Growth and Violence: Argument for a Per Capita Measure of Civil War

Hannes Mueller

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Abstract

This article proposes a new measure of civil war. The measure defines violence intensity in casualties per capita instead of number of casualties. We discuss the assumptions behind this *per capita model* and the existing *standard model*. We show that the two measures behave differently in standard growth regressions and argue that this is because the standard model is a mis-specification in this context. Casualties appear to affect growth more in smaller populations. We argue that a debate on the right model can help distinguish between competing theories in the conflict literature. This is particularly relevant given the current development of new micro-data in this field.

Keywords: civil war, conflict, growth

JEL-Codes: D74, O11, O47

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†Institut d'Analisi Economica (CSIC) and Barcelona GSE. Email: hannes.mueller@iae.csic.es.

1 Introduction

The empirical study of civil war has recently experienced a boom. An important tool for this research has been data on conflict victims both on the national level and, more recently, at the sub-national level. Typically, empirical work uses the absolute number of victims or conflict events to distinguish between different intensities of violence.[1] The UCDP/PRIO Armed Conflict Dataset, for example, uses two thresholds of 25 and 1000 battle related deaths to define dummy variables which have been used extensively in the cross-country literature. Even when other data is used, the 1000 death threshold is an important element of the way civil wars are defined.

Countries differ significantly in their population size. The 1000 (and 25) casualties threshold is therefore applied to units of observation that are extremely heterogenous. Figure 1 illustrates one consequence of this definition. The figure shows the relationship between population size and the prevalence of civil war, as defined by the 1000 casualties threshold.[2] The higher is population, the higher is the likelihood of experiencing a civil war. This raises the concern that the combination of heterogenous units and absolute threshold is the "wrong" model to study the effects and causes of civil war. An insurgency, for example, could have very different effects on the number of casualties in populous and less populous countries. If one uses the absolute threshold to study insurgencies this could affect results.

This article discusses the theoretical assumptions behind two ways of coding civil wars: a violence measure that uses absolute numbers (the standard model) and a measure in per capita terms (the per capita model). We show that the two measures imply very different assumptions regarding the relationship between violence and the respective independent or dependant variables. In studies of the effects of war, the effect of violence needs to grow proportionally with population to justify the use of the standard model. In other words, there must be a public bad aspect to violence. The standard model also assumes that triggers of violence affect individual behavior less in larger countries. This is conceptually questionable if, for example, the independent variable is defined in per capita terms or as a national average.

To illustrate the potential impact of this model choice we study the effect of civil war on GDP

[1] See, for example, Besley and Persson (2011), Brueckner and Ciccone (2010), Collier et al (2009), Esteban et al (2012), Faeron and Laitin (2003), Miguel et al (2004).

[2] Figure 1 shows twenty country groups in which each group contains 5 percent of the sample. Countries are grouped according to their population size and the graph reports the log of the mean within the group. The pattern for the lower threshold of 25 casualties is the same.

per capita growth. We show that defining civil wars with the number of battle-related deaths in this context could be an error. If we interpret the correlations in the cross-country data as causal, the economies of large, populous countries are less affected by a death than the economy of a small country. When we analyze the economic impact of civil wars on growth, the relative measure produces estimates that are up to 40 percent larger than in the standard model.

This should not be seen as an argument that the per capita model is the "right" model in all cases. Instead, we argue that theory should provide the fundament for empirical work. There is a conceptual weak spot that is generated by the use of the standard model as a default. The danger is that new insights from micro studies will not speak to this literature.

We proceed as follows. Section 2 discusses some of the related literature to show that the issue of scale is largely sidestepped. The following section discusses the theoretical underpinnings of the standard and the per capita model. In Section 4 we argue that the impact of civil war on per capita GDP growth is captured much more accurately by the per capita model. Section 5 discusses the findings and draws conclusions for the conflict literature.

2 Related Literature

The measurement and definition of civil war has always been a contentious issue.[3] However, there is a large implicit consensus regarding the use of absolute numbers as a measure for intensity in the empirical literature. The theory behind using absolute numbers is rarely made explicit.

We start our discussion with the cross-country literature. Cerra and Saxena (2008) analyze the growth effect of civil wars in the cross country data. They follow the definition in the conflict literature and use the standard model without a discussion of scale. Our results show that their results, and those provided by Mueller (2012), could be an underestimate.

Besley and Persson (2010) explain the rise of state capacity, measured by the share of taxes in GDP per capita, through internal and external wars. They use the standard model without a discussion of its validity. Collier, Hoeffler and Rohner (2009), use per capita data to explain civil war defined with the 1000 threshold, but ignore the question of scale. Hegre and Sambanis (2006) explicitly state that the likelihood of civil war rises with higher population because of scale but use this argument only to argue for population as a control variable. Similar analysis has been

[3] See Sambanis (2004) for an excellent review. Sambanis also briefly discusses a relative threshold but for very different reasons.

used in the policy debate to derive economic effects of civil war.[4]

Esteban, Mayoral and Ray (2012) derive a per capita conflict effort in their theory. Their paper is one of the rare examples that derives the regression equation directly from a micro-founded theory. However, they still use the 25 and the 1000 threshold, and do not discuss why this captures per capita conflict effort. We illustrate in the appendix that one of their most important results which holds at the 25 threshold does not scale up; results are not robust to using the 1000 threshold. However, results are strikingly consistent when the per capita model is used. This is to be expected from their theory if the 25 threshold is regarded as valid proxy for the per capita model.

There is a relatively new literature that tries to bring exogenous variation in weather and commodity prices to understand the economic triggers of civil war. Miguel et al (2004) study the impact of per capita growth on civil war onset using the 25 deaths threshold. They do not discuss scale. Hsiang et al (2011) study the same phenomenon on a global scale and with the 25 deaths threshold. Here the logics is very clearly a decentralized one working through averages in geographic cells - the size of countries is still not taken into account.

