Caught in a Trap: Simulating the Economic Consequences of Internal Armed Conflict*

Joan Margalef† Hannes Mueller‡

August 31, 2026

Abstract

While a year of internal armed conflict has modest effects on economic growth, conflict trap dynamics determine how these effects amplify over time. This paper studies the role of these dynamics in shaping the long-run economic costs of conflict. We develop a Markov model of the conflict trap, estimate it using cross-country panel data, and simulate the distribution of conflict trajectories and their associated growth paths. This allows us to study how growth effects compound with conflict trap dynamics. We can also analyze growth conditional on specific conflict histories. Our results show that conflict dynamics map modest growth effects into large long-run losses and account for substantial variation in outcomes. While a conflict year reduces GDP per capita growth by about 3 percentage points, the mean long-run loss is 17 percent. Losses are about 8 percent in countries we classify as peace-prone and rise to 31 percent in conflict-prone countries. Full recovery after conflict is rare, and more persistent conflict trap dynamics lead to higher growth volatility. Relapse risk is a key factor behind these outcomes. Policies that reduce recurrence can therefore yield disproportionately large benefits, especially in conflict-prone countries.

Keywords: Internal armed conflict, Development, Conflict trap, Growth

JEL Classification: D74, O11, O40

*This paper originated in a collaboration between Open Philanthropy and the Fundació d'Economia Analítica. Margalef acknowledges the financial support from the FPI grant of the Spanish Ministry of Science, Innovation and Universities (PRE2020-093943). Mueller acknowledges financial support from AEI/MICINN (ATR2023-144291), and from the European Research Council under Horizon Europe (Grant agreement 101055176, ANTICIPATE). We acknowledge financial support from the Severo Ochoa Programme for Centres of Excellence in R&D (Barcelona School of Economics CEX2024-001476-S), funded by MCIN/AEI/10.13039/501100011033. All errors are ours.

†United Nations University - World Institute for Development Economics Research. Email: joan.margalef.uni@gmail.com. Address: Katajanakanlaituri 6 B, 00160 Helsinki, FINLAND. (Corresponding Author)

‡IAE (CSIC), Barcelona School of Economics and CEPR. Email: h.mueller.uni@gmail.com.

1 Introduction

Many low-income countries struggle to close the gap with the world's income frontier. A large share of these countries has experienced internal armed conflict.[1] While a year of conflict has modest effects on economic performance—reducing annual GDP per capita growth by about 2 percentage points[2]—large long-run differences can arise from the self-perpetuating dynamics of conflict, often referred to as the *conflict trap*. Conflict episodes tend to last several years, and even after fighting ends, the risk of renewed outbreak remains high: about half of countries relapse before reaching seven years of peace.[3] As a result, losses accumulate over time, and studies tracking post-onset growth dynamics find cumulative losses exceeding 15 percent after a decade.[4]

Yet how much of this long-run cost comes from the conflict trap dynamics, rather than from the initial outbreak itself, has received little attention. Existing long-run estimates do not separate conflict trap dynamics from the growth effect of the initial conflict. Instead, they estimate average effects which bundle the initial shock with the effects of subsequent periods of conflict, recovery, and renewed outbreaks.

To address this gap, this paper studies the role of conflict trap dynamics in shaping the long-run economic costs of conflict. We develop a probabilistic model of the conflict trap that simulates conflict histories and the growth paths associated with them. The simulation approach allows us to study how growth effects compound with conflict trap dynamics. By generating the full distribution of conflict trajectories, we characterize—beyond the average response to an outbreak—the full distribution of long-run losses and assess the implications for post-conflict recovery and growth volatility. The model also allows us to study growth conditional on specific conflict histories. We use this feature to isolate the role of relapse risk.

Following the conflict literature, we model conflict trap dynamics as a Markov process (Besley & Mueller, 2012; Besley et al., 2024; Hegre et al., 2013). To capture post-conflict

[1] See Corral et al. (2020), Johnson and Papageorgiou (2020), and World Bank (2011). Violent conflict has long been linked to adverse long-run development outcomes (Besley & Persson, 2011b; Collier, 2007; North et al., 2009; Rodrik, 1999).

[2] A contemporary loss of 2.2 percentage points is the common benchmark (Collier, 1999). Similar effects are found in (Gates et al., 2012; Mueller, 2016). Higher estimates, ranging from 4 to 6 percentage points, are reported by Mueller (2012) and Mueller (2016). Estimates of about 1 percentage point are reported by Abadie and Gardeazabal (2003), Bove et al. (2017), Costalli et al. (2017), and De Groot et al. (2022).

[3] This is calculated using the probabilities estimated in the model. Conflict traps are reinforced by deteriorating material conditions and social ties (Rohner & Thoenig, 2021; Rohner et al., 2013), which makes past conflict a strong predictor of future conflict (Hegre et al., 2017; Mueller & Rauh, 2022).

[4] Evidence shows cumulative GDP per capita losses of roughly 15–35 percent after a decade (Crippa et al., 2025; Mueller, 2012; Novta & Pugacheva, 2021). Long conflict durations are also associated with large losses (Collier, 1999; De Groot et al., 2022).

risk, we extend the basic two-state model of peace and conflict by introducing multiple post-conflict peace states. Each state has its own distribution of GDP per capita growth. Using cross-country panel data, we estimate the transition probabilities and the growth distributions. We then simulate conflict paths following an outbreak and apply the corresponding growth effects at each period. This simulation approach bridges annual within-country estimates to long-run outcomes and yields the full distribution of losses. To assess differences in the severity of the conflict trap, we cluster countries as peace-prone and conflict-prone and apply the methodology separately to each group.

Our results show that conflict trap dynamics map modest direct growth effects into large long-run losses. While a year of conflict reduces GDP per capita growth by about 3 percentage points, conflict trap dynamics lead to a mean loss of 17 percent after thirty years. Conflict trap dynamics also generate substantial dispersion: losses range from about 3 percent to 37 percent.[5] Mean long-run losses are about 8 percent in peace-prone countries and exceed 31 percent in conflict-prone countries. Differences in conflict trap dynamics are therefore central to long-run outcomes. Full recovery after conflict is rare, and more persistent conflict trap dynamics increase growth volatility. We show that relapse risk is a key factor behind these outcomes.

Doing better or worse within the conflict trap thus shapes a country's long-run development path. Because most long-run losses arise from conflict persistence rather than the initial shock, policies that reduce recurrence can yield disproportionately large benefits, especially in conflict-prone countries. Furthermore, because conflict trap dynamics generate substantial dispersion in outcomes, estimating the economic costs of conflict benefits from a distributional perspective.

Our model integrates conflict trap dynamics into the empirical analysis of the costs of internal armed conflict, a literature that has followed two main approaches. A first strand estimates growth losses during conflict years (Collier, 1999; Costalli et al., 2017; Gates et al., 2012; Mueller, 2016). This yields a measure of the direct economic costs incurred while conflict is active, but does not attribute losses from subsequent outbreaks to the initial conflict. A second strand estimates post-onset growth dynamics (Abadie & Gardeazabal, 2003; Cerra & Saxena, 2008; International Monetary Fund, 2026; Mueller, 2012). This captures how losses accumulate over longer horizons, but bundles the direct effect of the initial outbreak with the effects of conflict trap dynamics.

We make three contributions. First, we decompose the cost of conflict into contemporaneous growth effects and conflict trap dynamics, estimating each separately and recombining them. This decomposition reconciles the modest within-country growth effect of a conflict year

[5] This range corresponds to the 10th and 90th percentiles of the simulated distribution.

with the large long-run income gaps across countries, and shows that conflict trap dynamics drive long-run outcomes. While the literature emphasizes that the conflict trap impedes macro development (Collier et al., 2003; Rohner & Thoenig, 2021; Rohner et al., 2013), to our knowledge, this paper is the first to explicitly model and isolate the role of trap dynamics in generating those losses.

Second, we broaden the scope of the analysis. Our simulation-based approach estimates the full distribution of losses, rather than focusing only on average effects. This allows us to both study conditional growth histories and longer horizons, while avoiding the sample-size constraints that limit reduced-form estimators. We use this to show that relapse risk plays a crucial role—a factor that is otherwise hard to quantify.

Third, we show that conflict trap dynamics account for an important share of the heterogeneity in long-run outcomes.[6] Existing estimates of the long-run economic costs of conflict diverge widely across studies (Crippa et al., 2025). For example, Mueller (2012) report losses of 18 percent after a decade, Novta and Pugacheva (2021) estimate 28 percent, and Crippa et al. (2025) report 35 percent. Bove et al. (2017) also documents substantial variation within their sample. If data restrictions or conflict definitions select samples with different underlying conflict trap dynamics, long-run cost estimates can differ substantially.

