POLICY RESEARCH WORKING PAPER 4692

Political Violence and Economic Growth

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The World Bank
Development Research Group
Macroeconomics and Growth Team
August 2008

Policy Research Working Paper 4692

Abstract

This paper analyzes the economic growth impact of organized political violence. First, the authors articulate the theoretical underpinnings of the growth impact of political violence in a popular model of growth under uncertainty. The authors show that, under plausible assumptions regarding attitudes toward risk, the overall effects of organized political violence are likely to be much higher than its direct capital destruction impact. Second, using a quantitative model of violence that distinguishes between three levels of political violence (riots, coups, and civil war), the authors use predicted probabilities of aggregate violence and its three manifestations to identify their growth effects in an encompassing growth model. Panel regressions suggest that organized political violence, especially civil war, significantly lowers long-term economic growth. Moreover, unlike most previous studies, the authors also find ethnic fractionalization to have a negative and direct effect on growth, though its effect is substantially ameliorated by the institutions specific to a non-factional partial democracy. Third, the results show that Sub-Saharan Africa has been disproportionately impacted by civil war, which explains a substantial share of its economic decline, including the widening income gap relative to East Asia. Civil wars have also been costly for Sub-Saharan Africa. For the case of Sudan, a typical large African country experiencing a long-duration conflict, the cost of war amounts to $46 billion (in 2000 fixed prices), which is roughly double the country's current stock of external debt. Fourth, the authors suggest that to break free from its conflict-underdevelopment trap, Africa needs to better manage its ethnic diversity. The way to do this would be to develop inclusive, non-factional democracy. A democratic but factional polity would not work, and would be only marginally better than an authoritarian regime.

This paper—a product of the Growth and the Macroeconomics Team, Development Research Group—is part of a larger effort in the department to analyze the development impact of conflicts. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at ielbadawi@worldbank.org or bodeaana@msu.edu.

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This paper was presented at the Plenary Session of the African Economic Research Consortium (AERC) Bi-Annual Research Workshop: December 3, 2006, Nairobi, Kenya; the Annual Meeting of the Midwest Political Science Association Meeting, Chicago, April 12 – 15, 2007. We would like to thank, without implication, Luis Serven for his very helpful comments. The views expressed in this paper are not necessarily those of the World Bank, its Board of Directors or affiliated organizations. Ibrahim Elbadawi would like to acknowledge the able research support of Linda Kaltani and Gary Milante.

I. Introduction

Political violence kills human beings, destroys natural resources and wild life, and wipes out productive physical capital. Although such violence is itself endogenous to a range of complex factors, once ignited, it can become the direct cause of untold human suffering, loss of life as well as massive economic decline and political instability. There is a large body of literature documenting the direct impact of political violence, most notably civil wars. For example, out of 30 major conflicts recorded in 2000, there were 23 civil wars, of which ten were in Sub-Saharan Africa (SSA). These wars are estimated to have resulted in over four million deaths and have cost the countries in question more than $138 billion (in 1995 prices).[1] Battle-related deaths declined precipitously between 1942 and 2002, where nearly 700,000 people were killed in the wars of 1950 compared to 20,000 in 2002[2]. Still, the toll in terms of loss of human life is high, especially if we account for the multiple lives lost by the indirect causes of wars, such as disease and starvation. Moreover, between 1980 and 1992 the total number of displaced people as a result of wars was estimated to have risen from 16 million to more than 40 million. In terms of the regional distribution of political violence, the largest number of battle deaths were registered in East Asia, Southeast Asia and Oceania during the period up to the 1970s; then in the Middle East and North Africa, Central and South Asia and Sub-Saharan Africa in the 1980s; and by the turn of the 21st century, Sub-Saharan Africa has become the most violent region, accounting for more battle-related deaths than all other regions combined (Human Security Centre, 2005).

The evidence on the direct destructive impact of political violence on human, natural and physical capital is abundant. However, the overall, general equilibrium, development costs of political violence are, in fact, much larger. This is particularly true for long-drawn-out violence, such as civil wars; or short-duration but highly intense violence, such as riots or uprisings. In addition to its direct destructive effect, political violence undermines the micro-security of the individual as well as the macro-security of communities, nations and countries. Therefore, it can change behavior, preferences as well as institutions and public policy. For example, it has been argued that the increased mortality associated with violence tends to shorten agents' planning horizon, leading to much heavier than normal discounting

[1] Reported in Willett (2001), and based on estimates taken from the International Institute for Strategic Studies' report for 2000/2001: IISS (2000).

[2] This decline in the number of casualties is due to changing face of wars, from inter-state wars, fought by major armies, to intrastate insurgency-type wars.

of the future. Such preferences are associated with reduced savings, lower human capital accumulation and risky behavior (Lorentzen, McMillan and Wacziarg, 2006). Worse still, protracted violence, such as civil wars, could also reduce trust in society and push it into an opportunistic equilibrium, where professional standards and professional ethics suffer and the quality of public policy deteriorates (Collier, 1999). Translated at the macro-institutional level, the development course of many countries that experienced civil wars has been one of: short-circuited democratic process, including repeated interventions by the military; misallocation of physical and human resources towards military activities; disruption of the country's external political and economic relations; general failure to create and implement a long-term development vision; and diminished legitimacy of the state.

Our paper contributes to the literature by analyzing the impact of political violence on economic growth for a global sample of developing and developed countries. We use a concept of political violence that accounts for three types of unruly contestation of political power: riots; coups; and civil wars. This index is developed in Bodea and Elbadawi (2007), where we estimate a multinomial model of political violence that controls for economic variables, quality of political governance, social characteristics as well as proxies for the technology of violence. This work allows the construction of predicted probabilities of aggregate political violence and the three sub-components. The probability estimates are used in the current paper as instruments for the onset of political violence in an endogenous growth model, which we estimate by a dynamic panel GMM. The GMM regressions control for potential endogeniety, most notably that of political violence; account for country heterogeneity; and are robust to standard specification and diagnostic tests. Our results suggest that political violence, especially civil war, has a robust and negative effect on growth. The estimated overall, direct and indirect general equilibrium, growth effect is substantially larger than the direct capital depletion/destruction effect[3], normally attributed to onset of political violence. We also find ethnic fractionalization to have a negative direct effect on growth, in addition to its indirect effect through political violence and economic and political institutions. Moreover, we find that democracy has had a direct positive effect on growth, especially in ethnically fractionalized societies. Though our results have some similarity to earlier ones on the impact of civil war, we will argue, however, that they have much more profound implications than just corroborating the evidence from the received literature. They hold in an encompassing model that fully accounts for country

[3] Capital is broadly defined here to include physical, human as well as environmental capital.

heterogeneity and potential endogeneity. Moreover, unlike previous studies we control for the relevant types of democracy from the perspective of the developing countries which are usually short of fully fledged democracies, but mix democratic and authoritarian features, making them only partially democratic. We find that, relative to autocracies, only a non-factional as opposed to a fragmented partial democracy has a direct and independent positive growth effect.[4]

Section II articulates the theory behind the growth impact of political violence in a stylized one-country version of a recent two-country stochastic AK growth model developed by Abadie and Gardeazabal (2006). Abadie and Gardeazabal analyze the impact of terrorism in a global world economy. Our focus will be on deriving steady-state growth and discussing the theoretical conditions for a larger general equilibrium impact of political violence on growth, well beyond the direct capital destruction effect. Section III briefly describes the model of political violence and the predicted probabilities for three distinct types of violence - riots, coup d'etat and civil war. Section IV estimates a GMM dynamic growth model for 68 countries over six five-year non-overlapping periods during 1970-99. The sample is dominated by the developing world, which accounts for 52 countries, including 15 from SSA. Though the results of this analysis have global applicability, they also allow us to focus on SSA, which has recently become the most conflict-ridden region in the world. In this context, we contribute to the quest for understanding the genesis of Africa's development failures, especially the debate on the causes behind the underdevelopment of Africa relative to other regions. First, we simulate the contribution of the risk of civil war to the expanding income differential between SSA and East Asia (EA). Second, we use our empirical framework to estimate the cost of civil war for the case of Sudan. Section V concludes.

[4] See for example, Elbadawi and Ndung'u (2005) and Gyimah-Brempong and Corley (2005), who accounts for the hazard of civil war in an endogenous, albeit, less encompassing, growth models. Also see Collier (2000) and Easterly (2001 a, b) who analyze the growth impact of social fractionalization, and political and economic institutions; and Collier (1999), who estimates the growth effects of civil war, post-conflict and ethnic fractionalization in a long-run growth model that abstracts from short-run dynamics and persistent endogeniety.

II. Economic Growth and Political Violence: A Stylized Model

We analyze the impact of political violence on economic growth in a stylized growth model that assumes stochastic AK technology and accounts for the onset of political violence as innovations from a Poisson process, p(t), with parameter λ . The onset (arrival) of political violence is assumed to destroy a fraction δ $(0 \le \delta \le 1)$ of the economy's capital stock k(t). This model is a specialization of Abadie and Gardeazabal (2006) (hereafter AG) two-country model on "terrorism and the world economy". The AG model attempts to explain the large observed effects of terrorism on the economic performance of a country impacted by a terrorist event by accounting for its overall general equilibrium effect through the FDI channel in an open global economy. Instead, this paper uses a one-country version of the AG model to analyze the impact of political violence on growth. Specifically, we analyze the effect of the onset of political violence on the steady-state growth. However, we introduce two generalizations to the AG model with regard to the specifications of the AK technology and the lifetime discounted utility, where we allow the rate of capital accumulation as well as the rate of discount of future consumption to depend on the Poisson parameter of the onset of political violence.

The stochastic AK technology is given by:[5]

$$(1) \quad dy(t) = \underset{(-)}{\alpha(\lambda)} k(t)\ dt + \sigma_{\omega} k(t)\ dw(t)$$

Where y(t) is output, k(t) is aggregate capital stock (both physical and human) and w(t) is a Wiener process, whose innovations captures domestic productivity shocks. The negative dependence of α on the Poisson parameter suggests that a high probability of war onset reduces the efficiency of the economy (in terms of output growth for given level of stock of capital). Accounting for the *direct* impact of political violence, the return to capital is given by the jump-diffusion process (akin to the specification for the effect of terrorism in AG's model):

$$(2) \quad dR(t) = \frac{dy(t) - \delta\ k(t)\ dp(t)}{k(t)}$$

This expression implies that the equation of motion for capital accumulation can be written as:

[5] As noted by Abadie and Gardeazabal, this specification follows Obstfeld (1994) and Turnovsky (1997) and is justified by the findings of McGrattan (1998) and Li (2002), who show that long-run trends in investment and growth are consistent with the predictions of the AK model.

(3) $dk(t) = dR(t)\ \ k(t) - c(t) = \{\alpha(\lambda)dt + \sigma_{\omega} dw(t) - \delta\ dp(t)\}k(t) - c(t)\ \ dt$

Where c(t) is consumption.

Agents are assumed to derive instantaneous utility from consumption through a constant relative risk aversion utility:

(4) $u(c) = \dfrac{c^{1-\gamma} - 1}{1-\gamma}$, where, $\gamma = {-cu''(c)}\big/{u'(c)} > 0$, is the Arrow-Pratt measure of relative risk aversion; also note that at the limit for $\gamma = 1$, $u(c) = \ln c$.

Now agents choose c(t) to maximize lifetime discounted utility, subject to the law of motion governing capital accumulation:

(5) $Max\{\int_0^{\infty} e^{-\beta(\lambda)t}\ \dfrac{c(t)^{1-\gamma} - 1}{1-\gamma} dt\}$

s.t. $dk(t) = \{\alpha(\lambda)k(t) - c(t)\}dt + \sigma_{\omega} k(t)\ \ dw(t) - \delta\ k(t)\ \ dp(t)$,

$0 \le c(t) \le k(t),\ \ k(t) \ge 0,\ \ k(0) = k_0$

Where $\beta = \underset{(+)}{\beta(\lambda)}$ suggests that agents tend to assign lesser value to future consumption the higher the probability of war onset.

