WHO provides data on deaths due to 'homicide and injury purposely inflicted by other persons', this information is based on death certificates issued by doctors. For countries for which WHO data were not available we used Interpol data. Homicides are measured as the homicide rate per 100,000 persons.

In Table 1, column 1, we replicate FLL (2002a).[1] FLL use GMM estimation in their work, however they seem to report the results from the two step estimator which is unlikely to be the appropriate estimation technique for such a small sample (Arellano and Bond, 1991). One possible estimation method is the use of a fixed effects estimator in order to take unobserved country specific effects into account. This method relies on the temporal variation of the explanatory variables only, which will cause a loss of efficiency if there is little variation over time. This is the case with many of our explanatory variables and the loss in efficiency is problematic. We therefore suggest the use of OLS estimation, taking heteroskedasticity into consideration by reporting White corrected standard errors. We tested for time effects but found them to be not significant. Using our updated data set we estimate the FLL model in column (2), our results are qualitatively similar.

The most striking apparent difference between civil war and the homicide rate is that the

[1] Their Table 1, column2.

most important variable in the former – GDP – is insignificant in the latter. However, the lack of significance of GDP in the homicide rate is open to question. Along with GDP, FLL include among the explanatory variables both the lagged dependent variable and the GDP growth rate. Given this specification, even if the true relationship is that the levels of all the explanatory variables – including GDP – determine the homicide rate, the level of GDP and its growth cannot both be significant. The inclusion of the lagged dependent variable is equivalent to using as the dependent variable the change in the homicide rate. The level of GDP can thus only be significant in the regression to the extent that is captures the change in GDP from the previous period, yet the inclusion of the growth rate as an explanatory variable preempts this possibility. It is, of course, entirely reasonable to suppose that the growth of GDP has an effect on the homicide rate over and above any effect of the level of GDP, but to investigate this the lagged dependent variable cannot be included. Once the lagged dependent variable is dropped, there is no longer such a strong case for the use of GMM, hence our switch to OLS. In the new regression (Table 1, column 3) the level of GDP becomes significant along with the rate of change. GDP and its growth have qualitatively the same effect on the homicide rate as they do on the risk of civil war: killing is higher in low-income countries in economic decline. Following Neumayer (2003) we also include democracy and the proportion of young men in our specification. Homicide rates are significantly higher in democracies. Neumayer (2003) finds that this effect diminishes at high levels of democracy. He includes a squared democracy term in his regressions and finds that the coefficient on this term is negative and significant. We cannot confirm this result and thus only include a linear democracy term. As Neumayer (2003) we find that countries with a high proportion of young men

have higher homicide rates.

Beyond this common core, however, there are differences. Our core regression of the risk of civil war finds the share of primary commodities in GDP, and ethnic dominance to be significant influences. Neither of these has a significant effect on the homicide rate (Table 1, columns 4 and 5). Conversely, our core regression for homicide (Table 1, column 3) finds three variables to be significant that are not included in our core model of the risk of civil war: inequality, democracy, and the proportion of young men in the population. Table 2, column 1, reproduces our core regression of the probability of an outbreak of civil war during a five-year period (Collier and Hoeffler, 2004). In the columns 2, 3 and 4, we show that none of these variables is significant when added to the core regression.

We now discuss what these similarities and differences might indicate. The common effect of low income and economic decline could proxy both the weakness of the state and the desperation of its citizens. That is, the formal restraints on murder might be atypically weak, and the lack of legitimate income-earning opportunities might propel people into violence whether individually or collectively.