This model also relates to the debate on post-conflict recovery. Standard macroeconomic theory predicts strong post-war growth as capital adjusts to higher productivity, implying a recovery that offsets initial conflict costs. While there is empirical support for recovery in external wars (Brakman et al., 2004; Davis & Weinstein, 2002; Miguel & Roland, 2011; Organski & Kugler, 1977), evidence for internal conflicts is weaker (Crippa et al., 2025; Mueller, 2012; Novta & Pugacheva, 2021).[7] Some evidence nevertheless shows supra-normal growth following internal armed conflict (Chen et al., 2008; Collier & Hoeffler, 2004). Consistent with this evidence, we find that although there are signs of post-conflict growth rebounds, these gains are insufficient to offset cumulative losses.

Furthermore, reduced-form studies analyzing post-conflict growth often focus on periods of sustained peace after conflict, which can introduce selection problems. For example, Chen

[6] We document this within samples, through differences in tail outcomes; and across samples, by comparing conflict-prone and peace-prone countries.

[7] One explanation is that internal wars generate persistent economic damage through the slow and incomplete recovery of human capital (Barro & Sala-i-Martin, 2004), institutional deterioration and criminal activity that divert resources from productive investment (Pinotti, 2015), trust erosion (Rohner et al., 2013), and persistent supply-chain disruptions (Couttenier et al., 2022). See also Akresh et al. (2012), Blattman and Annan (2010), Ichino and Winter-Ebmer (2004), Korovkin et al. (2024), León (2012), and Tapsoba (2023). For a recent review, see Vesco et al. (2025).

et al. (2008) condition on at least ten consecutive years of peace to analyze the aftermath of conflict—and find strong recovery. International Monetary Fund (2026) distinguishes between episodes that relapse and those that sustain at least five years of peace, finding weaker recovery when peace remains fragile. By splitting the post-conflict period into Markov states, we can embed relapse risk directly into the expected post-conflict trajectory. We find that the post-conflict phase is not a guarantee of recovery; rather, it is expected to incur more losses due to renewed conflict.

Our conflict-trap model also generates adverse growth cycles that relate to work on growth and volatility (Berg et al., 2012; Easterly et al., 1993; Ramey & Ramey, 1995), including studies of cyclical growth patterns in emerging economies (Aguiar & Gopinath, 2007; Garcia-Cicco et al., 2010). Aguiar and Gopinath (2007) note that emerging market growth is characterized by shocks to trend growth rather than transitory fluctuations around a stable trend. In other words, growth histories in emerging markets are characterized by long-lasting episodes in which economic growth is consistently low, followed by sudden growth spurts with a different trend growth. We show that conflict traps generate similar dynamics.

This paper is structured as follows. The next section describes the model of the conflict trap. Section 3 presents the model's estimation, including the definition of conflict and the methodology for classifying countries. Section 4 presents and discusses the main results. Section 5 reports alternative specifications using different definitions of conflict. The final section concludes.

2 A model of the conflict trap

This section presents our empirical model of the conflict trap. The main assumption is that a country's transition between conflict and peace follows a discrete-time Markov process.

Let s_t represent the state at period t. It can take values from the state space defined as $S = \{0, 1, \ldots, i, \ldots, \tau, \tau + 1\}$. When $s_t = 0$, the country is in the state of *conflict*. When $s_t = k$ s.t. $k \in [1, \tau]$, the country is in the kth consecutive year of post-conflict peace. States 1 to τ capture the post-conflict period in a strict chronological order. We refer to this post-conflict peace phase as *unstable peace*. Finally, when $s_t = \tau + 1$, the country is in *stable peace*, which represents a state that is not conditioned by past conflict.

When a country is in conflict ($s_t = 0$), it can either stay in conflict or transition to the first year of post-conflict peace ($s_t = 1$). When a country is in its first year of peace, it can either return to conflict or transition to the second year of post-conflict peace ($s_t = 2$). This pattern repeats until the country reaches τ consecutive years of post-conflict peace ($s_t = \tau$). At this point, the country can either go back to conflict or transition to stable peace ($s_t = \tau + 1$). The parameter τ determines the threshold of consecutive years of peace needed to escape from the conflict trap. Finally, a country in stable peace can either return to conflict or stay in stable peace.[8]

By the structure of the Markov process we assume, a country can only transition in two directions, to conflict or to one more year of peace. This allows us to simplify the notation of the transition probabilities, making π_i the probability of transition to conflict from state i. Thus, $1 - \pi_i$ is the probability of adding a year of peace from state i. The transition matrix is

$$\mathbf{\Pi} = \begin{pmatrix} \pi_0 & 1-\pi_0 & 0 & 0 & \dots & 0 & 0 \\ \pi_1 & 0 & 1-\pi_1 & 0 & \dots & 0 & 0 \\ \pi_2 & 0 & 0 & 1-\pi_2 & \dots & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots \\ \pi_\tau & 0 & 0 & 0 & \dots & 0 & 1-\pi_\tau \\ \pi_{\tau+1} & 0 & 0 & 0 & \dots & 0 & 1-\pi_{\tau+1} \end{pmatrix}$$

Denote GDP_t as the real GDP per capita when the Markov process is at period t. The realization of the state affects GDP_{t+1} by determining the distribution from which growth, u_{t+1}, is drawn, i.e., $u_{t+1}|s_{t+1} \sim f_{i=s_{t+1}}$. Then, at each period, GDP_{t+1} updates according to

$$GDP_{t+1} = GDP_t(1 + u_{t+1}) \tag{1}$$

For example, if a country is in conflict at period 2 ($s_2 = 0$), u_2 is drawn from f_0. Then, if $u_2 = -0.01$, it implies that GDP per capita is reduced by 1% from period 1 to 2 in the state of conflict.

We consolidate all the growth distributions into a single vector $\boldsymbol{f} = \begin{pmatrix} f_0 & f_1 & \dots & f_{\tau+1} \end{pmatrix}$ which we refer to as *growth vector*. We expect to draw lower growth from f_0 compared to the other elements of the growth vector.

[8] We conduct a robustness check that distinguishes between conflict outbreaks and ongoing conflict. See Section B.1 in the Appendix.

3 Estimation

3.1 Conflict definition and conflict trap's length

The conflict literature has traditionally relied on violence-intensity thresholds to operationalize conflict. Rather than imposing a predefined threshold, we use the data to identify the minimum level of annual per capita violence at which the economy is significantly harmed. We then define a country-year as being in conflict when violence surpasses this threshold.

We use battle-related deaths from the Uppsala Conflict Data Program's Georeferenced Event Dataset (UCDP/GED)[9] together with GDP and population data from the World Bank's World Development Indicators (WB/WDI). The resulting dataset covers 173 countries over the period 1989–2024 (country coverage is reported in Table C1 in the Appendix).

To find the threshold, we identify country-years with violence, arrange them in order of violence intensity, and bin them into deciles. We then run a regression of growth on these deciles with country and time fixed effects. The results are shown in Figure 1, which plots the point estimates along with the 90% (grey bars) and 95% (black bars) confidence intervals (see Table B7 in the Appendix for the corresponding regression results).

A clear pattern emerges in which the most intense conflicts are also associated with the largest contractions in growth. The coefficients for the 7th, 8th, 9th, and 10th deciles are significantly negative at the 10% level. We therefore define conflict as violence exceeding the threshold of the seventh decile, which corresponds roughly to 10 battle-related deaths per million inhabitants.[10] This threshold corresponds to the per capita violence criterion used by the World Bank with UCDP data (World Bank, 2023).

We recognize that the choice of threshold is consequential. The conflict literature has not converged on a single definition, and debate persists particularly over whether conflict should be measured using per capita or absolute deaths. Our preference for per capita violence is motivated by its suitability for studying effects on GDP per capita. Mueller (2016) shows that absolute thresholds make more populous countries more likely to experience conflict; however, these countries are significantly less affected in terms of GDP per capita than less populous countries. Absolute thresholds therefore produce substantially lower estimates of conflict costs.

[9]UCDP defines an event as: "An incident where armed force was used by an organized actor against another organized actor, or against civilians, resulting in at least 1 direct death at a specific location and a specific date". We are using the "best" estimate of fatalities summing all types of violence and aggregating all fatalities for each country-year.

[10]The exact threshold is 9.7 deaths per million inhabitants, which we round for interpretability and comparability.