This is the one-country version of the problem analyzed by AG, which gives the following one-country version of the Hamilton-Jacobi-Bellman equation:

(6)

$$\beta(\lambda)V(k) = \underset{c}{Max}\{\frac{c^{1-\gamma} - 1}{1-\gamma} + \frac{\partial V(k)}{\partial k}(\alpha(\lambda)k - c) + \frac{1}{2}.\frac{\partial^2 V(k)}{\partial k^2}\sigma_{\omega}^2 k^2 + \lambda[V(k - \delta\ k) - V(k)]\};$$

for some function V(k).

This solves for the corresponding optimum consumption plan for the one-country model:

(7) $c(t) = \dfrac{1}{\gamma}\{\beta(\lambda) + \alpha(\lambda)[\gamma - 1] - \dfrac{1}{2}\gamma(\gamma - 1)\sigma_{\omega}^2 - \lambda[(1-\delta)^{1-\gamma} - 1]\}k(t)$

Substituting (7) in (3), we solve for the steady-state rate of growth of the economy:

(8) $\dfrac{dk(t)}{k(t)} = \dfrac{1}{\gamma}\{[\alpha(\lambda) - \beta(\lambda)] + \dfrac{1}{2}\gamma(\gamma - 1)\sigma_{\omega}^2 - \lambda[1 - (1-\delta)^{1-\gamma}]\}d(t) + \sigma_{\omega} dw(t) - \delta\ dp(t)$,

And the expected growth (g) and its variance follow:

(9) $E(\frac{dk(t)}{k(t)}) = g(t) = \frac{1}{\gamma}\{[\alpha(\lambda) - \beta(\lambda)] + \frac{1}{2}\gamma(\gamma - 1)\sigma_{\omega}^{2} - \lambda[(1 + \gamma\delta) - (1 - \delta)^{1-\gamma}]\}dt$, and,

(10) $Var(\frac{dk(t)}{k(t)}) == (\sigma_{\omega}^{2} + \lambda\delta^{2})dt$

Therefore, like any one-sided risk, the onset of political violence does not only reduce the level of growth but it would also increase its volatility. The latter effect is relatively straightforward, where growth volatility is linear in the probability of political violence (λ)[6] for a given level of capital stock depreciation (due to political violence: δ); and for a given level of the onset probability, the rate of capital stock depreciation has a positive and quadratic effect on growth volatility. On the other hand, the effect of political violence on growth is more nuanced and depends on the degree of the risk aversion parameter (γ) as well as the probability of political violence parameter λ:

(11) $\frac{\partial E(dk(t)/k(t))}{\partial\lambda} = -\frac{1}{\gamma}\{[\beta'(\lambda) - \alpha'(\lambda)] + (1 + \gamma\delta) - (1 - \delta)^{1-\gamma}\}dt$

Where $\beta'(\lambda) = \partial\beta / \partial\lambda > 0$, and $\alpha'(\lambda) = \partial\alpha / \partial\lambda < 0$.

As stylized as it may be, this model can account for the multiple negative effects of political violence on growth, especially those discussed in the civil war literature (Collier, 1999). First the model captures the destruction of capital effect, reflected by $-\frac{1}{\gamma}\{(1 + \gamma\delta) - (1 - \delta)^{1-\gamma}\}dt$ (the second term of equation 11). The sign of this effect depends on the risk aversion parameter γ, though it is likely to be negative for all plausible degrees of risk aversion (see simulations below). The model also accounts for the *disruption* and *diversion* channels, which reduces the economy's productivity. The breakdown of social order or the setback to civil liberties associated with political violence reduces the efficiency of service delivery and, therefore, disrupts the economy. Moreover, the realignment of political powers during political violence, say from law enforcement institutions to the army entails reallocation of resources in favor of the latter, which diverts resources away from the key institutions for the enforcement of property rights and micro-security. These two channels are accounted for in the model by the stochastic productivity term of equation 11: $-\frac{1}{\gamma}\alpha'(\lambda)dt < 0$. This channel has a uniformly negative effect on economic growth. Also,

[6] Strictly speaking, the growth volatility is linear in the intensity of political violence (λ), however, the probability of political violence is monotonic in the intensity parameter.

in response to political violence, including to its effect on mortality, agents are likely to heavily discount the future, which would lead to *dis-saving*. This effect is accounted for by the component of equation 11, associated with the consumers' future discount parameter: $-\frac{1}{\gamma}\beta'(\lambda)dt < 0$, which also has a uniformly negative effect on growth.[7]

So far, the model can be shown to account for four (the destruction, disruption, diversion and dis-saving effects) of five channels identified by Collier (1999). The final *portfolio-substitution* channel can also be discussed in the context of the model by heuristically invoking AG's two-country framework. Assume that k is the world capital stock in a two-economy model (domestic and foreign); and that a fraction θ of the capital stock is owned by residents of the domestic economy, which leaves the remaining fraction of $(1-\theta)$ for the residents of the foreign economy. Therefore, the stock of wealth owned by the residents of the domestic economy is given by:

(12) $k^d(t) = \theta\ k(t)$

And similarly for the foreign economy:

(13) $k^f(t) = (1-\theta)\ \ k(t)$

Now, by following AG, and assuming that the fraction of the world capital allocated to the domestic economy is given by $v = v(\lambda),\ \ v'(\lambda) < 0$, we have a measure of the net foreign asset position of the domestic economy given by the foreign holding of domestic capital $\{(1-\theta).v.k(t)\}$ minus the domestic holding of foreign capital $\{\theta.(1-v).k(t)\}$. The difference normalized by the amount of productive capital allocated to the domestic economy ($v.k(t)$), is a measure of the stock of net foreign investment (NFInvst):

(14) $NFInvst = 1 - \theta / v(\lambda)$

At the onset of political violence net foreign investment in the domestic economy is likely to be positive in the typical low-income conflict-affected country (i.e. $\theta < v$). However, as a result of the violence, v shrinks over time as investors (with low risk aversion)

[7] Lorentzen, McMillan and Wacziarg (2006), for example, argue that a high adult mortality rate, which is one form of depletion of the human capital stock associated with political violence, tends to shorten time horizons and increase the level of risky behavior which, among other things, reduces investment in physical and human capital and ultimately growth.

divest from the domestic economy in favor of the foreign economy (i.e. higher $\theta.(1-v).k(t)$ for domestic investors and lower $(1-\theta).v.k(t)$ for foreign investors). This is because, as a one-sided risk, political violence offers no trade-offs for investors since it does not only decrease the average return to investment but it also increases its variance.

II.1 Illustrative Simulations

To simplify matters for simulation purposes we specify the efficiency and future discount parameters as linear functions of the Poisson parameter: $\beta(\lambda) = \beta_{00} + \beta_0\lambda$, and $\alpha(\lambda) = \alpha_{00} - \alpha_0\lambda$. Hence we can rewrite equations 11 as follows:

(11') $$\frac{\partial E(dk(t)/k(t))}{\partial \lambda} = -\frac{1}{\gamma}\{(\alpha_0 + \beta_0) + (1+\gamma\delta) - (1-\delta)^{1-\gamma}\}dt$$

We assume that the *direct* impact of the onset of political violence causes an annual rate of depletion of capital stock of 1.0% (i.e. $\delta = 0.01$), which is likely to be associated with a civil war of medium to high intensity of violence[8]. Given further assumptions about the combined growth effects of the efficiency and future discount parameters ($\alpha_0 + \beta_0 = 0.0, 0.05, 0.125, 0.25$), the net marginal growth impact of the onset of civil war (equation 11' above) is simulated in Figure 1 for a wide range of values of the risk aversion parameter: $\gamma = 0.05, ..., 20$. Note that when the *disruption*, *diversion* and *dis-saving* channels are assumed to be inconsequential (i.e. $\alpha_0 + \beta_0 = 0.0$), the net growth effect depends crucially on the degree of risk aversion. This can be seen from differentiating equation (7) relative to δ:

(15) $$\frac{\partial\{c(t)/k(t)\}}{\partial\delta} = \frac{\lambda(1-\gamma)}{\gamma(1-\delta)^{\gamma}} = 0, \text{ if } \gamma = 1.0; <0, \text{ if } \gamma > 1.0; >0, \text{ if } \gamma < 1.0$$

The above equation lies behind the simulations in Figure 1, when only the capital stock depletion effect of political violence is accounted for. Under risk neutrality, agents will adjust their consumption just enough so that the consumption/capital ratio remains unchanged, which means that the full brunt of the depletion will be reflected in the growth rate. However, risk averse agents ($\gamma > 1.0$) would disproportionately reduce consumption

[8] This rate can be thought of as a mean of the range $\delta \in \{-0.005, -0.035\}$, which corresponds to about a one and a half standard deviation interval around the point estimate of -0.02 for the growth effect of civil war found by Collier (1999). A value of δ equal to -0.5% would reflect low intensity civil war or other forms of political violence, such as riots or coups; while a high negative value of -3.5% will be associated with civil wars of extremely high intensity of violence.

(relative to capital stock) at the steady state, which softens the blow (on growth) of the initial capital stock depletion. On the other hand, risk taking agents would reinforce the negative depletion effects by raising relative consumption at the steady state. Thus an initial capital stock depletion effect of 1% could lead to a negative marginal growth effect as high as 4% under low risk aversion ($\gamma = 0.25$) to a much lower effect at -0.1% under high risk aversion ($\gamma = 6.0$). When we account for the combined influences of the disruption, diversion and dis-saving channels the relationship between risk aversion and the net growth effect will be weaker depending on the extent of the indirect effects on growth. In this case we obtain more realistic simulations that accounts for the fuller growth effects of political violence. Even a combination of high degree of risk aversion and the modest assumptions about the above combined indirect effects (0.05, 0.125, 0.25), generates large net growth effects. The simulated effects are, respectively, -1.5, -3.4, -6.5% for $\gamma = 4.0$; and -1.0, -2.2, -4.3% for $\gamma = 6.0$. Using these simulations we can assess the appropriateness of the econometric estimates of the growth elasticity of civil war abstained in the econometric literature. For example: Assuming capital stock depletion rates of 1.0% per year, Collier's (1999, Table 1) point estimate of the growth elasticity of civil war (-2.2%), based on a pooled OLS regression is consistent with a combination of risk aversion and indirect growth effects of ($\gamma = 6.0, \alpha_0 + \beta_0 = 0.125$); Gyimah-Brempong and Corley's (2005, Table 5) estimate of -5.2%, based on a GMM dynamic panel, would approximately correspond to a risk aversion - indirect effect combination of (6, 0.25). According to the latter authors, OLS estimates, including fixed effects OLS, are likely to substantially understate the true net effect of civil war.

III. Political Violence: Causes and Predictions

Our main goal in this section is to derive the risk of political violence that is used in the economic growth regressions later on in the paper. We use the theoretical approach and estimations from Bodea and Elbadawi (2007) and we generate the overall risk of political violence as well as the risk for three distinct types of political violence: riots, coup d'etat and civil war. From the theoretical model in section II we expect that the onset of political violence reduces economic growth. However, we suspect that the size of the effects differs across types of political violence.

The academic literature on civil wars is extensive and it employs a variety of

approaches: macro studies, analyses of survey data and case studies. The dominant view from the recent empirical literature on the causes of civil war onset can be summarized as follows: A high risk of civil war is robustly associated with low and stagnating income, high dependence on natural resources and other insurgency promoting environmental and demographic factors - such as high and sparsely dispersed population or rough geographic terrain. On the other hand, factors associated with "grievance motives" – such as democracy, ethnic and religious fractionalization, ethnic dominance, ethnic and religions polarization - have been marginalized as causes of civil strife.