That inequality is significant for the homicide rate, while primary commodities are significant for the risk of civil war might indicate the different targets for individual and group violence. Individual violence might be targeting relatively high-income people, while to target the rents from primary commodities requires substantial organized violence. However, in many cases the victim and the murderer are drawn from the same socio-economic group. An alternative explanation for the importance of inequality is that,

controlling for the mean level of per capita income, greater inequality is associated with increased poverty. Thus, the apparently common cause of targeted wealth for homicide and civil war may be illusory. The significance of the proportion of young men in the homicide rate but not in the risk of civil war may reflect the radically different degrees of organizational difficulty involved in individual and group killing. Young men, individually or in groups, evidently require no further organization to be able to kill individuals, but rebellion commonly requires a level of organization that may be beyond the reach of youth. Conversely, where there is a capacity to organize, finance and equip rebellion, the number of young men available may not be a binding constraint – in low-income countries in decline there are always more than enough recruits. It is on the face of it surprising that democracy should reduce homicide but not the risk of civil war. Its effect on the homicide rate may reflect the rule of law: where the rule of law is weak people resort to individual violence. Its lack of effect on the risk of civil war may indicate both that in low-income countries democracy does not help to produce outcomes that are accepted as 'fair', and that rebellions are not in practice attempts to achieve 'fairness', but rather are merely attempts to increase the resources available for the rebel group.

3. Inter-relations between Homicide and Civil War

We now turn to inter-relations between the homicide rate and the risk of civil war. We first investigate whether the homicide rate has an effect on the risk of civil war. Potentially we might expect such an influence. A high homicide rate might both cause and reflect a desensitization of the society to violence, and thereby weaken the inhibitions

to large-scale organized killing. In Table 2, column 5 we introduce the lagged homicide rate as an explanatory variable in the risk of civil war. The lag is necessary because otherwise we might pick up the reverse effect that when a civil war breaks out there is an effect on the homicide rate. The lagged variable is insignificant. Since the homicide rate is indeed likely to proxy the society's general exposure to violence, this suggests that rebellion is unrelated to widespread attitudes to violence within society. One explanation for this is that rebel groups are usually extremely small relative to the population: the ability to recruit or coerce a few hundred youths into a rebel army may simply be unrelated to how the majority of people view violence.

We next investigate whether civil war affects the homicide rate. We ignore any effect during civil war. It is likely that during civil war police records are incomplete, if only because part of the country is likely to be beyond official control. We therefore focus on the post-conflict period. We distinguish between the first five years after conflict, and the second five years.

In Table 1, column 6 we introduce as a dummy variable the first five years post-conflict. Although the variable is positive, it is only significant at the 20% level. Before dismissing the post-conflict period as unimportant for the determination of the homicide rate, however, we investigate whether it changes the causal structure of the homicide rate. Specifically, we investigate whether it changes the effect of the four variables that are normally important in the determination of the homicide rate -the level of income, its rate of growth, the degree of income inequality, and the proportion of young men in the society. For this we introduce in turn interaction terms between each of these variables and the post-conflict dummy. Only in one case does the interaction approach statistical

significance, names that with the degree of income inequality: this is on the borderline of significance at 10% and its inclusion has the effect of making the post-conflict dummy variable itself significant. It also has the effect of making GDP marginally insignificant. If GDP is dropped as a variable, both the post-conflict dummy and its interaction become significant, being borderline jointly significant. In order to attempt to adjudicate between the model of column 3, in which GDP is included but not the two post-conflict variables, and the model of column 9, in which the two post-conflict variables are included but not GDP, we perform a J-test, in which the predicted values from each regression are added to the rival regression (columns 10 and 11). There appears to be little to choose between the models, although the model of column 9 is marginally superior: the predicted values from that model are significant when added to the model of column 3, but not quite vice versa. None of the other interaction effects is sufficiently close to significance to be worth further consideration.

Any post-conflict effects are thus statistically weak, although there appears to be something of a surge in the homicide rate in the early post-conflict period. The magnitude is fairly substantial at around 25%.[2]

The interaction of the post-conflict dummy with inequality is negative. The coefficient in absolute terms fully offsets the normally positive effects of inequality on the homicide rate. That is, although in early post-conflict situations the homicide rate is unusually high, and inequality is usually the main determinant of homicide, in the post-conflict phase it has no effect on homicide. Further, while the other usual influences on homicide do

[2] The post-conflict homicide rate is 9.38 compared with an average homicide rate of about 7.

continue to have effects in early post-conflict situations, they are no more potent than normal and so do not account for the surge in homicides.