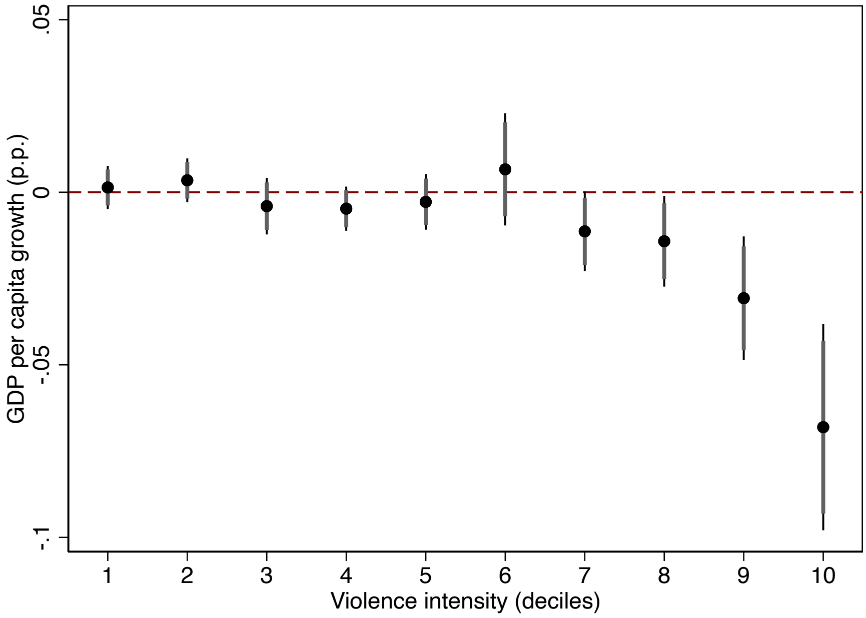


Figure 1: Violence intensity and economic growth

Notes: The figure shows the estimated coefficients from regressing GDP per capita growth on different levels of violence intensity. Violence intensity is quantified by the number of battle-related deaths per capita. GDP per capita growth is regressed on a set of dummies representing the absence of violence and each decile of violence intensity, with country and year fixed effects. Point estimates are displayed as circles where grey bars and black bars indicate significance at 5% and 10% respectively using robust standard errors.
Source: Authors' calculations based on data from the WB/WDI and UCDP/GED.

Novta and Pugacheva (2021) reaches the same conclusion.

To examine how the definition of conflict shapes the results, Section 5 re-estimates the model using alternative definitions of conflict, including higher thresholds of per capita violence as well as the standard absolute threshold of 1,000 deaths. As shown later, higher violence thresholds do not substantially alter the long-run effects, whereas the absolute threshold generates significantly smaller estimates, consistent with previous findings.

The second parameter to determine is the number of consecutive years of peace required to exit the conflict trap (τ). We again use the data to guide this choice. Specifically, we estimate relapse probabilities using the observed share of transitions back into conflict. Figure 2 reports these estimates. The probability of renewed conflict is around 20 percent in the first post-conflict year and declines steadily, stabilizing at about 2 percent once countries have experienced ten or more consecutive years of peace. Since relapse probabilities in years eight and nine are already close to this long-run level and are not statistically different from zero, we set the post-conflict threshold at seven years of peace ($\tau = 7$).[11] This choice implies a total of nine states. We also

[11] Mueller and Rauh (2022) shows that conflict history loses predictive power for renewed outbreaks after

conduct a robustness check using a shorter conflict-trap threshold of four years ($\tau = 4$) (see Section B.2 in the Appendix).[12]

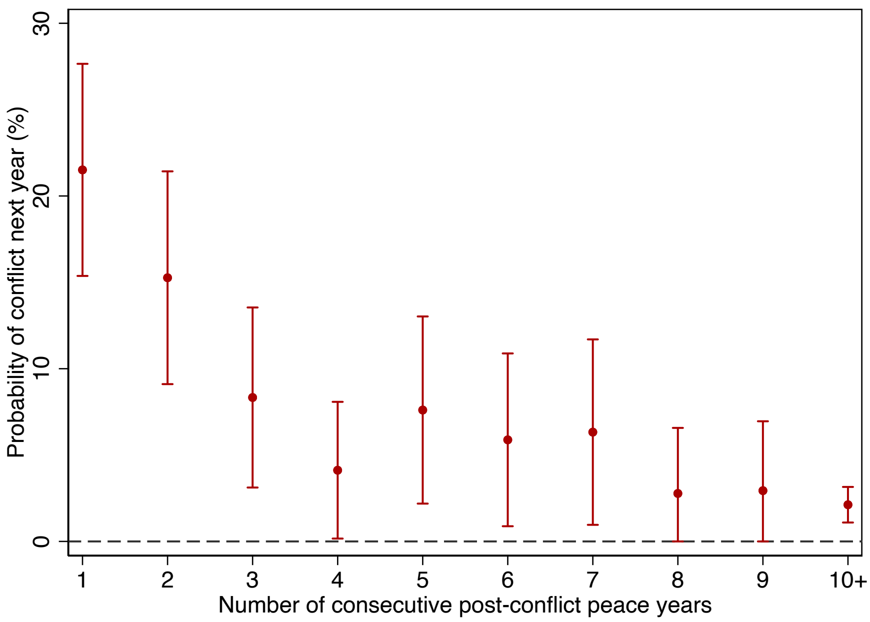


Figure 2: Risk of conflict relapse

Notes: The figure shows the probability of conflict during conflict years and subsequent peace years, estimated from observed transition frequencies in the data. Point estimates are displayed as circles where bars indicate significance at 5% using the Wald method. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants.

Source: Authors' calculations based on data from the WB/WDI and UCDP/GED.

3.2 Classification: peace-prone and conflict-prone countries

To analyze the implications of differences in the severity of the conflict trap, we classify countries into peace-prone and conflict-prone groups using k-means clustering. K-means is an unsupervised algorithm that partitions observations into groups by minimizing within-group variance. We use the share of years a country is in conflict to assign countries to two groups. The elbow criterion and the silhouette index support the choice of two clusters (see Appendix A for more details).

Figure 3 shows the outcome of the clustering exercise. Countries with lower values are

roughly four to ten years of peace.

[12]The estimated long-run losses are slightly smaller under the shorter threshold. This occurs because the shorter trap omits post-conflict years in which relapse risk remains higher than under stable peace. While the stable-peace state then aggregates these higher-risk observations and therefore becomes slightly riskier, their contribution is marginal relative to the full sample. See Section B.2 in the Appendix.

assigned to the *peaceful sample*, while those with higher values are assigned to the *conflict sample*. The algorithm identifies a threshold around 0.25, above which countries are classified as conflict-prone. The peaceful sample comprises 142 countries and 197 conflict years, while the conflict-prone sample comprises 31 countries and 544 conflict years (the country classification is reported in Table C1 in the Appendix). A small set of countries thus accounts for a disproportionate share of conflict years.

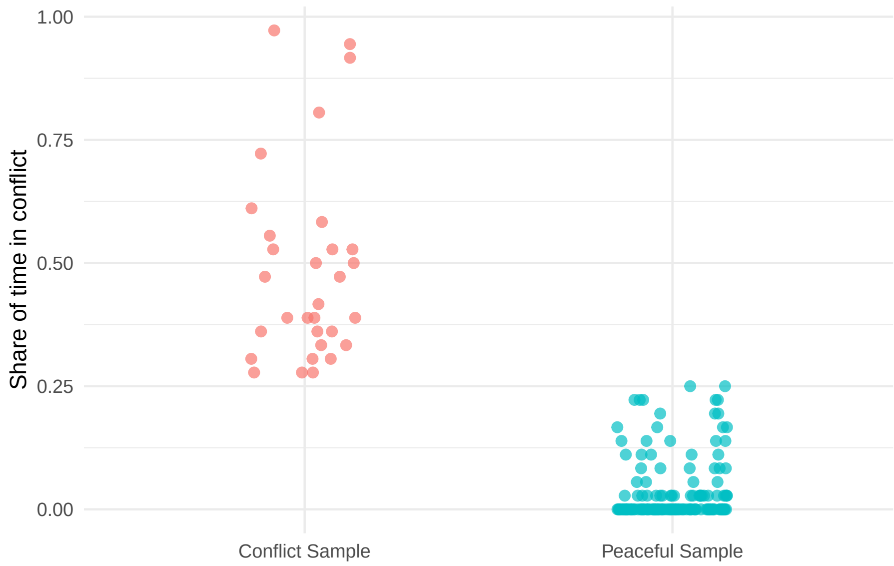


Figure 3: Classification of countries by conflict exposure

Notes: The figure shows the share of years each country is in conflict over the sample period, across the two groups identified by k-means clustering. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants.

Source: Authors' calculations based on data explained in Section 3.

Table 1 summarizes the characteristics of each group by reporting mean values across the variables used in the analysis, together with others commonly associated with conflict in the literature. As implied by the clustering, the conflict-prone sample exhibits nearly twenty times more battle-related deaths per capita and spends about twelve times more years in conflict than the peaceful sample. Peaceful countries are substantially richer, with GDP per capita about four times higher than in conflict-prone countries and average growth rates about 1 percentage point higher. They also display higher levels of democracy, measured by V-Dem's Polity2 index,[13] consistent with the importance of political institutions (Besley & Persson, 2011a; North et al., 2009; Robinson & Acemoglu, 2012). Using data from Montalvo and Reynal-Querol (2005), we find that conflict-prone countries exhibit greater social fragmentation, with higher levels

[13] The index measures the degree of democracy–autocracy and ranges from -10 (fully autocratic) to +10 (fully democratic).

of polarization and fractionalization (Esteban & Ray, 1994; Michalopoulos & Papaioannou, 2016).[14] Finally, they rely more on natural resources, consistent with the resource curse, which links resource dependence to increased incentives for conflict (Bazzi & Blattman, 2014; Berman et al., 2017; Dube & Vargas, 2013; Fearon, 2005; Ross, 2004).