Bazzi and Blattman (2011) provide a review of the price shock literature. They discuss most existing theories that link violence and income shocks and provide a tour-de force through possible empirical specifications. However, they never discuss scale. Using the continuous measure of battle-related deaths, for example, they find that rising prices, both agricultural and mineral, lead to fewer battle deaths. But why should a shock to per capita income lead to less conflict per capita in more populous countries?

Most importantly, perhaps, the absence of a discussion of scale makes the incorporation of new evidence difficult. Micro-studies like, for example, Dube and Vargas (2012) find an effect of price shocks on the absolute number of killings (events). Is this consistent with the use of the standard model at the country level? Besley and Mueller (2012) discuss what they call the public bad aspect of violence and therefore use the standard model. Indeed, a re-recreation of their results not reported here confirmed that this is the right model to use. This raises the interesting possibility that different models should be used at different levels of aggregation. It is, for example, completely consistent that violence is public bad locally but that the effect dissipates

[4]The Copenhagen Consensus project and the World Bank, for example, rely heavily on estimates from the cross-country literature like Collier (1999).

so that at the aggregate level it is not. The standard model should then be used at the micro level and the per-capita model at the aggregate level.

3 The Per-Capital Model of Violence

Consider two ways of using violence data available in a panel dataset. The first is to use the absolute value of victims of violence. The data could be used to construct a dummy or used as a count. Our argument is valid in both cases but for expositional purposes we focus on the case in which the count is used. Define the variable W_{ct} as the number of deaths in geographic area c at time t,

$$W_{ct} \equiv D_{ct}. \tag{1}$$

We will call this the *standard model* of the intensity of civil war. It is used in most empirical studies of violence, mostly in shape of a dummy that attributes civil wars to country/year observations that cross a threshold in the count of deaths.

As an alternative, we suggest the number of deaths weighted by population in area c at time t,

$$\hat{W}_{ct} \equiv D_{ct}/P_{ct}. \tag{2}$$

We will call this the *per capita model.*

The literature on the impact of violence has set per capita (economic) outcomes, y_{ct}, in a relationship to the absolute number of deaths

$$y_{ct} = \alpha \times W_{ct}.$$

In the per capita model this equation is analogously

$$y_{ct} = \hat{\alpha} \times \hat{W}_{ct},$$

and in both of these models, the parameters α and $\hat{\alpha}$ are assumed to be constant across c and t. The marginal effect of a death on per capita outcomes is therefore

$$\frac{\partial y_{ct}}{\partial D_{ct}} = \alpha \tag{3}$$

in the standard model, and

$$\frac{\partial y_{ct}}{\partial D_{ct}} = \hat{\alpha}/P_{ct} \tag{4}$$

in the per capita model.

From equation (3) we can see that in the standard model the marginal effect of a death on production per capita is assumed to be constant across time and units. Most relevant here is the assumption that the effect of an additional casualty is independent from the population in c. In other words, violence is treated as a public bad so that the impact of violence is independent of the size of the population. In the per capita model displayed in equation (4) the effect of one death is assumed to fall with population. The effect of violence at the individual level is proportional to the risk of becoming a victim to violence.

Both models have their merits. If violence patterns are hard to predict, for example, there is a strong public bad aspect to violence. Also, violence could proxy for political processes which affect all individuals regardless of population size. Violence could proxy for a government crisis, for example, and therefore affect the economy regardless of its size. The per capita model in equation (4), in contrast, is particularly relevant if violence patterns are localized compared to the size of the whole geographic unit, i.e. if fighting is restricted to only a part of a country. The difference between the standard and the per capita model is particularly relevant if the underlying geographic units differ in population.

Similar arguments apply to civil war as a dependant variable. In the standard model the individual likelihood to engage in violence needs to be inversely related to population. In other words, the standard model is realistic if per capita conflict effort is decreasing in population. It could be, for example, that conflict is centralized and can therefore be modelled by one aggregate contest function. The free-rider problem within groups will then reduce per capita effort in larger populations. The standard model should also be used if the correct unit of observation is the government or the state rather than the country. A putsch could, for example, lead to violence levels that are independent of the size of the country. In the per capita model this decision is independent of population. If conflict is decentralized and triggered by local characteristics then the per capita model needs to be used.

It is important to note that the difference between the models is not restricted to the country level. Units c could as well be grid cells or sub-national political regions like districts or states. These units can therefore feature similar differences in population to the country level and, hence, imply similar problems.

4 Economic Growth and the Per Capita Model

In this section we turn towards contrasting the two measures in the previous section empirically. We do so by studying the growth effect of civil war in the cross-country data. Cross-country data of civil wars is important as it forms the backbone to most of the micro studies and has been used extensively in studies not concerned with the effect of violence directly. In addition, the cross-country data has served as an important pillar for policy work.

A good way to reflect on the effect of violence on growth is the productivity parameter A in AK model. Assume that per capita output in country c in year t, y_{ct}, is given by

$$y_{ct} = A_{ct} \times k_{ct}$$

where k_{ct} is the per capita stock of capital. It follows

$$\begin{aligned} k_{ct} &= s y_{ct-1} - \delta k_{ct-1} \\ &= \left(s A_{ct-1} - \delta\right) k_{ct-1} \end{aligned}$$

and per capita output growth is therefore given by

$$\begin{aligned} g_{ct} &= \frac{y_{ct} - y_{ct-1}}{y_{ct-1}} \\ &= \frac{A_{ct}}{A_{ct-1}} \left(s A_{ct-1} - \delta\right) - 1 \end{aligned}$$

so that a persistent reduction in A_{ct} has two effects. First, growth drops immediately because the existing capital stock has become less productive (reduction of $\frac{A_{ct}}{A_{ct-1}}$) . Second, a reduction in output hinders the accumulation of capital in the following periods (reduction of A_{ct-1}). For simplicity, we equate both effects in the empirical implementation by assuming negligible δ.