We next investigate whether the surge in homicides is persistent. For this we change the period of focus from the first five years post-conflict to the second five years (Table 1, columns 10 -15). The dummy variable for this period is completely insignificant, with or without interactions. The surge in the homicide rate thus completely fades away after around five years of post-conflict peace.

What can we conclude from this pattern? The homicide rate probably surges in the early post-conflict years, but this is a problem which rapidly solves itself. Homicide in this short period is probably unrelated to inequality, normally the main determinant of homicide. There are several possible explanations of why this might happen. One legacy of civil war is a large stock of guns in the hands of the civilian population. However, were this to be the dominant explanation of the surge in homicides it might be expected that it would be fairly persistent. Guns can generally be expected to last longer than five years. For example, the surge in violence in South Africa may well be related to the ending of civil wars in neighbouring countries – with guns spilling over across the border, but this surge has to date been persistent. Further, there seems to be no reason why greater availability of guns would change the *structure* of homicide – making inequality unimportant – as opposed to simply increasing its incidence. A second possible explanation is that civil war leaves a legacy of scores to be settled across the society, and reduced inhibitions about settling them through violence. If this is the explanation, it is heartening that the effect fades so rapidly. A third possible explanation is that the surge in homicides may be related to demobilization. However, although we are unable to test for

this explicitly, other evidence casts doubt on such a hypothesis. For example, Collier (1994) investigates the effects of the demobilization in Uganda on the crime rate by district, and finds that in most districts the effect was benign – demobilization actually reduced crime. A fourth possible explanation is that civil war leaves a legacy of drug addiction. Rebellions are sometimes linked to drugs partly as a way of raising finance – as with the FARC in Colombia, and partly as a method of controlling recruits - as with the RUF in Sierra Leone. Globally, there is a strong relationship between drug abuse and homicide. A fifth explanation relates to the way in which rebel organizations typically finance themselves during conflict. Because such organizations are specialized in violence, they have a natural advantage in running extortion rackets: their threats of violence have high credibility, as for example, with the FARC. In principle, the onset of peace deprives these organizations of their revenue from such rackets: organized violence is supposedly at an end. However, even if the leadership of the rebel organization has genuinely accepted peace terms, those who have benefited from the revenues generated by protection rackets have an interest in trying to sustain them. Yet as a result of peace they face a credibility problem: they need to demonstrate that their capacity for violence continues despite the peace. This analysis would predict just such a temporary upsurge in violence as we observe. The recent upsurge in 'punishment' violence by some IRA activists in Northern Ireland appears to fit this pattern. The upsurge should, however, be temporary, because once credibility has been re-established, the scale of violence can be reduced.

The surge in homicides is not, on average, massive – during the first five years following a civil war it is around 25% higher than normal. However, in some situations a high rate

of post-conflict homicide might be a serious problem, for example, it might be seen as destabilizing. In other work we have found that during this phase there is an abnormally high risk of a reversion to civil war (Collier et al. 2003). We therefore investigate whether, although the homicide rate is not normally a significant risk factor in the initiation of civil war, it might be so in the peculiar circumstances of the early post-conflict phase. To test for this we need to introduce an interaction term of the dummy variable for the early post-conflict phase and the homicide rate into the core regression of the risk of civil war. First, however, we introduce the dummy variable on its own to ensure that any effect of the interaction term is not spuriously reflecting the direct significance of the dummy variable (Table 2, column 6). The dummy variable for the first five years of post-conflict is insignificant. We should note that this because the high risk during the early post-conflict phase is already well-captured in the core regression by a continuous variable which measures the number of months of peace. In Table 2, column 7 we introduce the interaction term with the homicide rate. It is also completely insignificant. Hence, the surge in the homicide rate in the early post-conflict phase, though obviously a problem in itself, is not linked to the far larger problem of the high risk of a reversion to civil war.