Table 1: Summary statistics

Variable	Aggregate Sample	Peaceful Sample	Conflict Sample
Battle deaths (per million inhabitants)	43.78	10.17	197.70
Share of years in conflict	0.12	0.04	0.49
GDP per capita (2015 USD)	11947.87	13886.38	3068.24
GDP per capita growth (%)	1.87	2.03	1.10
Population (millions)	38.29	39.92	30.82
Democracy index (polity2)	3.12	3.93	0.08
Polarization	0.50	0.47	0.61
Fractionalization	0.37	0.34	0.48
Natural resources (% of GDP)	7.98	6.96	12.67
Number of countries	173	142	31
Number of conflict observations	741	197	544

Notes: The table shows the summary statistics for the full sample and for the groups identified by the clustering procedure. These are means computed as country-level averages and then averaged across countries within each group. Polarization and fractionalization are constructed as the averages of their ethnic and religious components. *Source:* Conflict data come from UCDP/GED. GDP and natural resource data come from the WB/WDI. Democracy is measured using the Polity2 index from V-Dem, and ethnic polarization and fractionalization are from Montalvo and Reynal-Querol (2005).

3.3 Transition matrix and growth vector

We estimate the model on the full dataset and separately on each subsample from the classification exercise. The transition matrix is estimated using the proportion of transitions observed in the data. The corresponding estimates for each group are shown in Table 2. When using the whole dataset, the likelihood of staying in an additional year of conflict is 74%. This leads to an expected duration of uninterrupted conflict of 3.85 years.[15] Once conflict ends, the likelihood of going back to conflict falls dramatically to 22% in the first year after conflict, 15% in the second year, and 6% in the seventh year in peace. Finally, the baseline likelihood of conflict is just 2% in stable peace. On average, it takes 17.84 years, i.e., almost two decades, to escape

[14] Polarization measures the extent to which a society is divided into a small number of similarly sized groups with high internal cohesion and strong between-group differences. Fractionalization measures the probability that two randomly selected individuals belong to different groups. Polarization and fractionalization are constructed as the averages of their ethnic and religious components.

[15] We calculate it using the geometric distribution formula: $1/(1 - \hat{\pi}_0)$.

from the trap.[16]

Table 2: Estimated transition probabilities

	Stay in Conflict	Unstable Peace to Conflict							Stable Peace to Conflict
	$\hat{\pi}_0$	$\hat{\pi}_1$	$\hat{\pi}_2$	$\hat{\pi}_3$	$\hat{\pi}_4$	$\hat{\pi}_5$	$\hat{\pi}_6$	$\hat{\pi}_7$	$\hat{\pi}_8$
AS	0.74	0.22	0.15	0.08	0.04	0.08	0.06	0.06	0.02
PS	0.49	0.15	0.05	0.06	0.01	0.03	0.03	0.07	0.01
CS	0.83	0.30	0.30	0.14	0.10	0.19	0.14	0.06	0.08

Notes: The table shows the estimated transition probabilities for each sample: the aggregate sample (AS), the peaceful sample (PS), and the conflict sample (CS). $\hat{\pi}_i$ denotes the probability of transitioning to conflict from state i, where $i = 0$ is conflict, $i = k$ s.t. $k \in [1, 7]$ is the kth number of consecutive years in post-conflict peace, and $i = 8$ is stable peace. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants. Stable peace is defined as either no prior conflict or more than seven consecutive years of post-conflict peace.
Source: Authors' calculations based on data explained in Section 3.

Comparing the subsamples, countries in the conflict-prone sample face a significantly higher likelihood of transitioning back into conflict in most states. The expected duration of uninterrupted conflict is 1.96 years for the peaceful sample and 5.88 years for the conflict sample. Meanwhile, the expected number of periods in the conflict trap is 11.45 for the peaceful sample and 37.68 for the conflict one. Note that the pattern of high persistence in conflict and falling risks in post-conflict is robust across samples.

To estimate the growth vector, we regress GDP per capita growth on a set of dummy variables d_{ijt} that represents the state of country j at year t, with stable peace as the omitted category. The regression equation is

$$Growth_{jt} = \sum_{i=0}^{\tau} \beta_i d_{ijt} + \mu_j + \gamma_t + \varepsilon_{jt}, \tag{2}$$

where μ_j and γ_t denote country and year fixed effects, respectively. Table 3 reports the results. In the aggregate sample, GDP per capita growth is 2.8 p.p. lower in conflict years, a statistically significant effect that falls within the 2–3 percentage point range reported in the literature (Collier, 1999; Gates et al., 2012; Mueller, 2016).

The estimate is 3.6 p.p. for peace-prone countries and 2.4 p.p. for conflict-prone countries, both statistically significant. This difference between peaceful and conflict-prone countries holds across models and alternative definitions of conflict (see Table 5 in Section 5 and the robustness checks in Appendix B). One possible explanation is adaptation to conflict. Economies

[16] This statistic is obtained using the fundamental matrix of $\hat{\mathbf{\Pi}}$, treating stable peace as an absorbing state. The fundamental matrix is defined as $\boldsymbol{F} = (\boldsymbol{I} - \boldsymbol{Q})^{-1}$, where $\boldsymbol{Q}$ is the submatrix of $\hat{\mathbf{\Pi}}$ excluding the absorbing states.

in conflict-prone countries may become better adjusted to recurrent conflict and therefore experience smaller disruptions, whereas economies in peaceful countries, where conflict episodes are rare, may be less prepared and consequently suffer larger disruptions when conflict occurs. This interpretation is consistent with Collier (1999), who show that countries experiencing conflict shift economic activity toward less conflict-vulnerable sectors. At the micro level, households have been shown to adjust labor supply (Fernández et al., 2014) and alter crop choices to insure against future conflict (Arias et al., 2019).

Note that growth in the first post-conflict year is about 1 p.p. higher than in stable peace across all samples. These are signs of post-conflict recovery, although the effect is not statistically significant. The coefficients for the remaining post-conflict states are very small and statistically insignificant, indicating that growth resembles that in stable peace. As shown later in Section 5, which considers alternative definitions of conflict, the only definition exhibiting strong recovery effects is the absolute threshold of 1,000 deaths, consistent with the literature using this definition (Chen et al., 2008; Collier & Hoeffler, 2004).

Concerns about reverse causality and omitted variable bias naturally arise in this context. However, Novta and Pugacheva (2021) shows that controlling for pre-conflict GDP forecasts does not materially affect estimates of the growth effects of conflict, alleviating concerns about reverse causality. Furthermore, a large body of evidence shows that conflict has substantial causal economic effects at the micro level, including persistent losses in health, education, trust, and firm outcomes (see, for example, Ichino and Winter-Ebmer (2004), Blattman and Annan (2010), León (2012), and Akresh et al. (2012)). Rohner and Thoenig (2021) also argue that conflict effects are likely understated, since the mere risk of conflict induces costly preventive actions that rarely appear in conflict incidence data. Our results are robust to a more demanding specification with country-specific time trends (see Table B8 in the Appendix), and are not affected by concerns about using two-way fixed effects under treatment heterogeneity (Callaway & Sant'Anna, 2021; De Chaisemartin & d'Haultfoeuille, 2020; Sun & Abraham, 2021).[17] Our model is deliberately parsimonious; nevertheless, the estimates are reliable and have a reasonable claim to identification and external validity.

Since stable peace is the omitted category, we normalize growth for this state to 0, i.e. $\hat{f}_{\tau+1} = 0$. For the rest of the states, the growth distribution follows a normal distribution with the estimated coefficient as the mean and the standard error as the standard deviation. Formally, for $h \in S$ s.t. $h \leq \tau$, $\hat{f}_h = \mathcal{N}(\hat{\beta}_h, \hat{\sigma}_h^{SE})$ with $\hat{\sigma}_h^{SE}$ being the standard error of β_h. Therefore,

[17] See De Chaisemartin and d'Haultfoeuille (2023) for a related survey. Using the `twowayfeweights` command, we find that negative weights are small, accounting for about 8% of the total and summing to -0.0121.