The difference between the standard and per capita model is in how the number of deaths, D_{ct}, affects productivity A_{ct}. In the standard model a casualty is assumed to lower A_{ct} independently of population. This could be the case, for example, if violence is a proxy for political turmoil in the central government which leads to a reduction of public services in all of the country. The per capita model takes a more decentralized view. It assumes that a casualty in a country with a large population reduces A_{ct} less than in a country with a small population. Violence has little impact on economic activity if it affects only a tiny proportion of the population. The individual victimization risk is what drives changes in A_{ct}.

We test these two theories empirically. In the standard model we focus on the threshold of 1000 battle-related deaths and use the count of casualties as a robustness check.[5] To ensure

[5] Many studies use the low threshold of 25 battle-related deaths either as the main specification or as a robustness check. As smaller events remain largely unreported this threshold captures the extensive margin of political violence which will be identical in the standard and per capita model.

comparability between the two models we construct the per capita measure as close as possible to the standard measure of 1000 battle-related deaths. To do this we first divide the PRIO count of battle-related deaths by the population of the country. We try both average population and current population in this step in order to be able to check robustness in this regard. We then construct a dummy that uses an intensity threshold such that the number of civil war years is equal to the number of civil war years in the standard model. In this way we make sure that differences in the results are not due to one event being more or less common than the other.

We match the resulting dummies with GDP per capita data from the Penn World Tables. This gives us data from 1950 to 2011 and from 187 countries. For a detailed discussion of the sources and data see the appendix. Table 1 provides summary statistics. By construction, the means of the per capita measure match that of the standard measure. In other words, we exchanged some country/years above the 1000 casualty threshold with others below the threshold. This moves about 100 country/year observations below (and 100 above) the threshold. This is about 20 percent of all observations of civil war.

Using the model and the constructed civil war dummies we run standard growth regressions of the form

$$g_{ct} = \alpha W_{ct} + \mu_c + \eta_t + \epsilon_{ct} \tag{5}$$

where g_{ct} is per capita GDP growth, W_{ct} is the respective measure of civil war, μ_c are country fixed effects and η_t are year fixed effects.

The parameter of interest is α. We expect this to be negative if violence hinders economic activity. Changes in the estimated α from the standard to the per capita model will be due to the selection of country/years which qualify as "treatment". In the standard model α captures the impact of a war with more than 1000 battle-related deaths on growth. In the per-capita model α captures the effect of a civil war with an intensity of more than 0.065 battle related deaths per capita.[6]

The results from estimating equation (5) are in Table 2. In column (1) we use the civil war dummy from the standard model. If we interpret the coefficient in Table 2 as causal, a civil war year as defined by the 1000 deaths threshold reduces growth by about 2.8 percentage points.

In the previous section we argued that the validity of the standard model depends on whether

[6] This is the threshold for average population. If we use current population we need use the threshold 0.058 to equalize the total number of civil wars.

the reaction of per capita growth to one death is constant across countries with different population. In column (2) we divide the civil war dummy by population in order to check whether civil war affects growth differently depending on the size of the population.[7] The coefficient on the resulting variable reveals considerable heterogeneity of the effects of civil wars depending on population. Growth in more populous countries reacts less to a conflict that exceeds 1000 battle-related casualties. In fact, heterogeneity is so large that the standard measure is insignificant now. In column (3) we then run the same analysis with the count of battle-related deaths instead of the dummy. Again, the measure of casualties per capita enters with a negative sign which indicates that the economies of more populous countries are less affected by casualties.

Columns (1) to (3) suggest that the standard model is the wrong model when analyzing growth. Growth seems to be affected less by casualties in populous countries. This findings motivates the use of the per capita model. In column (4) we run the same specification as in column (1) only now we replace the absolute measure by our per capita measure. A civil war year now reduces growth by 3.5 percentage points. This is a striking difference given that we only redrew the line of what qualifies as a civil war but did not change the total number of civil war observations. Column (4) uses the current population to calculate violence intensities. The fact that there is almost no change in the coefficient indicates that it is the general scale of countries and not smaller variations of population that determine the difference to column (1).

In Table 2 we find that the switch to the per capita model increased the size of the estimated coefficient α in equation (5) by more than 20 percent. In Table (3) we run some robustness checks regarding this increase. In columns (1) and (2) we use only data after 1989. Estimates in the standard and in the per capita model increase. The point estimate in the per capita model is now more than 40 percent higher. In columns (3) and (4) we restrict the sample to countries below the mean income. The per capita estimate is about 30 percent higher now.

Columns (5) and (6) of Table 3 restrict the sample to countries with an average population of less than 10 million. As expected, the impact of civil war in the standard model increases compared to the main estimate in column (1) of Table (2). At the same time the difference to the per capita model disappears - both models now suggest a similar growth impact of over -4.5 percent. This highlights the fact that the heterogeneity in population in the sample is what really drives a wedge between the per capita and standard model. When this heterogeneity is

[7] We use average population to avoid that time variation in population drives results.

restricted, the two models yield similar results.

The per capita and standard model make different assumptions regarding what counts as more intense violence. If the per capita model is correct in the context of economic growth then counts of casualties should be an imperfect measure of intensity. One simple way to check this empirically is to run the regression

$$g_{ct} = \sum_{i=1}^{10} \alpha_i W_{i,ct} + \mu_c + \eta_t + \epsilon_{ct}$$

where $W_{i,ct}$ are now a set of dummies that capture deciles of violence intensity in the two models. In the standard model we group all country/years according the number of battle-related deaths such that $W_{1,ct}$ captures the 10 percent of violent country/years with the lowest number of battle-related deaths. In the per capita model we group all country/years according to the number of battle-related deaths per population.

In Figure 2 we show the estimated α_i coefficients in the standard model, i.e. with growing intensity deciles. At an intensity of 6 the negative growth impact of violence becomes significant. However, this is reversed at an intensity of $i = 9$. We have $\hat{\alpha}_9 > \hat{\alpha}_8$ and cannot reject the hypothesis that $\hat{\alpha}_9 = 0$. Figure 2 also shows an example to illustrate the role of population in this reversal. The decile $i = 9$ contains the year 1991 in India (average population of over 840 Million) and the year 1979 in Nicaragua (average population of 3.8 million).