Bodea and Elbadawi (2007) reevaluate the effects of grievance factors on the occurrence of political violence. It also embeds the study of civil war in a more general analysis of varieties of violent contestation of political power within the borders of the state. Empirically, other possible manifestations of irregular and violent contestation of political power are coups and riots. Bodea and Elbadawi (2007) use a multinomial logit specification, in which the manifestations of violence range from lower intensity armed violence to coups and civil wars. If civil war is just one of the alternative expressions of violent contestation of political power, a multinomial model is more appropriate than the use of logit or probit models. Also, a multinomial framework is more appropriate than a bivariate model of domestic conflict (civil war, coups and armed violence lumped together) because it recognizes that different forms of conflict may have different determinants (Reagan and Norton, 2005; O'Brien, 2002). To investigate the determinants of conflict, Bodea and Elbadawi (2007) estimate a family of encompassing multinomial regressions using a global database from 1950-1999, accounting for three types of domestic violence (civil wars, coups and other violent outcomes) as well as a host of "grievance" and "opportunity" variables commonly analyzed in the recent empirical literature.[9]

Social characteristics and political institutions play a large role both in explaining political violence (Bodea and Elbadawi, 2007) and as well as when we estimate the determinants of economic growth later on in this paper. Therefore, we go on and describe them in greater detail. We use the typology of democracy put forward by Goldstone et al. (2005) in their study of political instability. Specifically, we follow Goldstone et al. and rely on two underlying component variables of the Polity IV score: The measure of executive recruitment (exrec) and the competitiveness of political participation (parcomp) (Appendix

[9] We control for the following variables: Lagged log of GDP/capita (*lgdpenl*); Log of lagged population (*lpopl1*); Political instability (*instab*); Countries that are oil exporters (*oil*) and are geographically mountainous (*lnmtn*).

Figure A3).[10] A combination of these two components has the best predictive ability in the Goldstone et al. study and, moreover, reflects the degree to which the political system allows societal actors to translate their preferences into policy with the help of peaceful mechanisms such as voting and elections. The upshot is that meaningful elections will decrease the appeal of violent means of political contestation.

Further, we use several measures from Fearon and Laitin (2003) to capture the degree of fractionalization of societies - ethnic (*ef*), religious (*relfrac*), and linguistic (*numlang*) – as well as Reynal-Querol's index of language fractionalization (*Qlf*). Collier and Hoeffler (2004 a) find that ethnic dominance increases the chances of civil war and we employ two measures of ethnic and religious dominance (dummy variables that take the value of 1 if the largest ethnic / religious group is between 45 and 90 percent of the population). For the purposes of creating instruments for the different types of organized political violence we use the partition of social fractionalization along ethnic and language lines, which were the strongest predictors of civil war onset.[11]

The results from the multinomial model of organized political violence are shown in Table 1. The results are largely consistent with theoretical expectations: Low income countries are more likely to experience coups and civil wars (insignificant income coefficient for riots). Oil rich countries are more prone to have civil wars; compared with autocracies, full democracy reduces the chance that contestation of political power will involve violent means (negative and significant democracy coefficients for our three outcomes - riots, coups, and civil wars). Of the hybrid, anocratic regimes – partial democracies and partial autocracies - only partial democracies that develop factional politics increases the risk for all three of our violent outcomes, while partial autocracies increase the risk of riots and coups, but not the risk of civil war. The reference category for social fractionalization variables is our cross-cutting category that is countries with moderately high ethnic and language fractionalization. The results show that social fractionalization increases the likelihood of war onset: when compared to moderately divided countries, homogenous societies have a lower risk of civil war onset and extremely divided societies have a higher risk.

[10] See Polity IV data at: http://www.systemicpeace.org/polity/polity4.htm

[11] From our typology the following are diverse countries: Angola, Burkina Faso, Cameroon, Central African Republic, Chad, Ethiopia, Gabon, Gambia, Ghana, Guinea-Bissau, Ivory Coast, Indonesia, Kenya, Lebanon, Liberia, Malawi, Mali, Mozambique, Namibia, Nigeria, Senegal, Sierra-Leone, Sudan, South Africa, Papua New Guinea, Tanzania, Uganda, Togo, Zambia. Homogenous societies: Albania, Armenia, Denmark, Egypt, Greece, Honduras, Hungary, Ireland, Italy, Jamaica, Japan, South Korea, Libya, Norway, Poland, Portugal, Tunisia.

We use the model in Table 1 to predict the probabilities of violent outcome from riots, to coups and civil war. Table 2 shows the average predicted probabilities for each of the three violent outcomes against the actual outcomes. Given the notorious difficulty in predicting war outcomes, our model is doing a relatively good job predicting organized political violence: The average predicted probability across outcomes is twice as large when an actual event occurred. For example, the average probability of a riot happening is 0.33 for the cases when an actual riot did occur and 0.16 when there were no riots. Also, our model gives an average of 5% chances for the onset of civil war for the cases when a war actually starts that particular year, and 2% chances otherwise. Table 3 goes on to show the average predicted probabilities for the three violent outcomes for the specific geographical regions. Note that in our sample Sub-Saharan Africa has the largest average probability that a civil war would occur over the period 1950 to 1999 – approximately 3.8%. Asia minus Japan comes in second with an average probability of war onset of 2.9%. Further, Figure 2 shows the relative density of the predicted probabilities of war onset in the countries in our sample for the period 1950 to 1999. We show the densities separately for Sub-Saharan Africa and the rest of the developing world, for the whole duration of the sample and respectively for the most recently available period, the 1990s. For the whole period – 1950 to 1999 – the Sub-Saharan Africa density distribution is fat on the tail, with a fair amount of country years facing a probability of civil war onset larger than 5%. The rest of the developing world, however, sees much fewer country years with a risk of civil war onset larger then 5%. The difference between Sub-Saharan Africa and the rest of the developing world is even more striking in the most recent period available. In the 1990s in the developing world without Sub-Saharan Africa, most country years see a risk of civil war smaller than 6%, and all country years face less then 10% risk of war. Sub-Saharan Africa, on the other hand has a significant amount of country years with risk of civil war higher than 6%, and the region sees a risk of war as high as 30% in the 1990s.[12]

[12] The Sub-Saharan Africa countries which in the 1990s have a risk of civil war close to 30% are Liberia, Ethiopia, Senegal, Congo, Somalia and Gambia.

IV. Economic Growth and Political Violence: The Evidence

The model in section II suggests that the onset of political violence reduces economic growth and increases its volatility.[13] However, the received literature on civil war and other political violence also suggests that economic factors, including economic growth and income per capita, determines the opportunity costs of peace as well as the ability of the state to quell a potential challenge to its authority. Moreover, the some of the recent empirical literature suggests that these economic factors are robust determinants of the hazard of violent political conflicts.[14] Furthermore, economic outcomes (growth and income per capita) associated with political violence are themselves endogenous to the economic and political institutions that govern the organization of the political processes and economic activities in a society. In turn, the prevailing economic and political institutions are influenced and shaped by deeper societal and geography characteristics.[15]

Most empirical evidence on the relationship between institutions and ethnic fractionalization appears to support the view that social fractionalization, especially ethnic fractionalization, constitutes a challenge for the emergence of development-oriented institutions and is, therefore, associated with a bad policy environment. For example, Easterly and Levine (1997) establish that ethnic diversity leads to bad policy, which, in turn, decelerates growth, both effects being quite powerful. Indeed, they suggest that much of Africa's slow growth is attributable to its ethnic diversity. Ethnic diversity has also been shown to contribute to government dysfunction in several areas of economic policies, both in developed and in developing countries alike. For example, local or central governments in ethnically diverse societies tend to under-spend on public goods and education (Alesina, Baqir and Easterly, 1999; Goldin and Katz, 1999); produce low quality of services (Mauro, 1995; La Porta, 1999); generate greater political instability (Mauro, 1995; Annett, 1999); or misuse foreign aid and divert it into corruption (Svensson, 2000).[16] Africa specific literature, based on survey data, also finds evidence of dysfunction in government and civil society organizations. For example, Collier and Garg (1999) find that employment in the public

[13] The analysis of the impact of political violence on growth volatility is beyond the scope of this paper.
[14] See, for example, Sambanis (2004) for a comprehensive review of the empirical evidence on the determinants of civil war; and Bodea and Elbadawi (2007) on the determinants of riots, coups and civil wars in a multinomial model of political violence.
[15] There is recently an active debate on the "deep" determinants of growth and income disparities across nations and sub-national regions (for a review of the debates, see, for example, Easterly and Levine, 2003, Rodrik, Subramanian and Trebbi, 2004, and Elbadawi, 2005).
[16] See Easterly (2001a, b) and Collier (2000) for more detailed review of this literature.

sector in ethnically diverse Ghana was determined by patronage, not merit. Also Michael (1999) provides one more example from western Kenya, where he finds primary schools in ethnically diverse districts to be sharply under-funded.

There is also equally robust empirical support for the view that geography could affect development *indirectly* through institutions.[17] There are different views on how geography shapes institutions. The "location" view, for example, credits the emergence of modern coastal city states in southern Europe to the easy access to maritime trade, which led to an unprecedented expansion of merchant class, ship-builders and other associated service communities that depended on transnational trade. This emerging social class had, in turn, acted as a formidable agent pushing for the type of institutions required for expansion of trade and wealth creation. There is also the "Crop" theory of institutions (Engerman and Sokoloff, 1997; Sokoloff and Engerman, 2000), which argues that in countries where physical environments are more conducive to plantation-based agriculture, less egalitarian and less inclusive institutions developed. On the other hand, the "Germs" theory of institutions (Acemoglu, Johnson, and Robinson, 2001, 2002) is built on the observation that in colonies with an inhospitable germ environment (as measured by the mortality rate of European colonialists), colonial authorities established "extractive" institutions. European colonialists tended to settle and, therefore, establish settler-class institutions in more hospitable germ environments. The survey of this recent literature shows a large body of work corroborating the *indirect* role of social characteristics and geography on growth and political violence, channeled through the effects of political and economic institutions and their outcomes.

In addition, recent growth theory and rational choice models of political conflicts emphasize a *direct* effect as well. Yet, while the indirect effects of variables such as ethnic (or religious) fractionalization or landlockedness and tropical climate were found to be robustly associated with economic policy and institutions, the empirical evidence on their direct effect remains mixed.[18] Similarly, and despite strong theoretical arguments *directly* linking societal characteristics (such as ethnic fractionalizations and polarization) and geography

[17] See for example, Rodrik et al (2004), and Easterly and Levine (2003).

[18] Most evidence suggests that institutions have direct effects on income, while geography doesn't (Acemoglu, Johnson, and Robinson, 2001; Easterly and Levine, 2003; Rodrik et al, 2004). On the other hand, Sachs (2003) and more recently Carstensen and Gundlach (2006) show that malaria transmission, which is strongly affected by ecological conditions, directly affects the level of per capita income after controlling for the quality of institutions.