The implication of our analysis is that if the government wishes to reduce such violence, its most effective instruments among those we are able to measure are to accelerate economic growth and the establishment of democracy. Of course, in post-conflict situations other measures that we are unable to observe such as the re-establishment of effective policing, may be correlated with these variables and be the real source of

influence. However, recall that although growth and democracy both reduce the homicide rate, their effects in early post-conflict situations are no different from normal.

4. Conclusion

Homicide and civil war are two processes by which some people deliberately kill others in the same society. The homicide rate, being a continuous variable, is universally positive, whereas civil wars are rare except in low-income countries. However, where civil wars occur, the rate of deliberate killing is often on a scale fairly similar to homicide.[3] The most obvious reason to expect a difference between what determines the homicide rate and what determines the risk of civil war is that the latter requires large scale organization – a rebel group, armed and financed – whereas homicide is largely a small-scale crime. We have investigated whether the two processes have common causes. Contrary to the literature, we find that the economic fundamentals of homicide and civil war look similar. For both, killing is increased the lower is per capita income, the slower is the growth rate, and the larger are the financial resources of the potential 'target'. The latter is, however, different for the two types of killing: homicide is increasing in the gap between the rich and the poor, whereas the risk of civil war is increasing in our proxy for natural resource rents. In both cases one possible interpretation is that killing has the objective of capturing financial resources – the assets of the rich, or natural resource rents. However, this apparent similarity may be entirely spurious. Much murder occurs among poor people, rather than being poor-on-rich violence: inequality could increase

[3] The overall death rate from civil war generally dwarfs the scale of deaths from homicide, but this generally reflects the collateral damage of civil war to health systems and the flight of refugees.

homicides simply because for a given per capita income it increases poverty. Similarly, the association between civil war and natural resource rents could be due to the deterioration in the quality of government commonly associated with them rather than by the lure of rent-capture to rebels. Beyond this 'family resemblance' the two processes have some striking differences. Remarkably, both the extent of democracy and the proportion of young men in the society, - factors often suggested as being important in civil war – appear to matter only for homicide.

We have found a unidirectional causal relationship between the two processes. Homicide has no effect on the risk of civil war, but civil war temporarily raises the homicide rate. That the homicide rate has no effect on the risk of civil war is striking: it might be imagined that a society sensitized to a high level of violence is more likely to experience violent political challenges. This appears not to be the case. We have suggested that this may be because the ability to recruit a few hundred or a few thousand youths into a rebel army – which is all that is needed for a civil war – is unrelated to wider attitudes to violence across the society. Essentially, in many societies there may be a massive over-supply of youths willing to kill for an organization. In the early post-conflict period – the first five years - the rate of homicide is significantly higher – by around 25% - as a result of the war. This does not persist – between the sixth and tenth post-conflict years there is no discernable effect. During this brief period of above-normal homicide, the factors accounting for homicide are also distinctive. Income inequality, - normally the most significant factor in the homicide rate – has no effect. Other influences – democracy, the level of income, the growth rate, and the proportion of the society made up of young

males, are unchanged, but this leaves a large unexplained residual which appears to be a direct legacy effect of the war. Perhaps civil wars leave scores to be settled, and a willingness to resort to violence in order to do so. A potential concern of this brief phase of high personal violence is if it destabilizes the post-war peace, which is often fragile. We investigated this but did not find a significant effect of post-conflict violence on the risk of renewed conflict.