Figure 3 displays the estimated α_i in the per capita model. Now the Indian civil war episode in 1991 is coded as an event of intensity $i = 4$ while the civil war in Nicaragua falls in the most intense violence category. The impact on the ordering of the estimated α_i is shown in figure 3. There is a now a much clearer negative trend after an intensity of 4 with coefficients becoming significant at $i = 6$ and no reversal at $i = 9$.

By and large, the standard model appears to be the wrong model when trying to explain per capita growth. This does, of course, not mean that the standard model is not valid in other applications. But the results in this section put into question its universal validity.

5 Discussion

There is a broad consensus in the conflict literature regarding the use of counts of casualties or violence events as the measure of conflict intensity. We have argued that with regional units that are heterogenous in population the use of absolute counts imposes a particular model which should be made explicit and, perhaps, questioned. We suggest an alternative model that we call the per capita model. In this model casualties are weighted by population to give a measure of violence risk.

We have contrasted the two models by running standard cross-country growth regressions in both of them. The per capita model appears to capture intensity of conflict better in this context. We have shown that intensity in the standard model leads to growth effects that are non-monotonic in intensity. This can be explained by the fact that very populous countries, which are less affected by casualties, are mixed with less populous countries in this model. In the per capita model higher intensity is a better predictor of larger economic damage. This implies that the standard model could have led to an underestimate of the economic impact of violence on economic activity in existing studies.

The distinction between standard and per capita could also be relevant in the analysis of the causes of civil war. A central theoretical idea in this area is that conflict increases if the opportunity costs of conflict at the individual level decrease. If income from agriculture falls in a drought, for example, then violence increases because opportunities of non-violent activities decrease. This mechanism works at the individual level. Shocks to per capita income should therefore lead to patterns more in line with the per capita view. If 10 million individuals lose their livelihoods in a drought then this should, a priori, lead to more violence than if 10,000 individuals lose their livelihoods.

The option of the per capita and the standard model introduces a new perspective on existing empirical findings. Miguel et al (2004), for example, use the standard model when they run their analysis of weather shocks on conflict. As they do not provide a model of the mechanism at work it hard to say what can explain the empirical pattern they find. But if the standard model is correctly used then it must be a mechanism that is valid at the state level, not at a more disaggregate level. Income shocks then trigger violence because they lead to a government crisis - not because they lower the opportunity cost to violence. This interpretation would be in line with Bazzi and Blattmann (2011) who suggest that the mechanism that links commodity price shocks and civil wars might be operating through the fragility of the state. If this is true then economic shocks lead to violence because they weaken the state and it is correct to use the standard model.

While these conjectures are highly speculative they illustrate the main point of this article. The empirical literature on the causes and consequences of civil war needs to put its foot down regarding the mechanisms behind its empirical specifications. As a rule of thumb, state-centred theories should use the standard model while economic/opportunity cost channels should use the per capita model. The fact that the opportunity cost channel and the state fragility channel operate at different scales could be used to tell them apart empirically.

The current surge in disaggregated data makes these issues even more important. In most cases it will be theoretically inconsistent to use the standard model at different levels of aggregation. If the standard model is valid at the micro level, then more micro units will produce more violence which makes the standard model invalid at the country level. A theory-driven approach is needed to link country and micro findings.

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A Scalability in Esteban, Mayoral and Ray (2012)

Esteban, Mayoral and Ray (2012) derive conflict as a function of three indexes (P, F and G) constructed from data on ethnic groups. In their main specifications, per capita violence effort is proxied by the PRIO 25 battle-deaths dummy. Note that events with less killings are hard to detect so that both the per capita and standard model would yield the same coding at this threshold.

Section V, in their paper studies the role of public and private rents for conflict.[8] According to their theory, per capita conflict should increase when a high degree of publicness in the nature of the conflict coincides with high ethnic polarization. The results here are particularly interesting as the interaction between ethnic composition and economic incentives provides richer time variation.

Table A1, column (1) reproduces the specification from Table 9 column (1) which uses the 25 death threshold. The coefficients show that conflict is triggered by publicness for highly polarized countries and by privateness for highly factionalized countries. Column (2) uses the data in Esteban, Mayoral and Ray (2012) to run a robustness check with the standard model and the 1000 threshold. Results are not robust. Only the Gini index (G/N) predicts conflict. In other words, the specification from column (1) does not scale up to intense conflicts.

Column (3) runs the same analysis with the per capita model - results are now almost identical to column (1). In other words, the low 25 threshold might indeed be a proxy for per capita violence effort. Column (4) omits the population control. Results are robust to this.

B Data Sources

In our study of growth we try to build a panel of as many countries as possible that reaches as far back as possible. We use data on battle-related deaths by Lacina and Gleditsch (2005) between 1946 and 1989. This data is complemented by the compatible UCDP Battle-Related Deaths Dataset v.5-2013. In both of these datasets we used the "best" estimate where possible and the average between low and high when no "best" estimate was available. In order to be as consistent as possible with the casualties data we generate the absolute value dummies from the data of battle-related deaths.

Due to its large coverage of countries we merge this data with the Penn World Tables data version 7.1 from Heston et al (2012). We use real per capita GDP data (rgdpl) and calculate growth as the percentage point increase of per capita GDP compared to the previous year.

[8] For details regarding the variables and data used see the original paper.