(mountainous terrain or forests) to political violence, relatively limited robust association was found in the data.[19]

Identifying the true effect of political violence on economic growth requires controlling for the feedback effects from growth to political violence and vice versa as well as accounting for the common factors jointly determining these two vital development outcomes. Such factors must include economic and political institutions directly affecting the two outcomes as well as the social and geography characteristics that might be driving institutional outcomes. The societal and geography characteristics should not be treated as excluded (external) instruments because, despite the limited empirical evidence, there are also strong theoretical arguments for their having direct effects on growth and political violence. To fix the issues, we develop our empirical estimations around the following structural model:

(16) $p(t) = p(p_{t-1}, g_{t-1}, y_{t-1}, Polity_{t-1}, Social, WarfareTech)$

(17) $g(t) = g(p_t, y_{t-1}, Econ_t, Polity_t, Social)$

Where, p is the probability of the onset of political violence, which is a non-linear function of economic growth: g; income per capita: y; political institutions: Polity; and the time-invariant social characteristics (Social) and the warfare technology (WarefareTech), which accounts for the land area of mountainous terrain. Economic growth, in turn, linearly depends on the probability of political violence; convergence effect (lagged per capita income); a range of economic and policy institutions; and similar sets of social and political variables to those of the violence equation. Except for the time-invariant Social and WarfareTech, all other regressors in equations 16 and 17 are presumed to be endogenous, most notably p and g. Our estimation strategy is a sequential one, which allows us to first estimate the risk of political violence, given initial growth and per capita income; then the growth equation can focus on analyzing the direct effects on growth of essentially all the controls that are likely to jointly influence conflicts and growth as well as their indirect effect on growth channeled through the predicted hazard of political violence. However, we

[19] For example, two of the most widely quoted studies on the causes of civil war (Collier and Hoeffler, 2004a; and Fearon and Laitin, 2003) fail to find robust association between civil wars and social fractionalization. However, Sambanis (2004), who develops and uses a more comprehensive and better validated civil war onset dataset, finds that social fractionalization are more robustly associated with civil wars. Moreover, Bodea and Elbadawi (2006) estimate a multinomial model of violence (civil wars, riots/uprisings, coups) and find that social fractionalization has had a robust negative and monotonic effect on civil war; and is positively but non-monotonically associated with coups.

would still need to identify both equations. To do this, we hypothesize that some of the lagged conflicts variables in the multinomial political violence regression (Table 1), such as the incidence of riots in the past five years, are likely to affect expectations about future riots or other forms of political violence but are not likely to have a direct effect on growth. This should identify the growth regressions (Table 4). On the other hand, some economic and institutional variables in the growth regressions, such as trade openness or inflation, are not likely to have a direct impact of the hazard of political violence. This should identify the multinomial regressions of political violence.

Focusing on the growth regression, we note that most of the received literature attempts to identify the growth effect of civil war onset by using one period lags of all the potentially endogenous right-hand side variables, most notably the indicator variable of civil war onset.[20] This could be a useful strategy in minimizing the number of variables to be instrumented. However, the validity of this simpler approach hinges on a more restrictive assumption about the temporal endogeneity of political violence and the other endogenous right hand side variables. Instead, we adopt a two stage process for identifying the reduced form growth model derived from the above structural equations. First, we use the multinomial model of section III to predict the probability of political violence, $\hat{p}$.[21] Second, by using the predicted probability in equation 17 we have a standard linear growth model, which allows us to exploit dynamic panel regressions to account for potential endogeneity of lagged income and other explanatory variables as well as control for country-invariant period-specific effects and unobservable country-specific heterogeneity. Moreover, the models estimated in this literature also permit the latter to be correlated with lagged income and other endogenous explanatory variables.[22]

We, therefore, posit the following reduced form growth model, which also accounts for some non-linear interaction effects between social and political factors:

[20] Two exceptions are Brempong and Corley (2005), who estimate a dynamic GMM panel growth regression and instrument for the incidence of civil war by its predicted probability; and Elbadawi and Ndung'u (2005), who estimates a structural model centered on growth and the risk of civil war, using a variety of estimation techniques, including FIML.

[21] The two step estimation is dictated by our preference for the multinomial model to the linear probability estimation of political violence because the former is theoretically and empirically more appropriate than even the partial logit/probit models (Bodea and Elbadawi, 2007).

[22] See for example, Loayza and Soto (2002) and Loayza, Fajnzylber and Calderon (2005).

$$g_{it} = \varphi_0 + \varphi_1 \hat{p}_{it} + \varphi_2 Social_i + \varphi_3 Polity_{it} + \varphi_4 Social_i * Polity_{it}$$
$$+\varphi_5 Controls_{it} + \mu_t + \eta_i + \varepsilon_{it} \quad (18)$$

where *i* and *t* are country and time indexes, respectively; Controls is a vector of standard control variables that are robustly associated with cross-country growth (initial per capita GDP, initial GDP cyclical component, inflation, government expenditure as a share of GDP, human capital investment, a rule of law index, and a measure of trade openness); and, μ_t, η_i and ε_{it} are, respectively, time and country fixed-effects and a random disturbance term.

We estimate equation 18 by a Generalized Method of Moments (GMM) dynamic panel estimator using a panel of 68 countries, including 15 from SSA and 37 from other developing regions, over six 5-year non-overlapping averages spanning the period 1970 until 1999 (Table A.2 of the Appendix contains the list of countries and period coverage). The system GMM (developed in Arellano and Bover, 1995 and Blundell and Bond, 1997) implemented here, uses lagged values of the dependent and independent variables as instrument (called 'internal instruments') and combines regressions in differences with the regressions in levels to better address the issue of weak instrumentation often attributed to the older, difference estimator. Under the assumed moment conditions, the system GMM accounts for the combined problems of endogeneity and unobserved country effects. The consistency of the GMM system estimator is assessed by two specification tests. The Sargan test of overidentifying restrictions tests the overall validity of the instruments. Failure to reject the null hypothesis gives support to the model. The second test examines the null hypothesis that the error term is not serially correlated. Again, failure to reject the null hypothesis gives support to the model. Rejecting the null hypothesis would imply that the instruments are inappropriate and would call for higher-order lags of the variables to be used as instruments.

The regression results along with the Sargan and the serial-correlation tests are reported in Table 4. All six regressions in the table include the standard control variables, normally estimated in growth regressions. In general, all standard growth fundamentals have the expected sign and are statistically significant. Moreover, both the Sargan and the serial-correlation tests validate our specification. In addition to standard control variables, regression 1 also accounts for the probability of aggregate political violence; while in regression 2 the aggregate probability of violence is replaced by the probability estimates of

the three sub-components: riots/uprising, coups, and civil war. Regression 3 embeds regression 1 by further accounting for ethnic fractionalization as well; and similarly regression 4 embeds regression 2. Finally, regressions 5 and 6, respectively, embed regressions 3 and 4 by also controlling for democracy, as a measure of the quality of political institutions, as well as the interactions between democracy and ethnic fractionalization.

The results of regressions 1, 3 & 5 show that aggregate political violence is negatively and robustly associated with growth. Moreover, its influence gets stronger, both in terms of statistical significance and the magnitude of the estimated coefficient, the more encompassing the regression becomes. Nevertheless, the estimates are still comparable, as they range form -0.016 for regression 1 to -0.025 for regression 5. However, regressions 2, 4 & 6 reveal that the growth effect of political violence tends to vary across manifestation of violence. While, surprisingly, coups were not found to have an impact on growth; both of riots/uprising and civil wars were robustly and negatively associated with growth. One possible interpretation of this result is that coups are likely to be manifestations of establishmentarian power struggles within the ruling elites, and are, therefore, not likely to entail major paradigm shifts in the social contract. However, even if we assume that most coups are of this nature, they are likely to have grave consequences for growth[23]. Therefore, we think that coups should have a negative and significant growth effect but was not explicable in our regressions, perhaps due to the high temporal dependence between coups and the legacy of civil wars and riots/uprisings (Bodea and Elbadawi, 2007)[24]. Turning to the other two types of political violence, we find that the estimated coefficient of civil war was large, ranging between -0.24 for regression 6 to -0.39 for regression 4. On the other hand, the corresponding coefficient for riots/uprisings was much smaller, hovering around 0.02 for regressions 2 and 6.[25]

Probing further into the results of regression 6, we briefly analyze the growth deceleration effect of one standard deviation shocks to the hazards of civil war and riots (Figure 3). For the whole sample (and the developing world outside SSA), one standard

[23] For example, coups derail nascent democracies, thereby, setting back transparency and rule of law. More recently, unconstitutional change of political regimes, such as coups, might invite economic and political sanctions.

[24] Moreover, the contemporaneous correlation between civil wars and coups is also quite high (at 0.56). An alternative explanation for the insignificant effect of coup probability is that coups are followed by regimes that differ widely in the appeal they make to private investors (Duggan 2007). Thus, investors may behave differently depending on their expectation about the likelihood of coup success, potential involvement of a major capitalist power and the regime that would follow a coup. At this stage we do not differentiate coups according to the political regime that is likely to follow, and the consequence our treatment may be the indeterminacy of the findings with respect to the threat of coups.

[25] For regression 4, riots/uprising was only marginally significant (at higher than 10% significant level).

deviation shock to civil war decelerates the rate of per capita growth by 0.48%, which is almost 1.5 times the effect due to riots. For SSA, however, civil war was much more damaging, where a similar shock would reduce the rate of growth by 0.72, compared to 0.28% for riots. As expected, civil war was not a concern for OECD countries, where a shock to the hazard of riots leads to growth deceleration of 0.34%, while the growth effect of civil wars was inconsequential at -0.07%. An alternative articulation of the growth effects of civil war and riots would be to analyze their growth elasticities, which allows discussion of the rate of change in the growth rates rather than the absolute change (given by the deceleration in the rate of growth due to a given shock). The elasticities, which depend on the average rates of growth and the average predicted probabilities[26], reveal a much stronger contrast between SSA and the rest of the developing world (Table 5). For example, the long-run (whole period) average growth elasticity of civil war is estimated at more than -6.0 for SSA[27], compared to -0.32 for the rest of the developing world and only -0.03 for OECD. On the other hand, decadal average elasticities are significantly smaller for SSA and are comparable to other developing regions, especially in the 1980s decade. However, while the elasticity declined from more than -1.0 in the 1980s to -0.2 in the 1990s for other developing regions, it was -1.3 or less during the two decades for SSA. To a lesser extent, a similar story could be told about the elasticity of riots across regions. The long-run (period average) elasticity is again much higher for SSA (at -2.4) compared to other developing regions and OECD (at -0.3 and -0.2, respectively). However, as for the case of civil war, the decadal average elasticites are more comparable across regions.

Interpreting the divergent elasticity estimates for SSA and the rest of the developing world in the context of the model simulations of Figure 1 would suggest that these estimates cannot be assigned to a unique combination of risk aversion and indirect effects of the disruption, diversion and dissaving channels. However, the high whole period estimates for SSA (of about -6.0) would correspond to a combination of risk neutral to risk taking behavior and low net indirect effects {e.g. $(\gamma, \alpha_0 + \beta_0) =$ (0.15, 0.0) & (1.0, 0.05)} or moderate risk aversion but high indirect effects {e.g. (2.0, 0.125) & (4.0, 0.25). On the other

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[26] The civil war elasticity is given by $e_{cw} = \hat{\beta}_{cw} . \frac{\overline{p}_{cw}}{|\overline{g}|}$, where $\hat{\beta}_{cw}$ (negative) is the estimated coefficient of the hazard of civil war in the growth regression; $|\overline{g}|$ is the absolute value of the mean growth rate; and $\overline{p}_{cw}$ is the mean of the predicted probability of civil war. The same formula applies for the case of riots.

[27] The long-run elasticity for SSA is so high because, despite its relatively high hazard of conflict, long-term growth in SSA is extremely low, which makes the growth/hazard ratio very high (see the above footnote).

hand, the low estimates for the rest of the developing countries (-0.32) would correspond to a combination of moderate to high risk aversion and low indirect effects {e.g. (3.0, 0.0) & (15.0, 0.05). If we assume that agents in and outside Africa tend to display identical and moderate risk aversion, the division between Africa and other developing regions would suggest that African wars are likely to have a more devastating impact on already relatively weak state institutions, thus, perhaps, disproportionately degrading the quality of public policy and services as well as precipitating stronger reaction by individual agents. That is to say, for a given degree of risk aversion and direct asset depletion impact due to wars, the combined net effects of the disruption, diversion and dissaving channels tend to be stronger for the case of African wars.

Finally we discuss the results for ethnic fractionalization and democracy. According to regressions 3 and 4, ethnic fractionalization was not found to be significant in either regression. However, in the more encompassing regressions 5 & 6, which also accounts for democracy, it was negatively and significantly associated with growth. Following Bodea and Elbadawi (2007), we disaggregate the Polity index into full democracy, partial factional democracy and partial non-factional democracy, in addition to the other sub-indexes of autocracy and transitional/interregnum democracy. The effect of democracy is estimated relative to the latter two sub-indexes, which are excluded from the regression. Moreover, the full democracy index is dominated by the OECD countries, for which the score was essentially at its maximum level for most of the estimation period. Hence, this index is observationally equivalent to an OECD dummy and was, therefore, also dropped from the regressions.