Table 3: Estimation of the growth vector

	Aggregate Sample	Peaceful Sample	Conflict Sample
	GDP per capita Growth		
Conflict	-0.0282***	-0.0360***	-0.0243**
	(0.00650)	(0.00931)	(0.0106)
1st Year Post-conflict Peace	0.0102	0.0106	0.0102
	(0.00803)	(0.00977)	(0.0115)
2nd Year Post-conflict Peace	-0.00235	0.0000537	-0.00856
	(0.00682)	(0.00945)	(0.00904)
3rd Year Post-conflict Peace	-0.00288	0.00299	-0.0191
	(0.00561)	(0.00624)	(0.0124)
4th Year Post-conflict Peace	0.00242	0.00573	-0.00822
	(0.00496)	(0.00604)	(0.00910)
5th Year Post-conflict Peace	-0.00381	-0.00611	-0.000430
	(0.00513)	(0.00620)	(0.0106)
6th Year Post-conflict Peace	-0.00119	-0.000112	-0.0118
	(0.00405)	(0.00437)	(0.0102)
7th Year Post-conflict Peace	-0.000153	-0.00230	0.00502
	(0.00454)	(0.00522)	(0.0110)
Observations	6080	5041	1039
Country FE	✓	✓	✓
Time FE	✓	✓	✓
(Within country) R^2	0.103	0.121	0.106

Notes: The table shows the regression results from Equation 2 for each sample: the aggregate sample, the peaceful sample, and the conflict sample. GDP per capita growth is regressed on a set of dummies representing each state, with country and year fixed effects. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants. The base category is stable peace, defined as either no prior conflict or more than seven consecutive years of post-conflict peace. Robust standard errors are in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.
Source: Authors' calculations based on data explained in Section 3.

the estimated growth vector is given by the growth estimates from Table 3 with a 0 added from the benchmark stable peace: $\hat{\boldsymbol{f}} = \left(\mathcal{N}(\hat{\beta}_0, \hat{\sigma}_0^{SE}) \quad \mathcal{N}(\hat{\beta}_1, \hat{\sigma}_1^{SE}) \quad \dots \quad 0\right)$. This means that GDP per capita growth is stochastic for all states but not for stable peace due to the 0 growth normalization that we impose. Assumptions regarding the baseline growth do not affect the relative GDP losses we show in the results.

3.4 Simulation

Given an estimated transition matrix ($\hat{\mathbf{\Pi}}$) and the growth vector ($\hat{\boldsymbol{f}}$), we simulate growth paths as countries move through the state space.

Countries start with a given level of GDP per capita and in the state of conflict.[18] We treat stable peace as an absorbing state ($\pi_8 = 0$) to provide a fair comparison with a benchmark country that remains always in stable peace. In each period, we first draw the next state from the estimated transition matrix and then draw GDP growth from the distribution associated with the realized state in the growth vector. This procedure is iterated over a horizon of 30 periods. We repeat the simulation 10,000 times to recover the distribution of GDP paths, following a Monte Carlo approach.

Note that we impose only an initial year in conflict with its associated contemporaneous growth impact. The long-term losses are generated endogenously by conflict trap dynamics.

4 Results

4.1 Long-run losses, recovery, and volatility

Figure 4 illustrates the evolution of the distribution of GDP per capita losses for the three samples. The black line shows the mean loss, while the shaded areas represent percentile bands. A common pattern emerges across samples: losses increase sharply at first and then gradually converge. Because all simulations start in conflict, countries initially experience negative growth and are likely to remain in conflict for several years, which leads to rapid accumulation of losses. As time goes by, an increasing share of countries transitions through the post-conflict phase and eventually reaches the absorbing stable-peace state, at which point growth converges to the benchmark rate. As a result, most economic damage accumulates in the early years following conflict onset.

In the aggregate sample (left panel), the mean GDP per capita loss after thirty years reaches 17%. There is, however, wide dispersion in outcomes: comparing the 10th and 90th percentiles, long-run losses range from about 3% to 37%. To rule out that the dispersion is driven by randomness in the growth estimates, we conduct a counterfactual exercise in which we shut down the growth-volatility component of the growth vector and find that its contribution is negligible (see Figure B7 in the Appendix).

[18] We set $GDP_0 = 100$ and the distribution of states in period 0 is then $\boldsymbol{p_0} = \begin{pmatrix} 1 & 0 & \dots & 0 \end{pmatrix}'$.

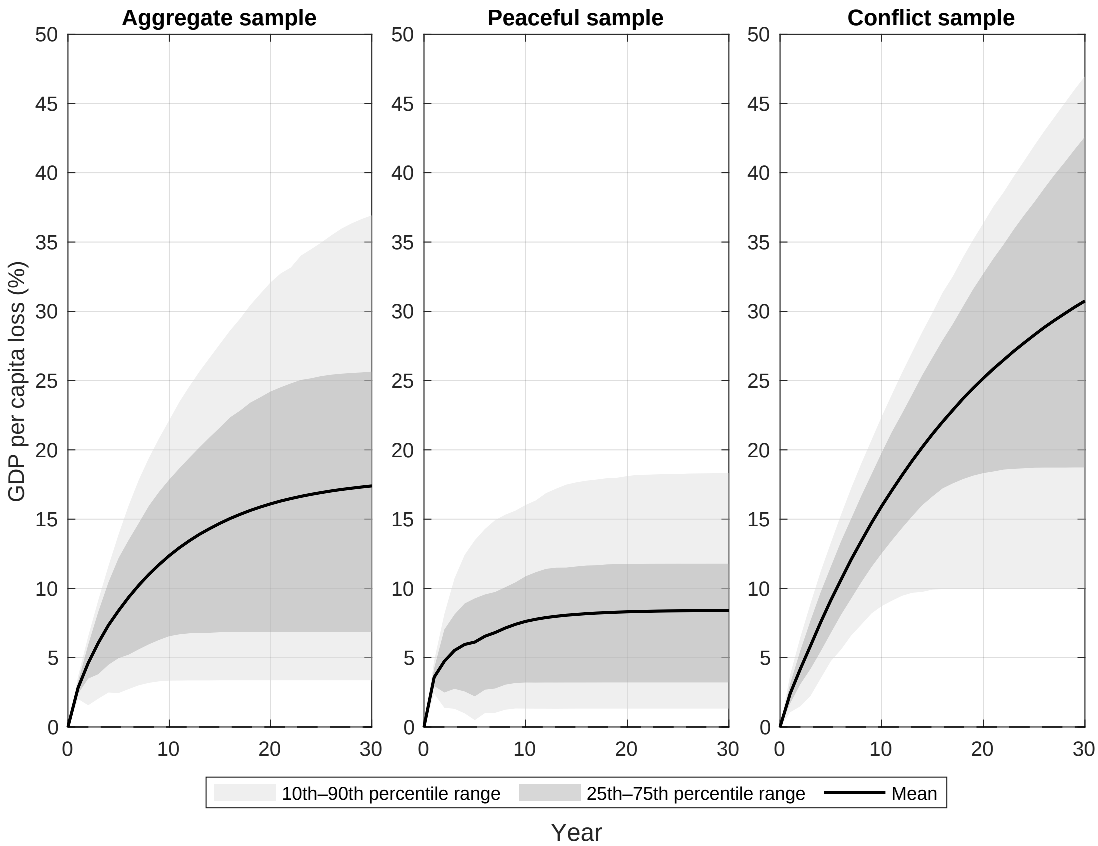


Figure 4: Evolution of GDP per capita loss

Notes: The figure shows the evolution of the distribution of GDP per capita losses following a conflict year, for each sample: the aggregate sample, the peaceful sample, and the conflict sample. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants.
Source: Authors' calculations based on data explained in Section 3.

The implications of differing conflict trap dynamics become evident when comparing peace-prone and conflict-prone countries. In the peace-prone sample (middle panel), the mean long-run loss is about 8%, with losses ranging from 1% to 18% between the tails. In the conflict-prone sample (right panel), the mean loss rises to 31%—almost four times larger than in peace-prone countries—and the distribution is substantially wider: losses range from about 10% to 47%. Note that although the impact of a conflict year is larger in peaceful countries (as shown in Table 3), higher recurrence in conflict-prone countries dominates and leads to substantially larger losses.

These results show that although a conflict year has modest effects on contemporaneous growth, the initial shock propagates through conflict trap dynamics and accumulates into large long-run losses. The more persistent the conflict trap dynamics, the larger the losses. This generates dramatic losses in conflict-prone countries, while even in peaceful countries losses remain substantial. More broadly, conflict trap dynamics are an important source of heterogeneity in

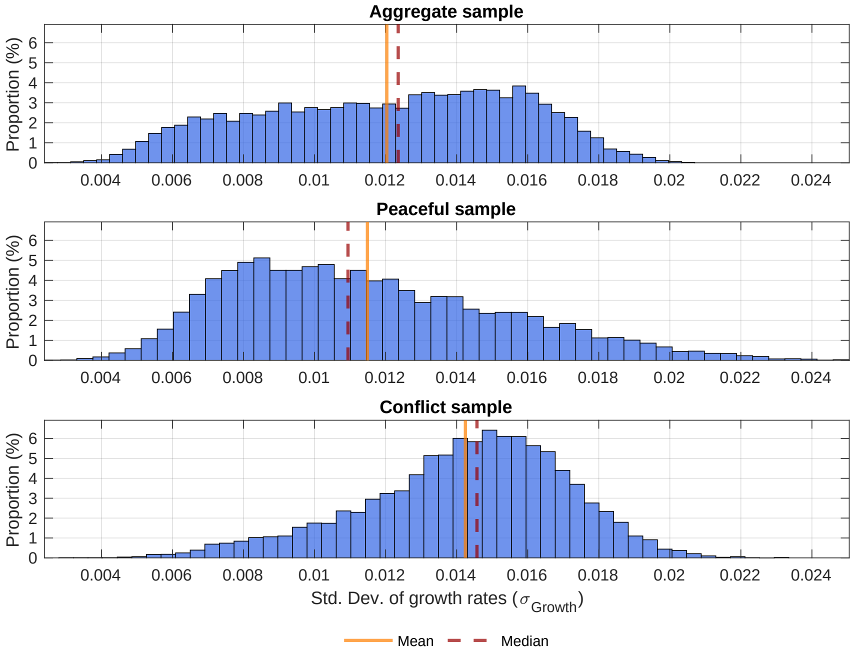


Figure 5: Growth volatility

Notes: The figure shows the distribution of the standard deviation of GDP per capita growth (σ_{Growth}), for each sample: the aggregate sample, the peaceful sample, and the conflict sample. For each simulation, σ_{Growth} is computed using the growth rates observed in all simulated years following a conflict year. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants.
Source: Authors' calculations based on data explained in Section 3.

long-run estimates.