Table 1: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
battle-related deaths (in thousand)	0.38	3.47	0	150
population (in thousand)	29038	107534	12	1330141
growth	2.23	7.04	-65	115
standard model				
1000 casualties dummy	0.052	0.222	0	1
25 casualties dummy	0.127	0.333	0	1
per capita model				
civil war (average pop)	0.052	0.222	0	1
civil war (current pop)	0.052	0.221	0	1

Table 2: Civil War and Growth in the Cross-Country Model

VARIABLES	(1) growth	(2) growth	(3) growth	(4) growth	(5) growth
civil war (standard model)	-2.818***	-1.124			
	(0.634)	(0.784)			
civil war (standard model) / population		-18,072***			
		(6,511)			
civil war (per capita model)				-3.459***	-3.531***
				(0.699)	(0.715)
battle-related deaths			0.100*		
			(0.0600)		
battle-related deaths / population			-3.003***		
			(0.431)		
country fixed effects	yes	yes	yes	yes	yes
year fixed effects	yes	yes	yes	yes	yes
Observations	8,642	8,642	8,642	8,642	8,642
R-squared	0.050	0.052	0.061	0.053	0.053
Number of countryid	187	187	187	187	187

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. "Civil war (standard model)" is a dummy that takes a value of 1 if the number of battledeaths exceeds 1000. "Civil war (per capita model)" is a dummy that takes a value of 1 if the number of battle-related deaths per population exceeds a threshold. The threshold is chosen such that there are exactly as many civil wars in the sample as in the standard model. Columns (2)-(4) use average population, column (5) uses current population.

Table 3: Robustness Checks

VARIABLES	(1) growth	(2) growth	(3) growth	(4) growth	(5) growth	(6) growth
civil war (standard model)	-3.165***		-2.756***		-4.777***	
	(1.063)		(0.627)		(1.053)	
civil war (per capita model)		-4.503***		-3.512***		-4.495***
		(1.386)		(0.740)		(1.073)
country fixed effects	yes	yes	yes	yes	ye	yes
year fixed effects	yes	yes	yes	yes	yes	yes
Observations	3,866	3,866	5,763	5,763	5,874	5,874
R-squared	0.063	0.069	0.048	0.052	0.051	0.051
Number of countryid	187	187	124	124	134	134

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. "Civil war (standard model)" is a dummy that takes a value of 1 if the number of battledeaths exceeds 1000. "Civil war (per capita model)" is a dummy that takes a value of 1 if the number of battle-related deaths per population exceeds a threshold. The threshold is chosen such that there are as many civil wars in the sample as in the standard model. Columns (1) and (2) use only data after 1989. Columns (3) and (4) use only data from countries with a GDP per capita below the mean. Columns (5) and (6) use only countries with an average population of less than 10 million.

Table A1: Scale in Esteban, Mayoral and Ray (2012)

VARIABLES	(1) low intensity conflict	(2) civil war (standard model)	(3) civil war (per capita model)	(4) civil war (per capita model)
P	-3.313	5.594	0.716	-0.844
	(4.143)	(3.751)	(4.509)	-4.335
F	0.727	0.755	0.531	0.336
	(0.578)	(0.755)	(0.836)	-0.807
G/N	-5.073	-18.74**	-5.340	-2.431
	(5.379)	(8.337)	(5.856)	-3.587
P * public price	17.38***	6.940	13.71**	13.06**
	(5.226)	(5.335)	(5.864)	-5.823
F * private price	2.529***	1.299*	2.212***	2.143***
	(0.861)	(0.696)	(0.818)	-0.825
(G/N) * public price	-0.720	6.571	0.0678	2.06
	(6.553)	(9.531)	(7.569)	-6.216
controls	yes	yes	yes	yes*
Observations	1,104	1,104	1,104	1,104

Robust standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Column (1) recreates column (1) in Table 9 of Esteban, Mayoral and Ray (2012). Column (4) omits population as control variable.