The results also suggest that, relative to autocracy and transitional-interregnum polity, partial factional democracy, as expected, does not have a direct linear effect on growth (regression 5 & 6). On the other hand, partial but non-factional democracy was positively and highly significantly associated with growth in the disaggregated-political violence model (regression 6). [28] Moreover, the interaction between partial democracy (both factional and non-factional) and ethnic fractionalization was positively and highly significantly associated with growth in the aggregate-political violence model (regression 5). However, in the more encompassing disaggregated-political violence model, the partial democracy-ethnic fractionalization interaction has no growth effect for the case of factional

[28] The exclusion of the "full democracy" sub-index is not likely to be consequential for this discussion, because only partial democracy matters for the developing world, as "full democracy" is not realistically within the feasible range for most of these countries.

partial democracy (regression 6). The magnitudes of these effects are quite large. For example, controlling for aggregate political violence and ethnic fractionalization (regression 5), partial democracy (both factional and non-factional) reduces the negative growth effect of ethnic fractionalization by half (from 2 to 1%). Moreover, in the disaggregated-political violence model (regression 6), non-factional partial democracy reduces the ethnic fractionalization effect by a comparable margin from -1.5 to -1.0%. The results of regression 6 also suggest that the growth effects of democracy are larger in socially fractionalized societies, with the positive marginal growth effect of democracy rising from 2 to 3%. These results strongly corroborate the strand of the growth literature that suggests that, once the rules of the political game in which the inter-ethnic contest is fought or the underlining institutions that mediate the effect of social diversity are accounted for, ethnic fractionalization does not have an independent growth retarding effect or that its effect is substantially reduced[29].

IV.1 Simulating the Impact of Civil War

The quest for understanding the disappointing performance of SSA relative to other developing regions, most notably the East Asian frontier performers, has led many researchers to use cross-country growth regressions to assess the relative importance of a variety of growth determinants in explaining the expanding EA-SSA per capita income (and growth) differentials. While acknowledging that, like the cross-country growth regression technique itself, such quantification entails possibly implausible assumptions[30]; we argue, however, that it is still a useful benchmark, especially if the underlining regressions attempt to control for endogeneity and country heterogeneity, as we claim our GMM dynamic panel model does. In assessing the development impact of civil war for SSA, we analyze its contribution to the expanding income per capita gap in favor of EA. As the above analysis

[29] For example, the results of Collier (1998, 2000) suggest that full democracy completely remove the growth drawbacks otherwise associated with ethnic diversity; while Easterly (2001a,b) finds that good quality institutions significantly mitigate the negative effects of ethnic diversity on overall growth as well as on a wide range of macroeconomic polices. Moreover, Rodrik (1999) finds that high quality economic or political institutions tend to mitigate the influence of ethnic diversity on persistence of growth following external shocks. Finally, based on his econometric results Elbadawi (2002) argues that Africa's ethnic diversity (if taken as the main component of social divisions in African societies) has no independent deleterious effect on long-term growth once the combined influences due to the lack of functioning democratic institutions and the geographic fractionalization of African societies are accounted for.

[30] See, for example, Durlauf (2002), who argues that estimated coefficients in growth regressions do not necessarily provide a valid framework for evaluation of alternative policy trajectories (which, in our case, would include the counterfactual scenario of no civil war). Instead, he proposed an alternative interpretation of growth regression based on Bayesian averaging techniques, accounting for the payoff function of the policy maker and model uncertainty regarding the subsets of the growth fundamentals and forms of country heterogeneity that are most relevant for the analysis at hand.

makes clear, compared to other developing regions, civil war has been a major drag on Africa's growth: a one standard deviation shock to the hazard of civil war decelerates growth in SSA by 1.5 times its effect in other developing regions. Though the median duration of African civil wars is comparable, if not shorter, than in other regions, SSA has, nevertheless, experienced several very long wars.[31] These particular wars, therefore, are likely to have been very costly--in terms of forgone output relative to the counterfactual of no civil war--in an already very poor region. We address this issue as well by analyzing the costs of the Sudanese civil war, which was one of the longest civil wars in Africa (1983-2002). This war ended in 2002 as a result of a cease-fire brokered by regional and international mediators, which eventually led to the signing of a full-fledged peace agreement in 2005.

We write the growth outcome in regression 6 of Table 4 in the following generic form:

$$(19)\ g_t = -\hat{\beta}_{cw}\hat{p}_t^{cw} - \hat{\beta}_r\hat{p}_t^{r} - \hat{\beta}_1 \log y_{t-1} + \hat{\beta}' F_t ,$$

where t= 0,…, T; and $g_t, y_t, p_t^{cw}, p_t^{r}, F_t$, respectively, denote annual per capita GDP growth, per capita income, predicted probabilities of civil war and riots, and all other determinants of g except for violence and $\log y_{t-1}$. By simple recursive substitution, the above equation can be solved out for the following expression of $\log y_t$:

$$(20)\ \log y_t = -\hat{\beta}_{cw}\sum_{j=0}^{t-1}(1-\hat{\beta}_1)^j\,\hat{p}_{t-j}^{cw} - \hat{\beta}_r\sum_{j=0}^{t-1}(1-\hat{\beta}_1)^j\,\hat{p}_{t-j}^{r} + \sum_{j=0}^{t-1}(1-\hat{\beta}_1)^j\,\hat{\beta}' F_{t-j} + (1-\hat{\beta}_1)^t \log y_0$$

East Asia-Africa income differential

Assuming that EA and SSA have the same risk of riots and similar sets of standard growth fundamentals, we can use equation 20 and write the income ratio between the two regions in the following two equations:

$$(21)\quad Z_0 = \frac{y_0^{EA}}{y_0^{SSA}} \text{ , for t=0, and}$$

[31] See, for example, Elbadawi and Sambanis (2000).

$$(22)\quad \log Z_t = -\hat{\beta}_{cw}\sum_{j=0}^{t-1}(1-\hat{\beta}_1)^j(\hat{p}_{cwt-j}^{EA} - \hat{p}_{cwt-j}^{SSA}) + (1-\hat{\beta}_1)^t \log\frac{y_0^{EA}}{y_0^{SSA}}$$

For t=1,…, T. Note that, under the above assumptions, the growth differential is accounted for by the civil war effect and the mechanical convergence term only. This simulation allows us to compute the marginal contribution of civil war to the EA-SSA income differential. Taking 1970-74 to be the initial period (t=0), we note that average GDP per capita for EA in this period was about three times the average income in SSA, which is already very high compared to the latter. However, as a result of vastly superior and sustained growth, the East Asian per capita income reached almost 4 times that of the SSA in 1999. Therefore, we ask the question as to how much has civil war contributed to this wide and expanding income gap between the two regions. Our estimates suggest that up to the second half of the 1980s, EA was assessed as the riskier region. Therefore, the war effect contributed, albeit marginally, to the narrowing of the gap between the two regions. However, by the turn of the 1990s, especially toward the end of the decade into the new century, SSA emerged as the substantially riskier region and the growth impact of civil war started to make an increasingly large contribution to the expanding income gap (Figure 4). For example, the contribution of civil war to the EA-SSA income differential precipitously rose from 3.5% in 1990 to 22.5% in 1999. With the further deterioration of political security in SSA in the new Millennium, while most other regions started to enjoy a significant decline in political violence[32], civil war is likely to become even more important as a cause of Africa's economic decline, especially relative to the increasingly peaceful EA.

Estimating the costs of war

Finally, we analyze the evolution of income during the conflict cycle in Sudan, expressed relative to its level in an initial period (1975-79) prior to the onset of the civil war.[33] Assuming that the risk of riots and other growth fundamentals remain the same as in the initial period, we have:

(23) $W_0 = 1$, for t=0, and

$$(24)\quad W_t = \exp\{-\hat{\beta}_{cw}\sum_{j=0}^{t-1}(1-\hat{\beta}_1)^j\,\hat{p}_{cwt-j}^{SDN} - (1-(1-\hat{\beta}_1)^t)\log y_0\}$$

[32] See, for example, the Human Security Centre's report on Human Security in 2005.

[33] This is an appropriately chosen period, so that it is close but not too close to the war start year of 1983.

For t=1,…, T. The income ratio curve (W(t)) is less than 1 for t>1 (Figure 5). The size of the area between the horizontal line W(0)=1 and the W(t) curve is equal to the total costs of the war divided by the per capita income in the initial period, which is equal to about $309 in 2000 fixed prices. Therefore, it is straightforward to estimate the total costs of the Sudanese war, which comes to $787 in per capita terms. This suggests that the more than 20 years long war have cost the country more than two and a half years worth of the annual GDP during (1975-79). Expressed in terms of total absolute costs, we estimate that the total dollar value in year 2000 USD is 23 billion. Finally, the same calculations also allow comparing the actual per capita income to the potential income under the counterfactual scenario of no civil war (Figure 6). Starting from an income per capita of $309 (in 2000 fixed prices), we estimate that, had it not been for the war, the Sudan would have realized an income per capita of $464 in 2002, compared to the actual income of $408.

The analysis of the costs of the Sudanese civil war contributes to a small literature on the indirect costs of internal conflicts. In a recent survey on the costs of armed conflicts- prepared for the "International Task Force on Global Public Goods"- Elisabeth Skons (2004) identifies only four studies on internal conflicts (Brown and Rosecrance, 1999; Stewart and FitzGerald, 2001; Collier et al, 2003; and, Collier and Hoeffler, 2004b).[34] The first study was concerned with the costs of prevention of conflicts to external parties but not to the conflict-affected countries themselves, while the second and third studies discuss the analytical underpinnings and the channels through which internal civil wars can be costly. However, neither study attempts to systematically quantify the monetary costs of civil wars. On the other hand, the paper by Collier and Hoeffler uses an estimate of the growth effect of -2.2% (due to Collier, 1999) to compute the average costs of civil war for a war-affected country to be around 105% of initial GDP, which comes to about $21 b (in 1985 fixed prices).[35] Their aggregate estimate also includes other costs: loss of GDP to neighbors (115% of the conflict-affected country's initial GDP); the costs due to the diversion of expenditure to the military for the country in question as well as well as for its neighbors (30% of GDP); and costs due to the health impact of conflicts (about $5b). This would

[34] Skons' review also includes two studies on the costs of the war in Iraq (Nordhaus, 2002; Bennis et al. 2004). The Iraq war is, however, a different type of conflict than the civil wars in low-income countries.

[35] Collier and Hoeffler estimate the average GDP for conflict-affected low-income countries (excluding China and India) prior to civil war onset to be $19.7 (in 1985 fixed prices) and apply the cumulative -2.2% growth effect to this initial income for a period of 21 years, including seven years of conflicts and 14 years of post-conflict. The latter is their estimate of the average period a country takes to recover to its pre-conflict national income level.

scale up to about $54 b. However, the sub-component of their total estimate of costs that directly pertain to the conflict-affected country, but not accounting for the recovery period ($21 b) is very comparable to the above initial estimate of this paper.

However, the costs of the Sudanese civil war will be much larger if we account for the post-conflict recovery period needed to bring economic activity to the level prior to the civil war. If we assume that recovery takes an equal of number of years to the duration of conflict (another 20 years)[36], the total cost would be double the estimated cost of war. Hence without accounting for the negative externality of the Sudanese civil war in terms of excessive military expenditure and the health effects, including death, injury and psychological scars, the total cost will come to about $46 billion (in fixed 2000 fixed prices). This is about twice Sudan's outstanding stock of external debt.