Tables

Table 1: Determinants of Homicide

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
lagged	0.842	0.813					
homicides	(14.90)***	(0.056)***					
GDP per capita	-0.046	-0.036	-0.065	-0.079	-0.086	-0.066	-0.064
growth	(-2.790)***	(0.011)***	(0.017)***	(0.018)***	(0.020)***	(0.017)***	(0.017)***
ln GDP per capita	-0.007	-0.029	-0.093	-0.079	-0.084	-0.077	-0.096
	(0.079)	(0.040)	(0.045)**	(0.046)*	(0.044)*	(0.046)*	(0.046)**
income	0.021	0.012	0.036	0.036	0.036	0.038	0.036
inequality	(1.821)**	(0.005)**	(0.006)***	(0.006)***	(0.006)***	(0.006)***	(0.006)***
education	0.027	0.007					
	(1.044)	(0.024)					
democracy			0.078	0.073	0.075	0.077	0.078
			(0.018)***	(0.018)***	(0.017)***	(0.018)***	(0.018)***
proportion			10.789	12.049	11.510	10.517	10.678
of young men			(4.215)**	(4.442)***	(4.170)***	(4.159)**	(4.237)**
primary commodity				-0.366			
exports/GDP				(1.139)			
primary commodity				0.157			
exports/GDP^2				(1.685)			
ethnic					0.013		
dominance					(0.109)		
post-conflict						0.423	
(0-5years)						(0.328)	
post-conflict							-0.116
(6-10 years)							(0.228)
Observations	136	183	292	290	290	292	292
R-squared	NA	0.77	0.26	0.26	0.27	0.26	0.26

Table 1 continued …

	(8)	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*
GDP per capita	-0.064	-0.068	-0.004	-0.012	-0.066	-0.065	-0.065	-0.066
growth	(0.017)***	(0.017)***	(0.039)	(0.037)	(0.017)***	(0.018)***	(0.017)***	(0.017)***
ln GDP per capita	-0.075		-0.074		-0.079	-0.077	-0.074	-0.074
	(0.046)		(0.044)*		(0.047)*	(0.046)*	(0.045)	(0.046)
income	0.040	0.041	0.003	0.010	0.038	0.038	0.038	0.038
inequality	(0.006)***	(0.006)***	(0.020)	(0.019)	(0.006)***	(0.006)***	(0.006)***	(0.006)***
democracy	0.079	0.063	0.022	0.0158	0.078	0.077	0.077	0.077
	(0.018)***	(0.014)***	(0.004)	(0.031)	(0.019)***	(0.018)***	(0.018)***	(0.018)***
proportion	10.602	12.548	-0.656	1.925	10.506	10.543	11.645	10.537
of young men	(4.153)**	(4.180)***	(7.589)	(7.278)	(4.165)**	(4.157)**	(4.142)***	(4.195)**
post-conflict	1.899	2.021		1.899	0.491	0.471	4.016	1.214
(0-5years)	(1.031)*	(1.030)*		(1.031)*	(0.546)	(0.359)	(2.759)	(2.900)
post-conflict*	-0.039	-0.040		-0.039				
income inequality	(0.024)	(0.024)*		(0.024)				
predicted homicide rates			0.0.895					
from regression (3)			(0.501)*					
predicted homicide .rates				0.804				
from regression (8)				(0.489)				
post-conflict(6-10)*					-0.017			
democracy					(0.080)			
post-conflict(6-10)*						-0.024		
GDP per capita growth						(0.057)		
post-conflict(6-10)*							-26.167	
proportion of young men							(20.779)	
post-conflict(6-10)*								-0.120
ln GDP per capita								(0.440)
Observations	292	292	292	292	292	292	292	292
R^2	0.27	0.26	0.27	0.27	0.26	0.26	0.27	0.26

Notes: The natural logarithm of the homicide rate is the dependent variable. Estimation method for the first column is level-GMM, i.e. there are no controls for country specific effecs. The estimation method for all other columns is OLS. In the first column the t-statistics are shown in parentheses. For all the other columns robust standard errors are shown, * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 2: Determinants of Civil War