Figure 1: Population and Prevalence of Civil War

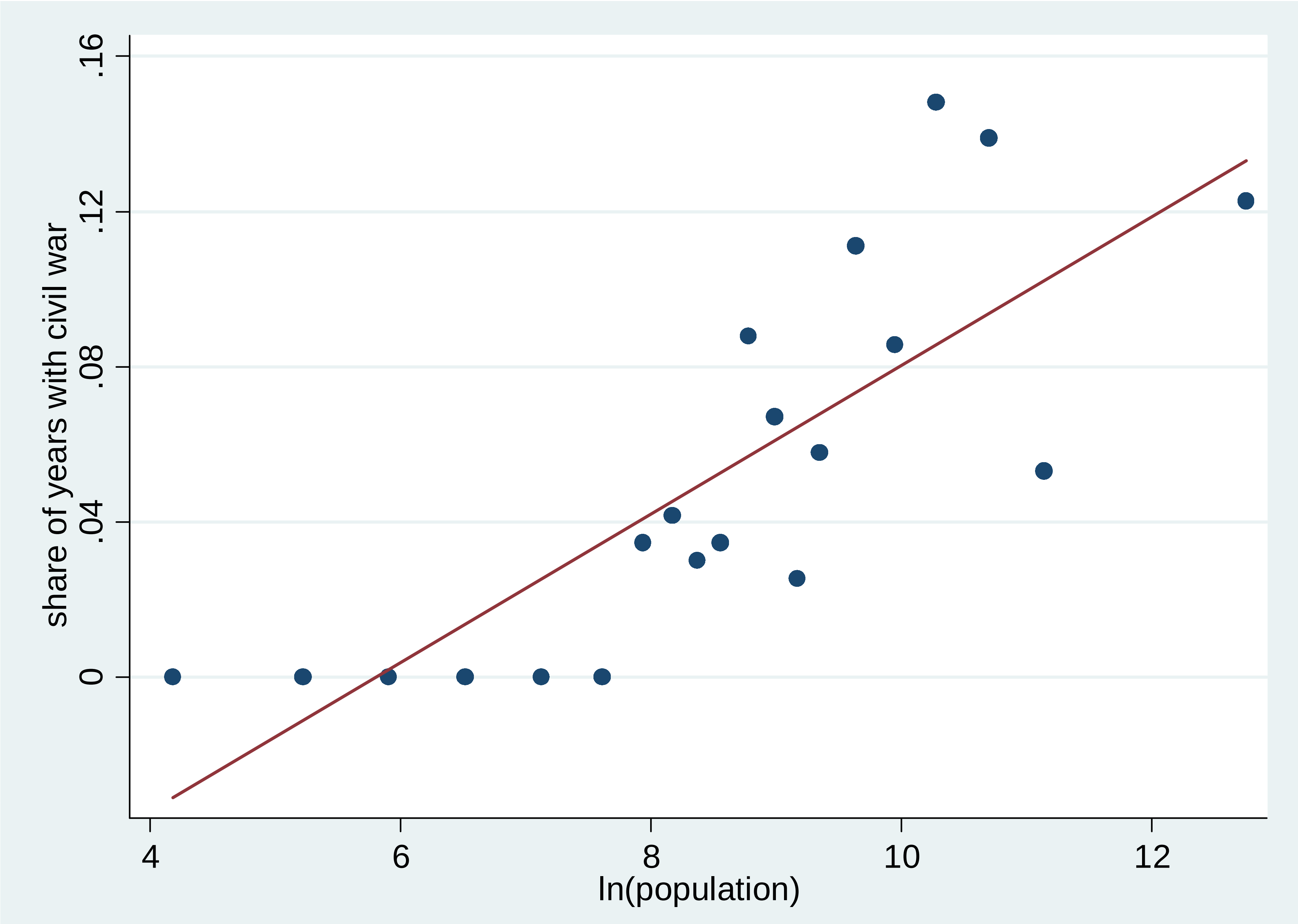
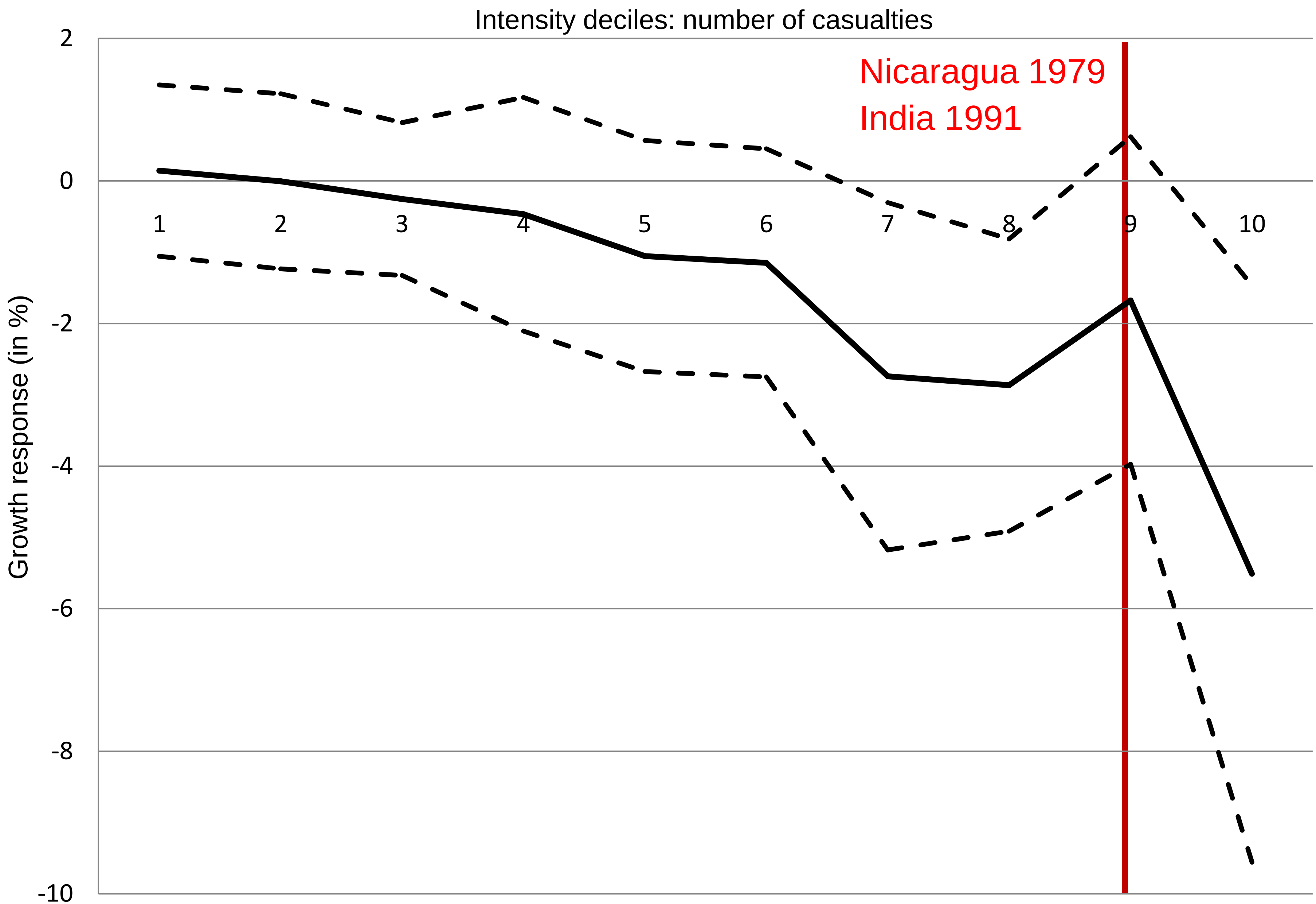
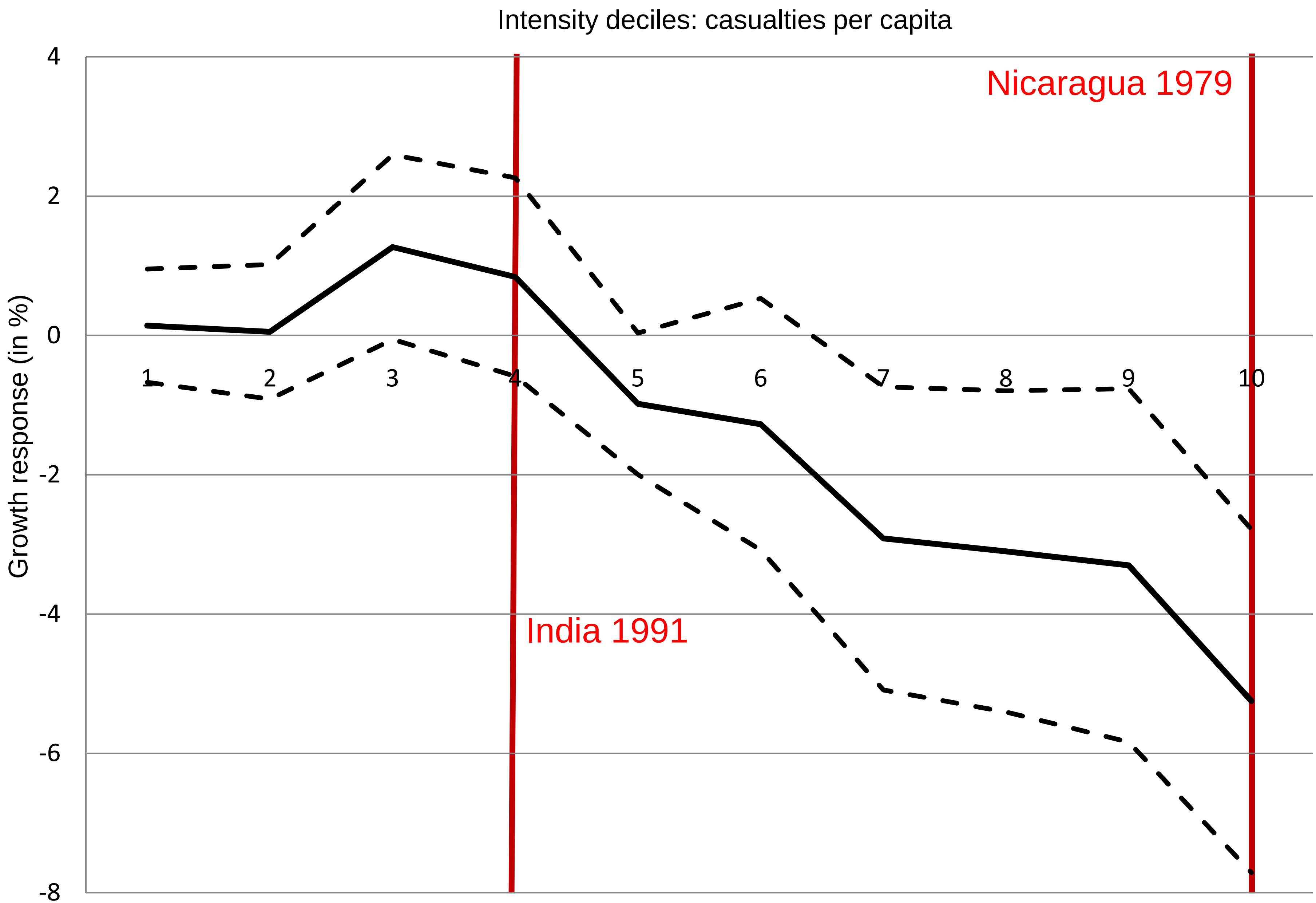