V. Conclusions

This paper contributes to the literature analyzing the development and economic growth impact of organized political violence. We use a formal endogenous growth model to analyze the general equilibrium growth effects of political violence. We show that, under plausible assumptions about risk aversion during times of conflict, the overall effects of organized political violence are likely to be much higher than its direct capital destruction impact. Using a multinomial model of violence that distinguishes between three levels of political violence (riots, coups and civil war), we use predicted probabilities of aggregate violence and its three types to identify their growth effects in an encompassing growth model. The model is estimated by dynamic panel regressions that fully account for country heterogeneity and potential endogeneity. Compared to the received literature, our instrument for organized political violence is sharper because our multinomial specification better reflects the nature of violence as an ongoing and diverse process. We view organized political violence as a complex process with multiple manifestations, one of which is civil war, and this helps us define more precisely what the benchmark for our analyses should be, i.e. for what we think defines periods of relative peace as opposed to conflict. We can therefore specify multiple risks that a country faces at any given time (risk of civil war, coups or violent riots) and assess their separate effects on economic growth.

[36] This is a modest assumption compared to the ones adopted in the literature. For example, Collier, Chauvet and Hegre (2007) assume that civil war duration of seven years would require about 14 years of post-conflict growth of about 2.2% to revert to the pre-war per capita income level.

First and foremost, political violence, especially civil war, was found to be negatively and highly significantly associated with growth even after controlling for the *direct* growth effects of some of its potential determinants, such as ethnic fractionalization and democracy. The indirect effects of these factors are accounted for by including them in the equation that instruments for the probability of political violence. Further, unlike previous studies we control for the relevant types of democracy from the perspective of the developing countries and find that only non-factional partial democracy has a direct and independent positive growth effect. That is, political regimes involving some degree of competitive political participation and the relatively free election of the executive are instrumental to growth only if they do not promote parochial or ethnic-based particularist agendas that favor group members to the detriment of common, secular and cross-cutting agendas. The effect of non-factional democracy is even more compelling because it does not only have an independent effect on per-capita income growth but it also reduces the negative growth effect of ethnic fractionalization, particularly when we distinguish among the types of organized political violence. As we discussed in section IV, the above results are new and have much more profound implications than just corroborating the evidence from the received literature.

Second, while our results have global applicability, we focus on the implications for SSA, given that it has become the most conflict-ridden region in the world. Our results show that not only has Sub-Saharan Africa been the region with the worst performance but that there are great risks for the region in the future. Specifically, we find large negative effects of the risk of civil wars on economic growth and we also find that in the 1990s the Sub-Saharan Africa region has been increasingly at risk of war, while the other developing world appears to have learned to manage conflicts in a more peaceful manner. This is reflected in the increasingly high contribution of the risk of civil war to the widening income gap between SSA and East Asia. We estimate that the risk of civil war has accounted for more than 22% of this income gap in 1999; and with the further deterioration of political security in SSA in the new Millennium, civil war is likely to become even more important as a cause of economic decline in Africa. We attempt to explain the divergent estimates of the growth effects of civil wars for SSA relative to the rest of the developing world in the context of our simulation model. We argue that perhaps African civil wars tend to more disproportionately degrade the quality of public policy and services as well as precipitate stronger reaction by agents. The net effect is larger combined disruption, diversion and

dissaving effects. Moreover, we estimate that civil war has also been very costly for the many poor African countries, which also happen to have experienced long conflicts, such as the Sudan. A modest estimate of the costs of the Sudanese civil war would come to $46 b (in 2000 fixed prices), which is twice the country's stock of external debt.

Third, to draw the implications of the above findings for SSA, we start by stating the obvious: that SSA is in a conflict-underdevelopment trap. This statement is neither new nor controversial. However, our results suggest an important new twist to this generally accepted proposition about the recent African development discourse. In our view, Africa's ethnic fractionalization lies at the heart of this trap. Not because it is destiny but because we need to explicitly account for it in the design of development strategies. Specifically, to break free from this trap, we will argue, Africa needs to better manage its ethnic diversity and the way to do it is to develop non-factional democracy. Democratic but factional polity will not do the trick and is only marginally better than authoritarian regimes.

Table 1: **Organized Political Violence, Democratic Governance, and Social Diversity (language and ethnicity)**

	Multinomial model		
	Riot	Coup	Civil war
Log lagged GDP/capita	0.1	-0.2*	-0.3**
	(0.1)	(0.1)	(0.2)
Log lagged population	0.2***	-0.1	0.2**
	(0.0)	(0.1)	(0.1)
Oil	-0.2	-0.0	0.6**
	(0.1)	(0.2)	(0.3)
Log of mountainous	0.01	0.01	0.1
terrain	(0.01)	(0.1)	(0.1)
Instability	-0.1	-0.2	0.2
	(0.1)	(0.2)	(0.3)
Lagged transitional	0.5*	0.6	1.3***
and interregnum regimes	(0.3)	(0.4)	(0.5)
Lagged democracy	-0.3*	-3.1***	-1.4*
	(0.2)	(1.0)	(0.8)
Lagged factional	0.4***	0.6***	0.8**
partial democracy	(0.1)	(0.2)	(0.3)
Lagged non-factional	0.1	-0.1	-0.4
partial democracy	(0.2)	(0.3)	(0.5)
Lagged partial autocracy	0.4*	0.7***	-0.5
	(0.2)	(0.3)	(0.6)
Coup in the past 5 years	-0.2*	1.3***	0.4*
	(0.1)	(0.2)	(0.2)
Number of years with	0.6***	0.4***	0.3***
riots in the past 5 years	(0.0)	(0.1)	(0.1)
Civil war ongoing in the	-0.2	0.3	-0.4
past year	(0.1)	(0.2)	(0.3)
Partially homogenous	0.1	-0.1	0.4
	(0.1)	(0.2)	(0.3)
Partially diverse	0.2	0.2	0.4
	(0.2)	(0.3)	(0.4)
Diverse	0.2	0.2	0.8*
	(0.2)	(0.3)	(0.5)
Homogenous	0.3*	-0.2	-1.7*
	(0.2)	(0.3)	(1.0)
Ethnic dominance	0.1	-0.01	0.1
	(0.1)	(0.2)	(0.3)
Constant	-5.3***	-1.3	-3.9***
	(0.6)	(1.1)	(1.5)
Number of events in the sample	835	210	91
Observations	4231		
Log Likelihood	-2802.1		

Note: The samples have 125 countries and go from 1950 to 1999. The table shows coefficients (standard errors in parentheses below coefficients) from a multinomial logit regression in which the reference outcome is periods with no new civil war onsets, no riots and no coups. Stars show conventional levels of statistical significance: * significant at 10%; ** significant at 5%; *** significant at 1%. The reference category for regime dummy variables are autocracies. The reference category for social fractionalization variables is our cross-cutting category. The results from a multinomial probit regression are similar to the results shown here. Results are robust if we include a cold war dummy variable. Ethnic dominance is a dummy variable that equal 1 when the largest ethnic / religious group represents between 45 and 90 percent of the population.

Table 2. Goodness of fit of the violence model
Outcome predicted probabilities versus actual outcomes

Actual outcome	**Average predicted probability**
	Probability of a riot
Riot	0.33
All other outcomes	0.16
	Probability of a coup
Coup	0.10
All other outcomes	0.04
	Probability of civil war onset
Civil war onset	0.05
All other outcomes	0.02

Note: Predicted probabilities are from the multinomial logit model with outcomes riots, coups and civil war.

Table 3. Manifestations of organized political violence by regions

Region	Outcomes					
	Predicted probability of war	Actual number of wars 1950-1999	Predicted probability of coups	Actual number of coups 1950-1999	Predicted probability of riots	Actual number of country years with riots 1950-1999
Sub-Saharan Africa	0.038	45	0.069	107	0.13	127
North Africa & Middle East	0.018	20	0.046	43	0.17	120
Asia (-Japan)	0.029	33	0.052	39	0.24	191
Latin America	0.02	13	0.087	87	0.21	255
Eastern Europe	0.013	9	0.02	4	0.17	60
OECD countries	0.002	1	0.005	7	0.2	212

Note: Predicted probabilities are from the multinomial logit model with outcomes riots, coups and civil war. Coups include both successful and attempted events. About 50% of coups are successful.

Table 4

Economic Growth and the Role of Violence, Ethnic Fractionalization, and Democracy

Cross-country panel data consisting of non-overlapping 5-year averages spanning 1970-2000
Dependent variable: Growth rate of real GDP per capita
Estimation method: GMM-IV system estimator

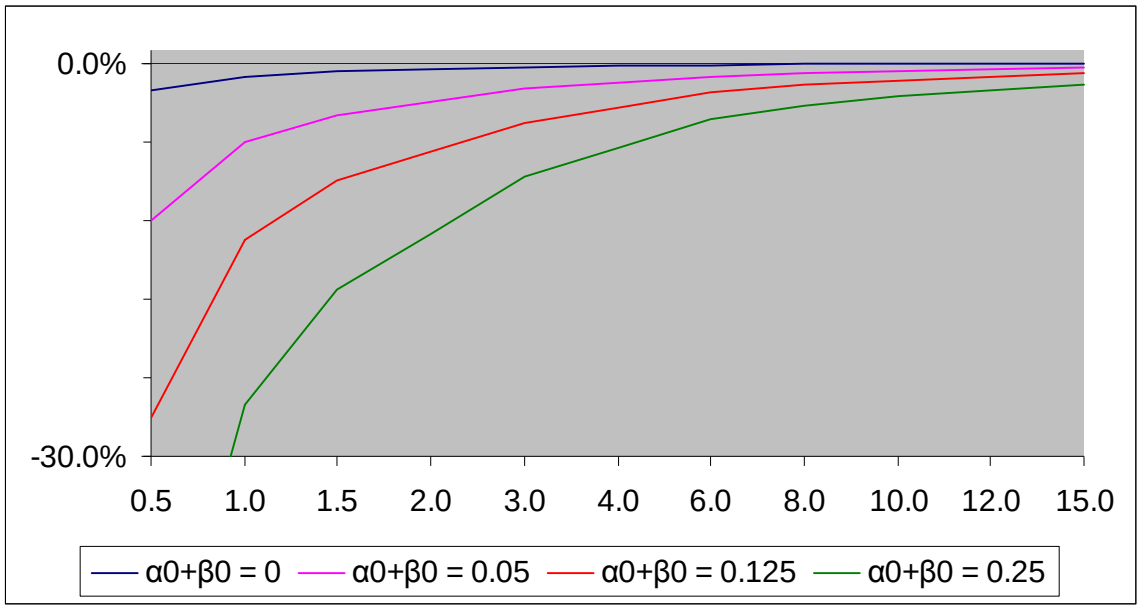
Variable	[1]	[2]	[3]	[4]	[5]	[6]
Standard Control Variables						
Initial GDP per Capita	-0.0203 **	-0.0258 **	-0.0231 **	-0.0253 **	-0.1806 **	-0.0137 **
(in logs)	-8.3960	-9.0549	-8.8068	-7.6389	-13.7665	-4.7976
Initial GDP per Capita	-0.1656 **	-0.1649 **	-0.1639 **	-0.1631 **	-0.1806 **	-0.1876 **
Cyclical Component	-14.2273	-14.8897	-13.0319	-14.3485	-13.7665	-15.4582
Inflation	-0.0165 **	-0.0217 **	-0.0173 **	-0.0208 **	-0.0226 **	-0.0228 **
(Log of Inflation + 100)	-8.0507	-13.0093	-7.5745	-11.8699	-10.4249	-10.6693
Government Expenditure/ GDP	-0.0344 **	-0.0347 **	-0.0328 **	-0.0318 **	-0.0326 **	-0.0309 **
(in Logs)	-9.6700	-8.6947	-9.4830	-8.1731	-4.9557	-5.1438
Human Capital Investment	0.0540 **	0.0443 **	0.0403 **	0.0375 **	0.0210 **	0.0225 **
(secondary enrollment, in logs)	9.6987	9.0971	7.0098	7.5080	3.5883	3.9700
Governance	0.0178 **	0.0158 **	0.0225 **	0.0156 **	0.0112 **	0.0120 **
(from ICRG, 0-6)	7.6480	7.2821	9.2323	6.8609	4.3630	7.9926
Trade openness	0.0136 **	0.0051	0.0167 **	0.0066 *	0.0228 **	0.0164 **
(trade volume / GDP, in logs)	3.3448	1.2660	4.2579	1.8845	4.7746	4.3408
Manifestation of Violence						
Probability of Riots		-0.0159 **		-0.0114		-0.0215 **
		-2.2281		-1.6020		-2.9758
Probability of Coups		0.0012		-0.0063		-0.0103
		0.0511		-0.2650		-0.4569
Probability of Civil War		-0.3258 **		-0.3896 **		-0.2404 **
		-10.4507		-12.0612		-3.5531
Aggregate Probability of Violence	-0.0163 *		-0.0180 **		-0.0253 **	
	-1.8769		-2.0478		-3.7641	
Fractionalization						
Ethnic			0.0027	-0.0010	-0.0232 **	-0.0154 **
			0.3212	-0.1578	-2.4243	-2.0120
Democracy						
Partial Democracy Factional					-0.0139	-0.0042
					-0.6393	-0.2311
Partial Democracy Non-Factional					0.0170	0.0183 **
					1.3922	2.7124
Interactions						
Ethnic Fractionalization*Partial Democracy Factional					0.0971 **	0.0664
					1.9276	1.5372
Ethnic Fractionalization*Partial Democracy Non-factional					0.0469 **	0.0337 **
					2.0902	2.6726
Period Shifts (base period: 1975-79):	-0.11926 **	0.02963	-0.06994 **	0.04755	-0.059938 *	-0.001441
1980-84	-0.0179 **	-0.0171 **	-0.0149 **	-0.015495 **	-0.018769 **	-0.018419 **
1985-89	-0.0202 **	-0.0177 **	-0.0151 **	-0.01609 **	-0.017971 **	-0.019628 **
1990-94	-0.0256 **	-0.0212 **	-0.0207 **	-0.019657 **	-0.024363 **	-0.025479 **
1995-99	-0.0336 **	-0.0292 **	-0.0294 **	-0.026536 **	-0.034894 **	-0.034139 **
No. Countries / No. Observations	68/283	68/283	68/283	68/283	68/283	68/283
SPECIFICATION TESTS (P-Values)						
(a) Sargan Test	0.1520	0.1760	0.2780	0.1590	0.4320	0.453
(b) Serial Correlation : Second-Order	0.7140	0.6900	0.7320	0.6640	0.7560	0.972