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
ln GDP per capita	-0.950	-0.918	-0.951	-0.886	-2.024	-1.469
	(0.245)***	(0.314)***	(0.247)***	(0.260)***	(0.813)**	(0.603)**
GDP per capita	-0.098	-0.066	-0.097	-0.096	0.191	0.179
growth t-1	(0.041)**	(0.054)	(0.042)**	(0.041)**	(0.171)	(0.131)
primary commodity	16.773	21.691	16.595	16.187	75.453	61.963
exports/GDP	(5.206)***	(7.689)***	(5.245)***	(5.195)***	(38.044)**	(25.452)**
primary commodity	-23.800	-37.145	-23.573	-23.072	-207.396	-167.369
exports/GDP^2	(10.040)**	(16.698)**	(10.055)**	(9.936)**	(122.378)*	(83.398)**
social	-0.000	-0.000	-0.000	-0.000	-0.001	-0.001
fractionalization	(0.000)***	(0.000)**	(0.000)***	(0.000)***	(0.000)*	(0.000)*
ethnic	0.480	0.470	0.476	0.496	-0.463	1.577
dominance	(0.328)	(0.396)	(0.328)	(0.328)	(0.884)	(0.755)**
peace	-0.004	-0.003	-0.004	-0.004	-0.005	-0.005
	(0.001)***	(0.001)**	(0.001)***	(0.001)***	(0.003)*	(0.002)**
ln population	0.510	0.595	0.500	0.486	0.730	0.826
	(0.128)***	(0.172)***	(0.134)***	(0.131)***	(0.502)	(0.379)**
geographic	-0.992	-1.986	-0.985	-1.099	-3.304	-3.886
concentration	(0.909)	(1.131)*	(0.914)	(0.918)	(2.894)	(2.082)*
income		0.012				
inequality		(0.020)				
proportion of			3.762			
young men			(17.924)			
democracy				-0.029		
				(0.052)		
ln homicides (t-1)					0.046	
					(0.414)	
postconflict *						-3.507
ln homicides						(4.445)
Observations	750	517	743	714	253	319
Pseudo R^2	0.22	0.18	0.22	0.22	0.44	0.40

Notes: Logit estimates of war starts. The dependent variable indicates whether a war started in a particular five year sub-period. Standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%.

Appendix

Table A1: Descriptive Statistics

Variable	*N*	*Mean*	*Standard Deviation*
war start (dummy)	750	0.069	0.254
homicides (per 100,000 pop)	319	6.999	10.827
GDP per capita (in const 1990 US $)	685	5672	8667
GDP per capita growth	684	1.50	3.37
Income Inequality (Gini coefficient)	517	41.35	10.21
secondary schooling of young men (gross enrolment rates)	688	44.49	30.97
proportion of young men in the population	743	0.129	0.012
democracy (index 1-10)	714	4.25	4.29
population (in millions)	750	30.6	111
primary commodity exports/GDP	750	0.155	0.140
ethnic dominance (dummy)	750	0.437	0.496
post-conflict (first five years) (dummy)	750	0.06	0.238
post-conflict (second five years) (dummy)	750	0.045	0.208
social fractionalization (index 0-10,000)	750	1813	1982
peace since the end of the civil war (months)	750	348	160
geographic concentration of the population (index 0-1)	750	0.6	0.21

Table A2: Homicide Rates for Selected Countries

Country	*Homicide Rates Average 1995-99*	*Estimated Number of Homicides in 1995*
Argentina	4.78	1,700
Bangladesh	2.51	3,000
Canada	4.65	1,400
China	2.10	25,000
Ethiopia	13.42	7,600
Mexico	13.51	12,400
Pakistan	7.31	9,500
Rwanda	43.39	2,800
Thailand	7.80	4,600
United Kingdom	3.82	2,240
Venezuela	14.16	3,100

Note: The estimated number of homicides in 1995 was obtained by applying the average homicide rate for 1995-99 to the total population measured in 1995.

Data Sources

Democracy
The degree of openness of democratic institutions is measured on a scale of zero (low) to ten (high). Source: http://www.cidcm.umd.edu/polity/index.html. The data are described in Jaggers and Gurr (1995).