Figure 2: War Intensity and Growth in the Standard Model



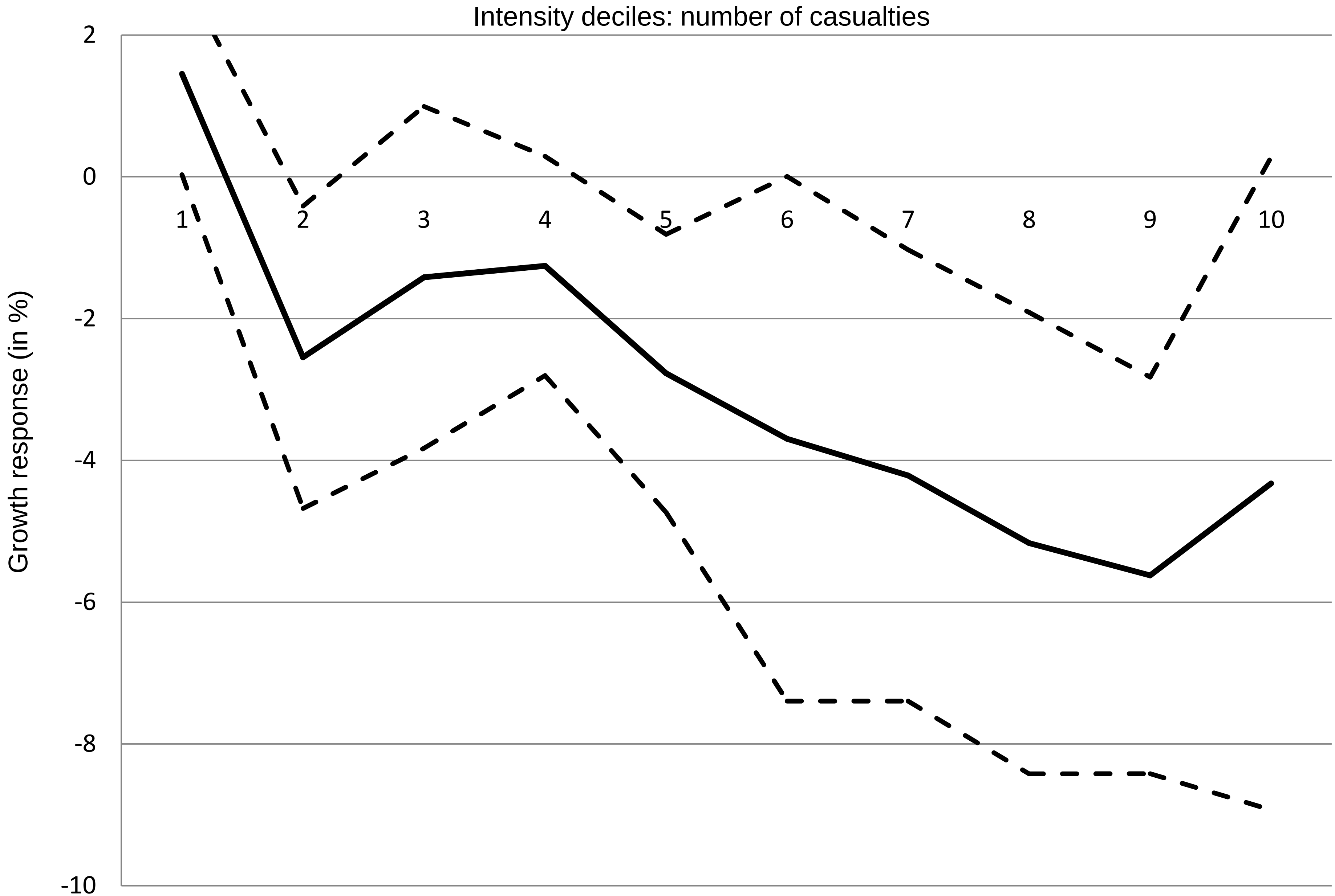
The figure shows coefficients of a regression of GDP per capita growth on 10 intensity decile dummies, country and year fixed effects. Dotted lines indicate 95 percent robust confidence intervals.