Numbers below coefficients are the corresponding robust t-statistics. * (**) denotes statistical significance at the 10 (5)
Source: Authors' calculations

Table 5: Growth Elasticities for the Hazards of Civil Wars and Riots

	Civil Wars				Riots			
	1970s	*1980s*	*1990s*	*Whole period*	*1970s*	*1980s*	*1990s*	*Whole period*
All Sample	-0.22	-0.81	-0.37	-0.37	-0.20	-0.77	-0.36	-0.35
Sub-Saharan Africa	-0.53	-1.30	-1.36	-6.21	-0.18	-0.46	-0.56	-2.35
Other Developing Countries	-0.24	-1.18	-0.21	-0.32	-0.20	-1.20	-0.27	-0.33
OECD	-0.03	-0.02	-0.02	-0.03	-0.22	-0.20	-0.20	-0.21

Figure 1: Net Marginal Growth Effects of Political Violence



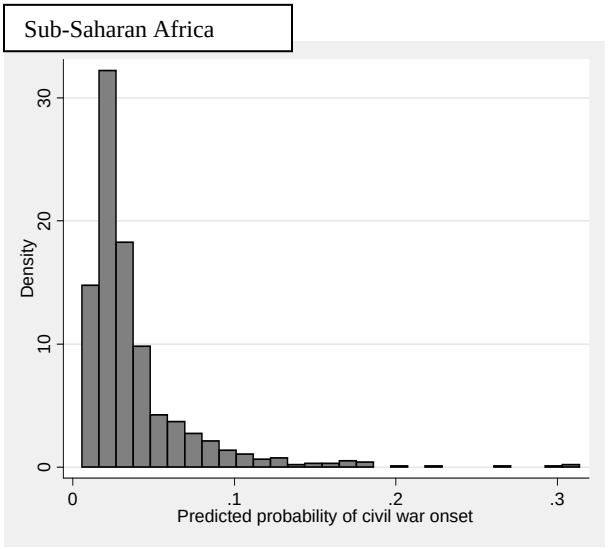
Delta= 0.01

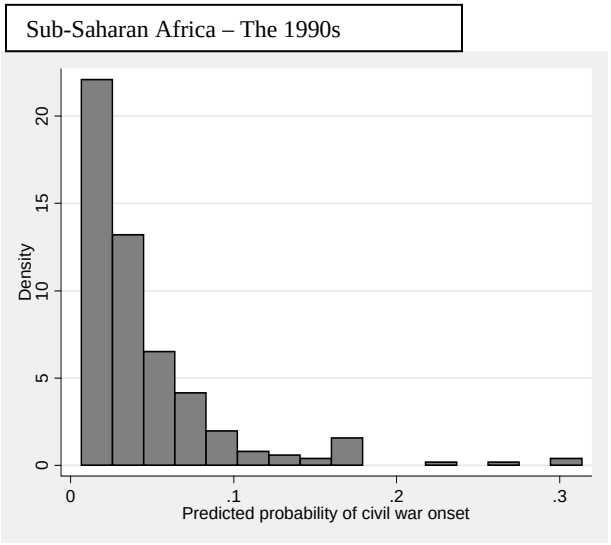
Gamma:

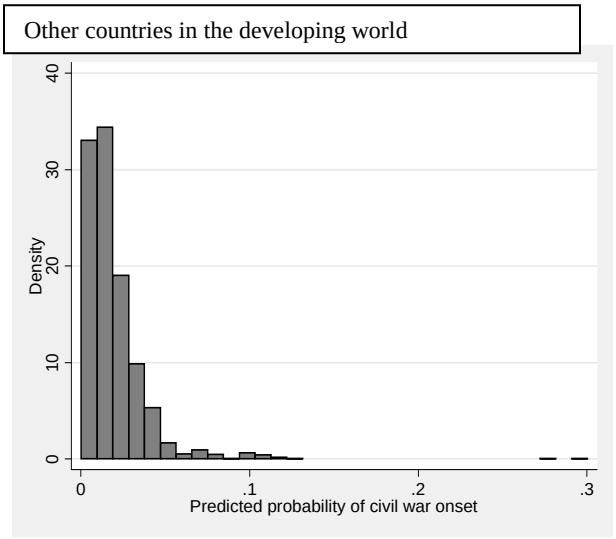
	0.05	0.1	0.15	0.25	0.5	1	1.5	2	3	4	6	8	10	12	15
α0+β0 = 0	-20%	-10%	-6.7%	-4.0%	-2.0%	-1.0%	-0.7%	-0.5%	-0.3%	-0.2%	-0.1%	-0.1%	-0.1%	0.0%	0.0%
α0+β0 = 0.05	-120%	-60%	-40%	-24%	-12%	-6.0%	-4.0%	-3.0%	-2.0%	-1.5%	-1.0%	-0.7%	-0.6%	-0.4%	-0.3%
α0+β0 = 0.125	-270%	-135%	-90%	-54%	-27%	-14%	-9.0%	-6.7%	-4.5%	-3.4%	-2.2%	-1.7%	-1.3%	-1.1%	-0.8%
α0+β0 = 0.25	-520%	-260%	-173%	-104%	-52%	-26%	-17%	-13%	-8.7%	-6.5%	-4.3%	-3.2%	-2.6%	-2.1%	-1.7%

Note: given the above parameter values, the marginal growth simulations are based on equation (11'): $\frac{\partial E(dk(t)/k(t))}{\partial \lambda} = -\frac{1}{\gamma}\{(\alpha_0 + \beta_0) + (1+\gamma\delta) - (1-\delta)^{1-\gamma}\}dt$.

Figure 2. Predicted probability of war onset







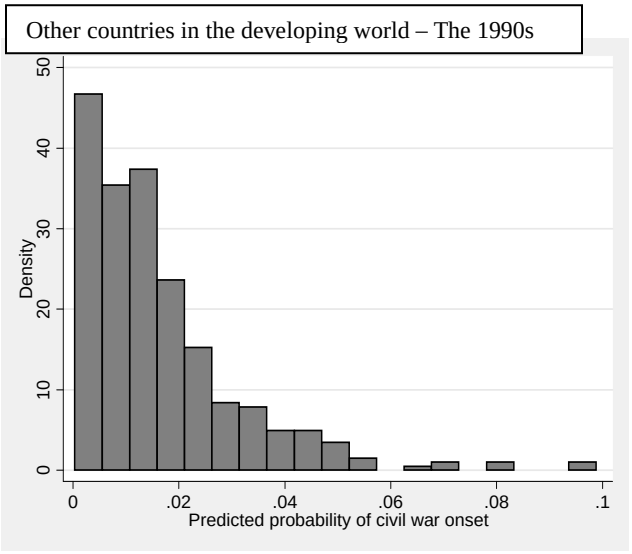
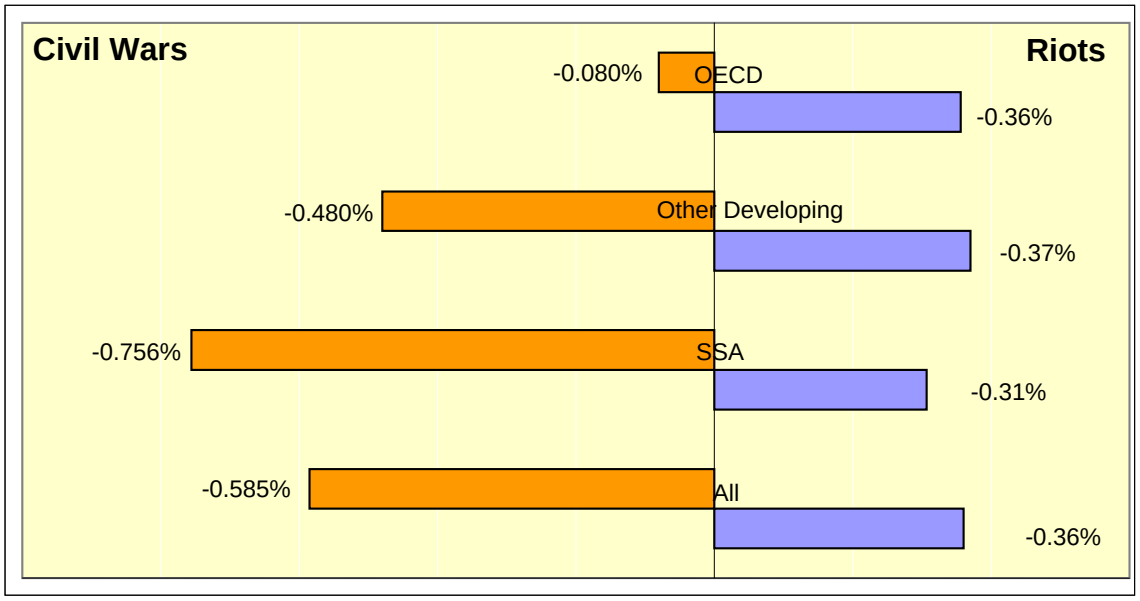


Figure 3. The Growth Deceleration Effects of the Risk of Civil War and Riots (1970-99)



Note:
Change in growth-civil wars=Beta(civil wars)*St.Dev(civil wars)
Change in growth-riots=Beta(riots)*St.Dev(riots)
where Beta(civil wars)=-0.24 and Beta(riots)=-0.02. St.Dev.(civil wars)=0.02,0.03,0.02, and 0.003 for all sample, SSA, Other developing, and OECD, respectively. for St.Dev.(riots)=0.17,0.14,0.17, and 0.17 all sample, SSA, Other developing, and OECD respectively.