Education
We measure education as the average years of schooling in the adult population aged 15 and over (source: Barro and Lee, 1996).

Ethnic dominance
Using the ethno-linguistic data from the original data source (Atlas Narodov Mira, 1964) we calculated an indicator of ethnic dominance. This variable takes the value of one if one single ethno-linguistic group makes up 45 to 90 percent of the total population and zero otherwise. We would like to thank Tomila Lankina for the translation of the original data source.

GDP per capita
We measure income as real PPP adjusted GDP per capita. The primary data set is the Penn World Tables 5.6 (Summers and Heston, 1991). Since the data are only available from 1960-92 we used the growth rates of real PPP adjusted GDP per capita data from the World Bank's World Development Indicators 1998 in order to obtain income data for the 1990s. These GDP per capita data were used to calculate the average annual growth rate over the previous five years. For Table 1 we used per capita income data in constant US dollars from the World Development Indicators 2003.

Geographic Concentration of the Population
We constructed a dispersion index of the population on a country by country basis. Based on population data for 400km^2 cells we generated a Gini coefficient of population dispersion for each country. A value of 0 indicates that the population is evenly distributed across the country and a value of 1 indicates that the total population is concentrated in one area. Data is available for 1990 and 1995. For years prior to 1990 we used the 1990 data. We would like to thank Uwe Deichman of the World Bank's Geographic Information System Unit for generating this data. He used the following data sources: Center for International Earth Science Information Network (CIESIN), Columbia University; International Food Policy Research Institute (IFPRI); and World Resources Institute (WRI). 2000. Gridded Population of the World (GPW), Version 2. Palisades, NY: IESIN, Columbia University. Available at http://sedac.ciesin.org/plue/gpw.

Homicides
Homicides are measured as homicide rates per 100,000 persons. Data for 1970-94 was obtained from FLL and we would like to thank the authors for their help with the data. We updated these homicide rates for 1995-99 using data from the World Health Organization, following the methodology as discussed in Begg and Tomijima (2001). We would like to thank Niels Tomijima for help with the data. Further observations were obtained from Interpol statistics.

Income Inequality
Inequality is measured by the Gini coefficient of income inequality (source: Deininger and Squire, 1996).

Peace Duration
This variable measures the length of the peace period (in months) since the end of the previous civil war. For countries which never experienced a civil war we measure the peace period since the end of World War II.

Population
Population measures the total population, the data source is the World Bank's World Development Indicators 1998.

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

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

The fractionalization indices range from zero to 100. A value of zero indicates that the society is completely homogenous whereas a value of 100 would characterize a completely heterogeneous society.

We calculated our social fractionalization index as the product of the ethno-linguistic fractionalization and the religious fractionalization index plus the ethno-linguistic or the religious fractionalization index, whichever is the greater. By adding either index we avoid classifying a country as homogenous (a value of zero) if the country is ethnically homogenous but religiously divers, or vice versa.

War Data
A civil war is defined as an internal conflict in which at least 1,000 battle related deaths (civilian and military) occurred per year. We use mainly the data collected by Singer and Small (1992) and according to their definitions (Small and Singer, 1984) we updated their data set for 1992-99.

References

Arellano, M. and S. Bond (1991). "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies* 58: 277-97.

Barro, R. J. (1991). 'Economic Growth in a Cross Section of Countries', *The Quarterly Journal of Economics*, 106, 407-43.

Barro, R. J. ed. (1997). *Determinants of Economic Growth*, MIT Press, Cambridge.

Barrett, D. B., ed. (1982). *World Christian Encyclopedia*, Oxford University Press, Oxford.

Begg, S. and N. Tomijima (2001). ' Global burden of injury inthe year 2000: an overview of methods' , mimeo. http://www.who.org

Collier, P. (1994). Demobilization and Insecurity: a Study in the Economics of the Transition from War to Peace," *Journal of International Development*, 6.