The model also allows us to estimate recovery rates, defined as the share of simulations in which GDP per capita equals or exceeds the benchmark level at the end of the horizon—equivalent to the probability of recovery. In the aggregate sample, full recovery occurs in 1% of cases. In contrast, recovery occurs in about 4% of cases in the peace-prone sample and only 0.1% of cases in the conflict-prone sample. Overall, recovery is rare, and it is shaped by the persistence of conflict.

Regarding growth volatility, Figure 5 shows the distribution of the standard deviation of growth (σ_{Growth}) across simulations, with vertical lines indicating the mean and median. The distribution for the conflict-prone sample (lower panel) is shifted to the right relative to the peaceful sample (middle panel). These results indicate that more persistent conflict trap dynamics lead to higher growth volatility. To isolate the role of conflict trap dynamics from volatility arising from differences in estimated growth effects across samples, we conduct a counterfactual exercise that combines the growth vector of one group with the conflict trap dynamics of the other. The results are shown in Figure 6. Assigning conflict-prone dynamics to the peace-prone sample increases growth volatility, whereas assigning peaceful dynamics to the conflict-prone

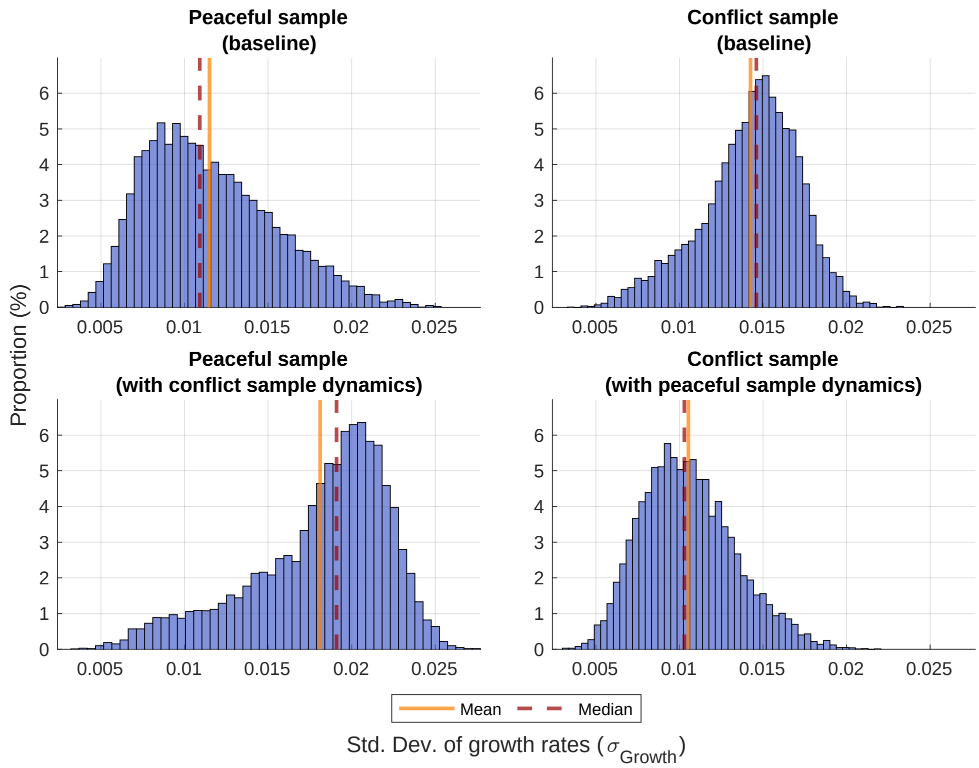


Figure 6: Growth volatility — counterfactual exercise

Notes: The figure shows the distribution of the standard deviation of GDP per capita growth (σ_{Growth}), for the peaceful sample, and conflict-prone samples, both under their own estimated conflict trap dynamics and under counterfactual dynamics obtained by interchanging them. For each simulation, σ_{Growth} is computed using the growth rates observed in all simulated years following a conflict year. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants.
Source: Authors' calculations based on data explained in Section 3.

sample reduces it.[19]

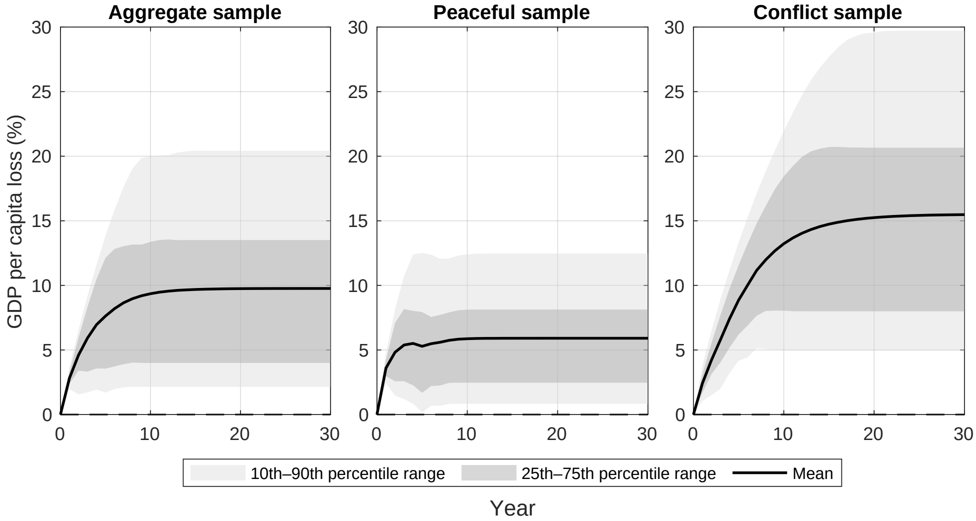
4.2 The role of relapse risk

The model also allows us to study growth conditional on specific conflict histories, which we use to analyze the importance of relapse risk. Figure 7 shows the evolution of GDP per capita losses under two scenarios.

Panel (a) considers countries that experience only a single conflict episode. That is, after the initial conflict—whose duration may still vary—simulations are constrained not to relapse into conflict. This scenario corresponds to nearly 50% of the simulated trajectories. Compared to the main specification, losses converge much faster toward the benchmark growth path, leading to substantially smaller estimates. In the aggregate sample, long-run losses fall to roughly

[19] See Figure B8 in the Appendix for the corresponding counterfactual exercise for GDP per capita losses, showing that losses increase when peaceful countries are assigned conflict-prone dynamics, whereas the opposite occurs when conflict-prone countries are assigned peaceful dynamics.

(a) Single conflict episode (no relapse)



(b) Starting from post-conflict

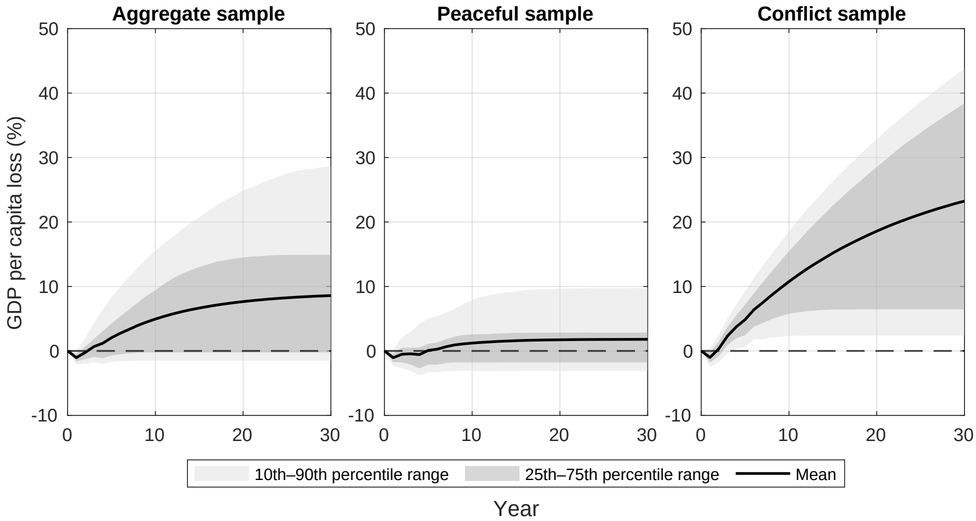


Figure 7: Evolution of GDP per capita losses — relapse-risk counterfactuals

Notes: The figure shows the evolution of the distribution of GDP per capita losses under two counterfactual scenarios, for each sample: the aggregate sample, the peaceful sample, and the conflict-prone sample. Panel (a) shows simulations following a conflict year under the constraint of no additional outbreaks. Panel (b) shows the evolution of GDP per capita losses starting from the first post-conflict year ($\tau = 1$). Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants.
Source: Authors' calculations based on the data described in Section 3.