Figure 4: East Asia-Sub-Saharan Africa Income Gap (log y(EA)/y(SSA))

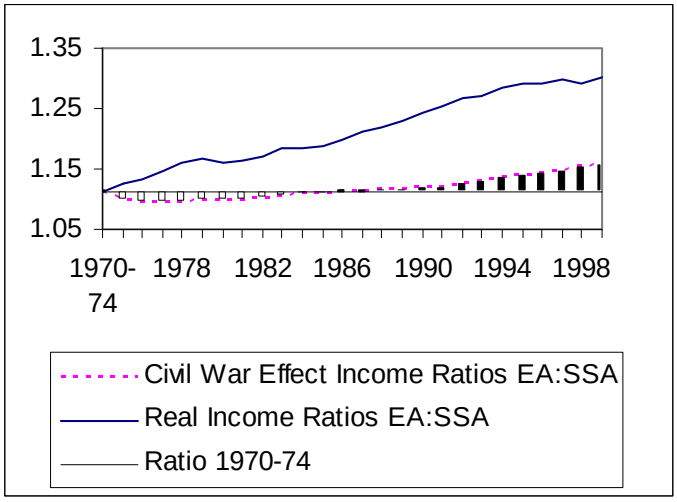


Figure 5: The Costs of Civil War in Sudan (as a ratio to initial GDP per capita in 1975-79)

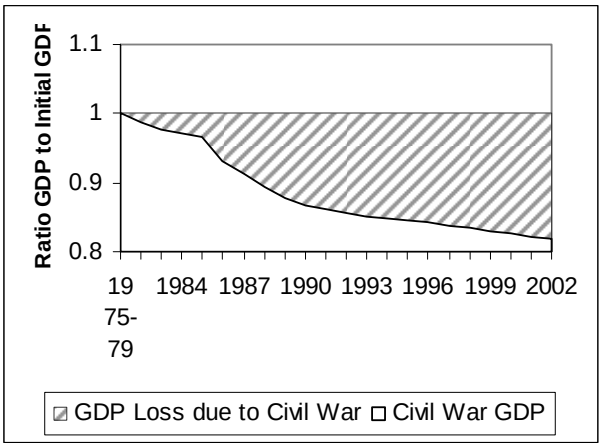
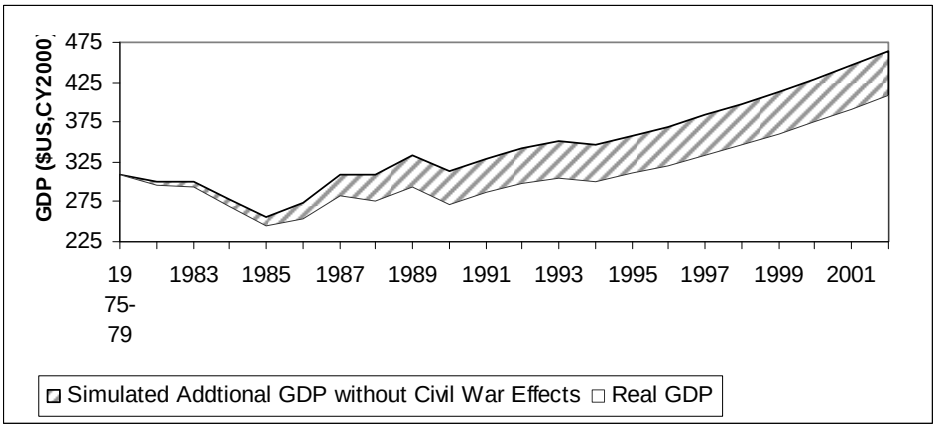


Figure 6: The Forgone Income Per Capita Due to the Sudanese Civil War (1983-2002)



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Appendix A.1: Definitions and Sources of Variables Used in Regression Analysis

Variable	Definition and Construction	Source
Terms of Trade	The terms of trade index shows the national accounts exports price index divided by the imports price index.	World Development Indicators (2005, 2006) and Loayza et al. (2005)
GDP per capita growth	Log difference of real GDP per capita.	Authors' construction using data from World Development Indicators (WDI), The World Bank (2006).
Initial GDP per capita	Initial value of ratio of total real GDP to total population.	Authors' construction WDI, The World Bank (2006).
Initial GDP per Capita Cyclical Component	Difference between the logarithm of actual GDP per capita and the logarithm of potential (trend) GDP. The Hodrik-Prescott filter was used for the decomposition.	Authors' calculations using data from WDI (2006)
Inflation	The logarithm of 100 plus the inflation rate.	Author's calculations with data from WDI (2006)
Government Expenditures	Ratio of government expenditures (in local currency) to GDP (in local currency).	Data come primarily from International Financial Statistics (IFS), 2006; when missing, they are complemented with data from WDI (2006) and UN National Accounts Statistics (2006)
Human Capital Investment	Ratio of total secondary enrollment, regardless of age, to the population of the age group that officially corresponds to that level of education.	Easterly and Sewadeh (2002), WDI (2006), UNESCO (2006).
Governance	Average of three indices capturing the presence of law and order, lack of corruption, and accountability of public officials. Range is between 0 and 6.	International Country Risk Guide (ICRG), Political Risk Services. www.icrgonline.com
Trade Openness	Ratio of exports and imports (in local currency) to GDP (in local currency).	Data come primarily from International Financial Statistics (IFS), 2006; when missing, they are complemented with data from WDI (2006) and UN National Accounts Statistics (2006)
Real Exchange Rate Misalignment	Percentage difference between real effective exchange rate and its estimated equilibrium value.	Authors' calculations. See Appendix A.1 for the methodology.
Period-specific Shifts	Time dummy variables.	Authors' construction.
Log lagged GDP/capita	Gdp/pop based on pwt5.6, wdi2001,cow energy data	Fearon and Laitin 2003
Log lagged population	Log population, lagged except for first in country series	Fearon and Laitin 2003
Oil	More then 1/2 3 of export revenue from fuel	Fearon and Laitin 2003
Log of mountainous terrain	% Estimated mountainous terrain	Fearon and Laitin 2003
Instability	More than 2 points change in the polity 2 score in the last 3 years	Fearon and Laitin 2003
Lagged transitional and interregnum regimes Lagged democracy Lagged factional partial democracy Lagged non-factional partial democracy Lagged partial autocracy	This the classification of political regimes along the lines of executive recruitment [Executive recruitment involves the ways in which superodinates come to occupy their positions (Polity IV manual pp. 19)] and the competitiveness of competitiveness of political participation [The competitiveness of competitiveness of political participation refers to the extent to which alternative preferences for policy and leadership can be pursued in the political arena (Polity IV manual pp. 25)].	Polity IV
Coups	Successful and attempted coups	Belkin and Schofer 2003
Riots	Violent demonstration with more than 100 participants	Banks; Cross National Tine Series Data Archive
Civil war		Sambanis 2004

Partially homogenous	Uniform (homogenous) societies have both indexes of language and ethnic fractionalization lower than the 25th percentile of the whole sample. Diverse societies have both indexes of language and ethnic fractionalization greater than the 75th percentile of the whole sample. We group together societies that are fairly diverse ethically (Ef greater than the 25th percentile and smaller than the 75th percentile) and as language composition (Qlf greater than the 25th percentile and smaller than the 75th percentile) and we label them as societies with cross-cutting cleavages. Partially homogenous societies have either but not both of the Ef index or the Qlf index smaller than its respective 25th percentile. Partially diverse countries have either but not both of the Ef index or the Qlf index larger than its respective 75th percentile.	Fearon and Laitinl ef variable; and Reynal-Querol 2002 *Qlf* variable.
Partially diverse		
Diverse		
Homogenous		
Ethnic dominance	The largest ethnic / religious group is between 45 and 90 percent of the population	Fearon and Laitin 2003

Appendix Table A.2 : Country and Period Coverage

	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99
Algeria	?	?	?	?	?	?
Argentina	?	?	?	?	?	?
Australia	?	?	?	?	?	?
Austria	?	?	?	?	?	?
Bolivia	?	?	?	?	?	?
Brazil			?	?	?	?
Cameroon	?	?	?	?	?	?
Canada	?	?	?	?	?	?
Chile	?	?	?	?	?	?
Colombia	?	?	?	?	?	?
Costa Rica	?	?	?	?	?	?
Cote d'Ivoire	?	?	?	?	?	?
Democratic Republic of the Congo	?	?	?	?	?	?
Dominican Republic	?	?	?	?	?	?
Ecuador	?	?	?	?	?	?
Egypt		?	?	?	?	?
El Salvador			?	?	?	?
Finland			?	?	?	?
France	?	?	?	?	?	?
Gabon	?	?	?	?	?	?
Greece	?	?	?	?	?	?
Guatemala			?	?	?	?
Honduras	?	?	?	?	?	?
India	?	?	?	?	?	?
Indonesia	?	?	?	?	?	?
Iran		?	?	?	?	?
Israel			?	?	?	?
Italy	?	?	?	?	?	
Jamaica	?	?	?	?	?	?
Japan			?	?	?	?
Jordan			?	?	?	?
Kenya	?	?	?	?	?	?
Korea			?	?	?	?
Malaysia	?	?	?	?	?	?
Malawi			?	?	?	?
Mali				?	?	?
Mexico			?	?	?	?
Morocco	?	?	?	?	?	?
Mozambique				?	?	?
New Zealand	?	?	?	?	?	?
Nicaragua			?	?	?	?
Niger				?	?	?
Nigeria	?	?	?	?	?	?
Norway	?	?	?	?	?	?
Pakistan	?	?	?	?	?	?
Panama			?	?	?	?
Papua New Guinea			?	?	?	?
Paraguay	?	?	?	?	?	?
Peru	?	?	?	?	?	?
Philipines	?	?	?	?	?	?
Portugal	?	?	?	?	?	?
Sierra Leone				?	?	?
South Africa	?	?	?	?	?	?
Spain	?	?	?	?	?	?
Sri Lanka		?	?	?	?	?
Sudan	?	?	?	?	?	?
Sweden			?	?	?	?
Switzerland	?	?	?	?	?	?
Syria	?	?	?	?	?	?
Thailand	?	?	?	?	?	?
Tunisia			?	?	?	?
Turkey	?	?	?	?	?	?
Uganda				?	?	?
United Kingdom			?	?	?	?
United States	?	?	?	?	?	?
Venezuela	?	?	?	?	?	?
Zambia				?	?	?
Zimbabwe				?	?	?

Note:
Checkmarks indicate that the country-period combination is included in the growth regressions.

Appendix Figure A.3: Democracy; Anocracy; Autocracy

<table>
<tr><td></td><td colspan="6">Competitiveness of Political Participation</td></tr>
<tr><td>Executive Recruitment</td><td>Repressed (1)</td><td>Suppressed (2)</td><td>Unregulated (0)</td><td>Factional (3)</td><td>Transitional (4)</td><td>Competitive (5)</td></tr>
<tr><td>(1) Ascription</td><td colspan="2" rowspan="5">Autocracy</td><td colspan="4" rowspan="5">Partial Autocracy</td></tr>
<tr><td>(2) Ascription + Designation</td></tr>
<tr><td>(3) Designation</td></tr>
<tr><td>(4) Self-Selection</td></tr>
<tr><td>(5) Transition from Self-Select.</td></tr>
<tr><td>(6) Ascription + Election</td><td colspan="2" rowspan="3">Partial Autocracy</td><td rowspan="3">Non-Factional Partial Democracy</td><td rowspan="3">Factional Partial Democracy</td><td rowspan="3">Non-Factional Partial Democracy</td><td></td></tr>
<tr><td>(7) Transitional or Restricted Elec.</td><td rowspan="2">Democracy</td></tr>
<tr><td>(8) Competitive Election</td></tr>
</table>

Note: Based on Executive Recruitment (EXREC) and Competitiveness of Political Participation (PARCOMP) variables in the Polity IV data set. Table is from Goldstone et al. 2005. Source: Goldstone et al. 2005. Full democracies make 22% of observation in the sample. Factional partial democracies make 11% of observations and non-factional partial democracies about 9 %. Partial autocracies are about 6% of the sample. Autocracies make about 48% of the observations in the sample. Transitional regimes and irregular transfers make a little more than 3% of the sample.