Collier, P. (2000). 'Rebellion as a Quasi-Criminal Activity', *Journal of Conflict Resolution*, 44, 839-53.

Collier, P., V. L. Elliot, H. Hegre, A. Hoeffler, M. Reynal-Querol and N. Sambanis (2003*). Breaking the Conflict Trap: Civil War and Development Policy*. Oxford, World Bank and Oxford University Press.

Collier, P. and A. Hoeffler (2004). ` Greed and Grievance in Civil War',*Oxford Economic Papers*, forthcoming.

Deininger, K. and L. Squire (1996). ' A New Data Set Measuring Income Inequality' , *World Bank Economic Review*, 10, 565-91.

Deininger, K. and L. Squire (1998). 'New Ways of Looking at Old Issues: Inequality and Growth', *Journal of Development Economics*, 57, 249-87.

Easterly, W. and R. Levine (1997). 'Africa's Growth Tragedy: Policies and Ethnic Divisions.' *Quarterly Journal of Economics*, 113, 203-49.

Esteban, J.-M. and D. Ray (1994). 'On the Measurement of Polarization.' *Econometrica*, 62, 819-51.

Esteban, J.-M. and D. Ray (1999). 'Conflict and Distribution', *Journal of Economic Theory*, 87, 379-415.

Fajnzylber, P., D. Lederman and N. Loayza (2002a). "What causes violent crime?" *European Economic Review* 46: 1323-1357.

Fajnzylber, P., D. Lederman, and N. Loayza (2002b). "Inequality and Violent Crime." *Journal of Law and Economics* 45: 1-40.

Grossman, H.I. (1991). `A General Equilibrium Model of Insurrections', *American Economic Review*, 81, 912-21.

Grossman, H.I. (1999). ' Kleptocracy and Revolutions' *Oxford Economic Papers*, 51, 267-283.

Hegre, H., T. Ellingsen, S. Gates, and N.-P. Gleditsch (2001). ' Toward a Democratic Civil Peace? Democracy, Political Change, and Civil War, 1816-1992' *American Political Science Review*, 95, 33-48.

Interpol (2004) International Crime Statistics. Data source. http://www.interpol.int.

Jaggers, K. and T. R. Gurr (1995). 'Tracking Democracy' s Third Wave with the Polity III Data', *Journal of Peace Research*, 32, 469-82.

Klare, M.T. (2001). *Natural Resource Wars: The New Landscape of Global Conflict*, Metropolitan Books, New York.

LaFree, G. (1999). ' A Summary and Review of Cross-National Comparative Studies of Homicide' , in M. Dwayne Smith and M.A. Zahn, eds, *Homicide – A Sourcebook of Social Research*. Sage, London.

Mauro, P. (1995). 'Corruption and Growth', *The Quarterly Journal of Economics*, 110, 681-712.

Neumayer, E. (2003). "Good Policy Can Lower Violent Crime: Evidence from a Cross National Panel of Homicide Rates, 1980-97." *Journal of Peace Research*, 40, 619-640.

Sachs, J. and A.M. Warner (2000). 'Natural Resource Abundance and Economic Growth'. In *Leading Issues in Economic Development*, 7th ed. G.M. Meier and J.E. Rauch, Oxford University Press, Oxford.

Singer, D. J. and M. Small (1994). *Correlates of War Project: International and Civil War Data, 1816-1992*. Inter-University Consortium for Political and Social Research, Ann Arbor, Michigan, data file.

Small, M. and J. D. Singer (1982). *Resort to Arms: International and Civil War, 1816-1980*, Sage, Beverly Hills.

Summers, R. and A. Heston (1991). ' The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950-1988' *The Quarterly Journal of Economics*, 99, 327-68.

USSR (1964). *Atlas Narodov Mira*, Department of Geodesy and Cartography of the State Geological Committee of the USSR. Moscow.

World Bank (various years). *World Development Indicators*, Washington DC, data file.

World Health Organization (2004) Burden of Disease Statistics, data source. http://www.who.org.