10% (about 7 p.p. lower than in the baseline specification). In the peaceful sample, losses decline to around 6% (2 p.p. lower), while in the conflict-prone sample they fall to around 15% (15 p.p. lower). The reduction is especially pronounced for conflict-prone countries, as the counterfactual shuts down their more severe conflict trap dynamics. Restricting attention to a single conflict episode thus substantially understates long-run losses.

Panel (b) reports simulations that start from the first post-conflict year. In the first year, losses become negative because the first year of post-conflict is associated with supra-normal growth (see Table 3). However, losses subsequently increase over time and eventually become substantially positive. This occurs because countries remain exposed to relapse risk, and renewed outbreaks generate additional economic losses. Long-run losses still reach almost 9% in the aggregate sample, around 2% in the peaceful sample, and above 20% in the conflict-prone sample. A post-conflict state is therefore not a guarantee of recovery; on average, countries should expect to incur further losses through renewed outbreaks.

5 Alternative conflict definitions

In this section, we present the results using alternative definitions of conflict. We use higher thresholds of conflict intensity: 20 and 50 battle-related deaths per million inhabitants;[20] as well as an absolute threshold of 1,000 battle-related deaths. For each definition, we repeat the clustering procedure to partition the data, re-estimate the transition matrix and growth vector, and simulate the long-run dynamics.

Table 4 reports the estimated transition matrices. As expected, the conflict-prone sample exhibits a higher tendency toward conflict under all definitions. Although there is no clear probability dominance across definitions, the expected number of periods required to escape the trap is 16.88 years under the 20-deaths-per-million threshold, 16.78 years under the 50-deaths-per-million threshold, and 18 years under the absolute threshold of 1,000 deaths. Recall that under the baseline definition, the expected duration was 17.84 periods. Thus, the absolute threshold exhibits slightly higher persistence, whereas higher per capita violence thresholds are associated with slightly lower persistence.

Table 5 reports the regression results to construct the growth vector, following Equation 2. Several patterns emerge. First, across all definitions, the peaceful sample experiences larger growth losses during conflict than the conflict-prone sample, suggesting adaptation to conflict. Second, comparing the per capita definitions, higher violence intensity is associated with larger estimated conflict effects, consistent with Figure 1. While the estimated effect is 2.8 p.p. under the baseline threshold of 10 deaths per million inhabitants, it increases to 3.2 p.p. under the 20-

[20]These thresholds correspond approximately to the 8th and 9th deciles shown in Figure 1. Section B.3 in the Appendix also reports results for a threshold of 150 deaths per million inhabitants, corresponding approximately to the 10th decile.

Table 4: Estimated transition probabilities — alternative conflict definitions

	Stay in Conflict	Unstable Peace to Conflict							Stable Peace to Conflict
	$\hat{\pi}_0$	$\hat{\pi}_1$	$\hat{\pi}_2$	$\hat{\pi}_3$	$\hat{\pi}_4$	$\hat{\pi}_5$	$\hat{\pi}_6$	$\hat{\pi}_7$	$\hat{\pi}_8$
20 deaths per million									
AS	0.74	0.16	0.12	0.08	0.06	0.06	0.07	0.06	0.01
PS	0.48	0.07	0.08	0.03	0.02	0.02	0.02	0.06	0.01
CS	0.83	0.26	0.19	0.15	0.15	0.17	0.21	0.07	0.07
50 deaths per million									
AS	0.68	0.22	0.09	0.07	0.10	0.10	0.00	0.11	0.01
PS	0.48	0.11	0.04	0.02	0.00	0.09	0.00	0.05	0.01
CS	0.76	0.32	0.16	0.13	0.28	0.11	0.00	0.27	0.07
1000 deaths									
AS	0.72	0.20	0.20	0.08	0.05	0.13	0.07	0.05	0.01
PS	0.50	0.14	0.18	0.07	0.00	0.10	0.03	0.06	0.01
CS	0.83	0.30	0.24	0.10	0.16	0.19	0.15	0.00	0.08

Notes: The table shows the estimated transition probabilities for each sample across conflict definitions: the aggregate sample (AS), the peaceful sample (PS), and the conflict sample (CS). $\hat{\pi}_i$ denotes the probability of transitioning to conflict from state i, where $i = 0$ is conflict, $i = k$ s.t. $k \in [1, 7]$ is the kth number of consecutive years in post-conflict peace, and $i = 8$ is stable peace. Conflict is defined using alternative thresholds: 20 and 50 deaths per million inhabitants, and an absolute threshold of more than 1,000 battle-related deaths. Stable peace is defined as either no prior conflict or more than seven consecutive years of post-conflict peace.
Source: Authors' calculations based on data explained in Section 3.

deaths threshold and to 4 p.p. under the 50-deaths threshold.[21] Third, the conflict estimate under the absolute threshold (2.9 p.p.) is very similar to that under the baseline definition; however, it exhibits strong post-conflict recovery, especially in the peaceful sample. Growth is about 1 p.p. higher than before conflict in the first and second post-conflict years. It then rises to around 2–3 p.p. in years three and four, then 1 p.p. again in years five and six, with all of these latter effects being statistically significant. This pattern aligns with work documenting supra-normal post-conflict growth (Chen et al., 2008; Collier & Hoeffler, 2004), which also uses the absolute 1,000-deaths definition of conflict.

Figure 8 presents the simulation results. Across all definitions, although the contemporaneous growth effect of conflict is smaller in the conflict-prone sample than in the peaceful sample, long-run losses are larger in the conflict-prone sample due to the persistence of conflict. Note that the 90th percentile of the loss distribution in the conflict-prone sample exceeds 40% under all definitions. This highlights that, although the direct growth effects of conflict differ across specifications, trapping dynamics are the key mechanism generating large long-run losses.

[21] Using a threshold of 150 deaths per million inhabitants, the estimated effect rises to 5.7 p.p.. See Table B6 in the Appendix.

Table 5: Estimation of the growth vector — alternative conflict definitions

	20 deaths per million			50 deaths per million			1000 deaths		
	AS	PS	CS	AS	PS	CS	AS	PS	CS
Conflict	-0.0323***	-0.0446***	-0.0232**	-0.0401***	-0.0555***	-0.0309**	-0.0292***	-0.0429***	-0.0228*
	(0.0072)	(0.0108)	(0.0109)	(0.0092)	(0.0142)	(0.0121)	(0.0084)	(0.0130)	(0.0121)
1st Year Post-conflict Peace	0.0084	-0.0011	0.0229	0.0098	0.0096	0.0159	0.0146	0.0153	0.0146
	(0.0105)	(0.0116)	(0.0168)	(0.0134)	(0.0176)	(0.0185)	(0.0141)	(0.0222)	(0.0122)
2nd Year Post-conflict Peace	0.0053	0.0029	0.0109	0.0133	0.0153	0.0184	0.0039	0.0148	-0.0160
	(0.0076)	(0.0099)	(0.0102)	(0.0096)	(0.0137)	(0.0119)	(0.0108)	(0.0145)	(0.0150)
3rd Year Post-conflict Peace	0.0004	0.0009	-0.0013	0.0097	0.0135	0.0016	0.0122	0.0220*	-0.0084
	(0.0060)	(0.0077)	(0.0109)	(0.0073)	(0.0084)	(0.0124)	(0.0092)	(0.0127)	(0.0094)
4th Year Post-conflict Peace	0.0046	0.0076	-0.0046	0.0127	0.0142	0.0097	0.0247***	0.0318***	0.0031
	(0.0050)	(0.0057)	(0.0106)	(0.0080)	(0.0091)	(0.0164)	(0.0079)	(0.0102)	(0.0121)
5th Year Post-conflict Peace	-0.0070	-0.0059	-0.0053	-0.0024	-0.0058	0.0011	0.0068	0.0121**	-0.0101
	(0.0059)	(0.0062)	(0.0143)	(0.0064)	(0.0065)	(0.0156)	(0.0062)	(0.0047)	(0.0226)
6th Year Post-conflict Peace	-0.0011	-0.0012	-0.0003	-0.0043	-0.0016	-0.0107	0.0114**	0.0101*	0.0095
	(0.0046)	(0.0054)	(0.0108)	(0.0057)	(0.0058)	(0.0160)	(0.0046)	(0.0058)	(0.0115)
7th Year Post-conflict Peace	-0.0013	-0.0037	0.0029	-0.0019	-0.0029	0.0026	0.0062	0.0046	0.0142
	(0.0053)	(0.0061)	(0.0123)	(0.0065)	(0.0070)	(0.0176)	(0.0043)	(0.0050)	(0.0097)
Observations	6080	5185	895	6080	5375	705	6080	5454	626
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
(Within country) R^2	0.104	0.129	0.0938	0.108	0.128	0.102	0.103	0.110	0.136