Figure 3: War Intensity and Growth in the Per Capita Model



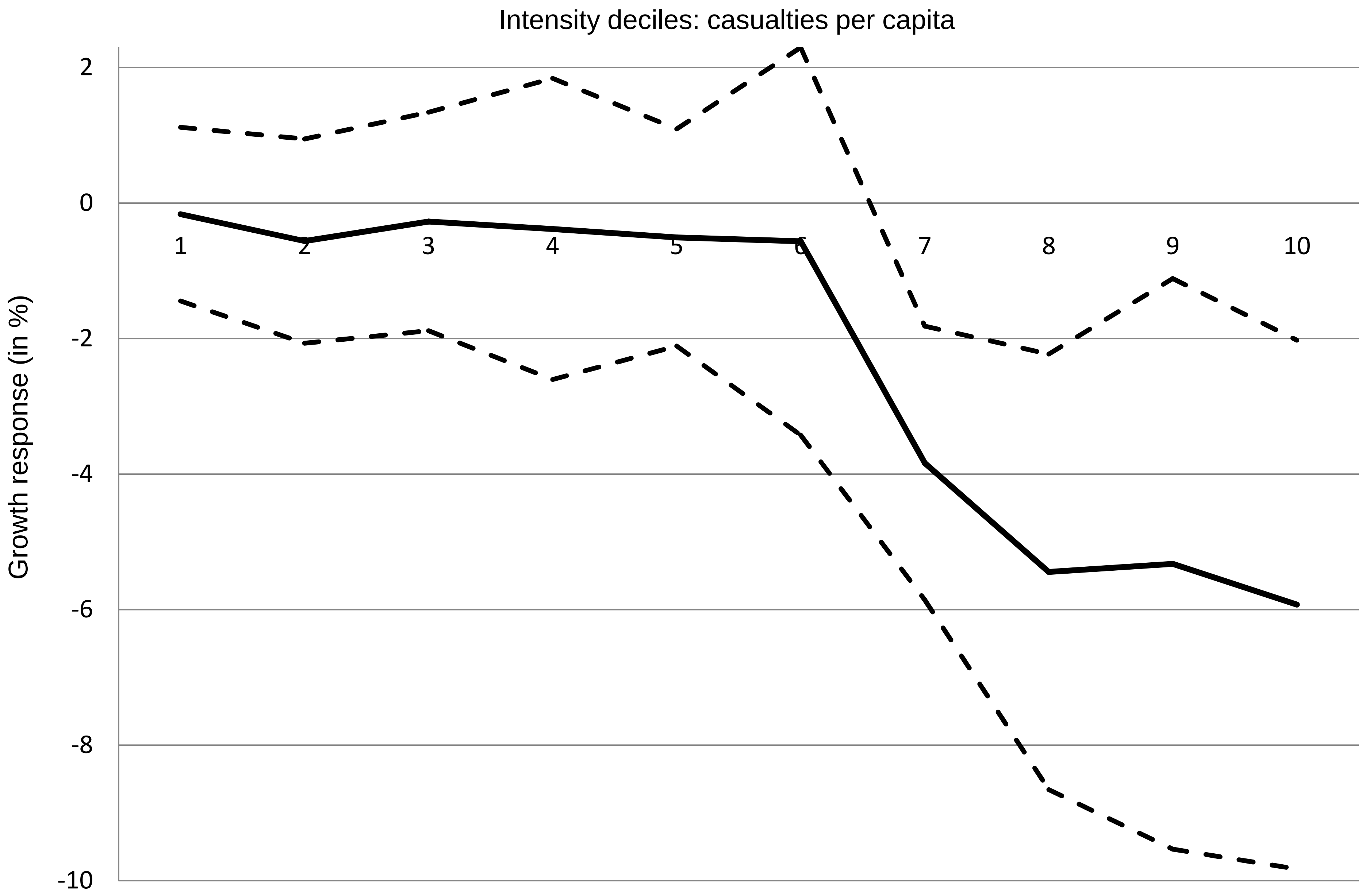
The figure shows coefficients of a regression of GDP per capita growth on 10 intensity decile dummies, country and year fixed effects. Dotted lines indicate 95 percent robust confidence intervals.

Figure A1: War Intensity and Growth in the Standard Model (post Cold War)



The figure shows coefficients of a regression of GDP per capita growth on 10 intensity decile dummies, country and year fixed effects. Dotted lines indicate 95 percent robust confidence intervals.

Figure A2: War Intensity and Growth in the Per Capita Model (Post Cold War)



The figure shows coefficients of a regression of GDP per capita growth on 10 intensity decile dummies, country and year fixed effects. Dotted lines indicate 95 percent robust confidence intervals.