Notes: The table shows the regression results from Equation 2 for each sample across conflict definitions: the aggregate sample (AS), the peaceful sample (PS), and the conflict sample (CS). GDP per capita growth is regressed on a set of dummies representing each state, with country and year fixed effects. Conflict is defined using alternative thresholds: 20 and 50 deaths per million inhabitants, and an absolute threshold of more than 1,000 battle-related deaths. The base category is stable peace, defined as either no prior conflict or more than seven consecutive years of post-conflict peace. Robust standard errors are in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.
Source: Authors' calculations based on data explained in Section 3.

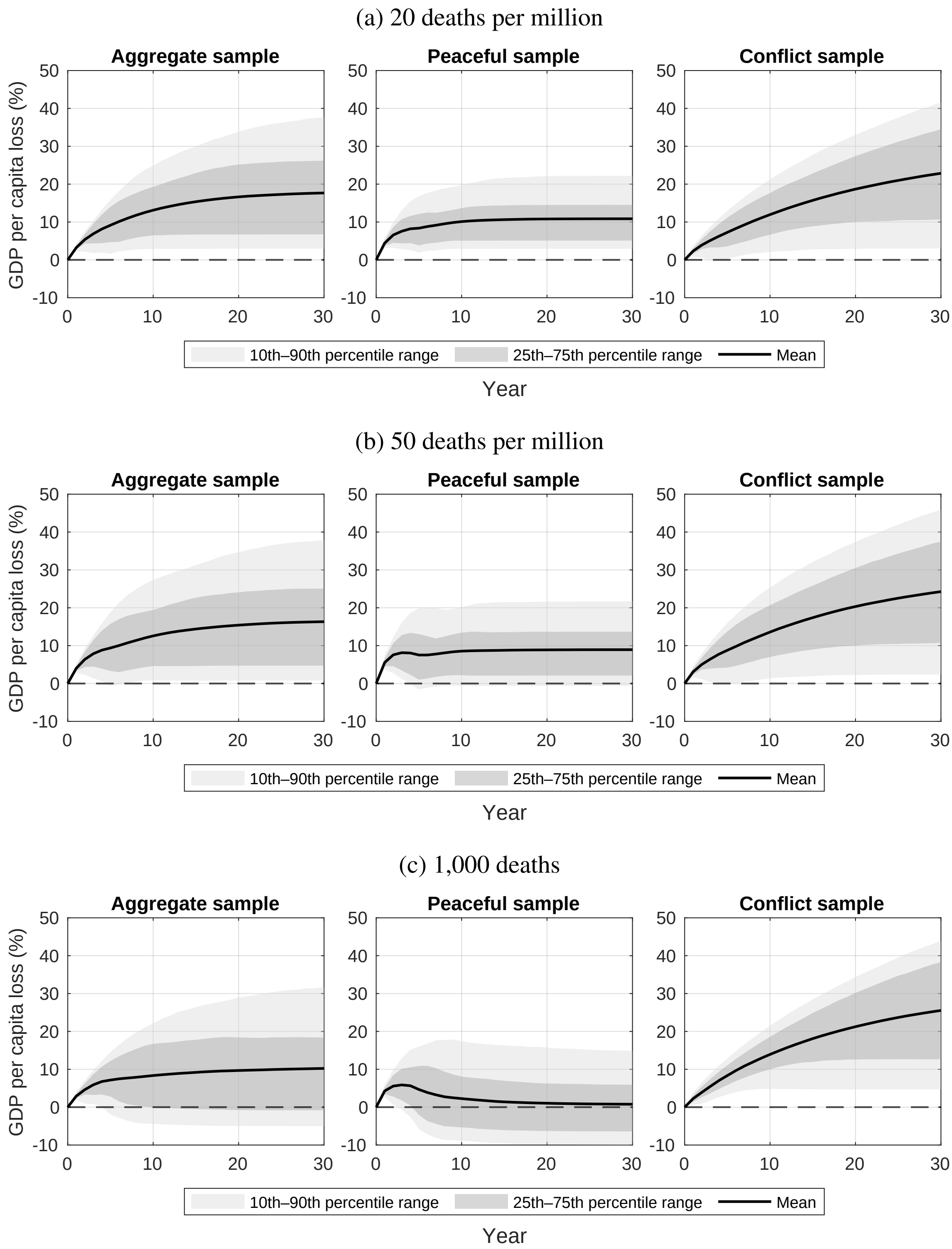
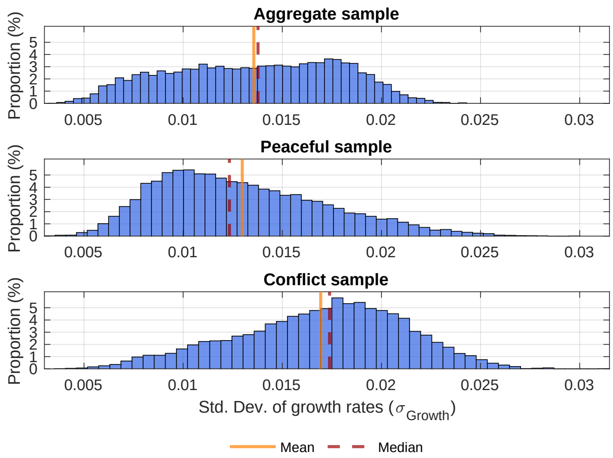


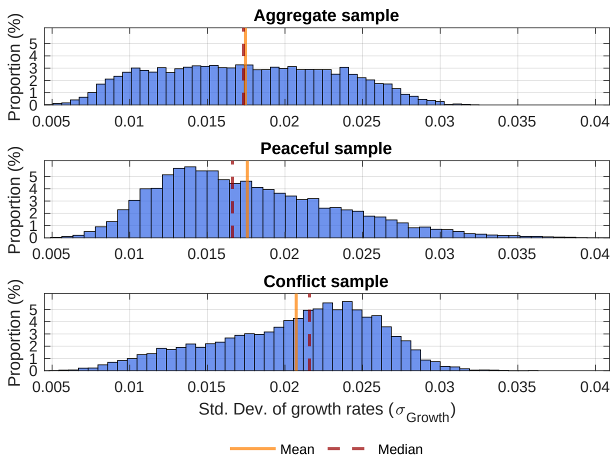
Figure 8: Evolution of GDP per capita losses — alternative conflict definitions

Notes: The figure shows the evolution of the distribution of GDP per capita losses following a conflict year, for the aggregate, peaceful, and conflict samples. Conflict is defined using alternative thresholds: 20 and 50 deaths per million inhabitants, and an absolute threshold of more than 1,000 battle-related deaths.
Source: Authors' calculations based on data explained in Section 3.

(a) 20 deaths per million



(b) 50 deaths per million



(c) 1,000 deaths

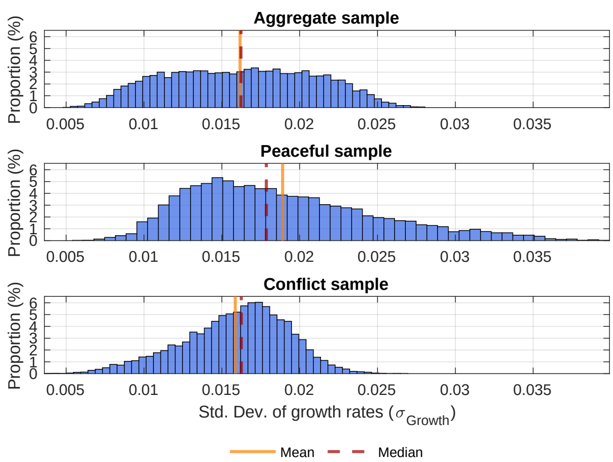


Figure 9: Growth volatility — alternative conflict definitions

Notes: The figure shows the distribution of the standard deviation of GDP per capita growth (σ_{Growth}), for the peaceful sample, and conflict-prone samples. For each simulation, σ_{Growth} is computed using the growth rates observed in all simulated years following a conflict year. Conflict is defined using alternative thresholds: 20 and 50 deaths per million inhabitants, and an absolute threshold of more than 1,000 battle-related deaths.

Source: Authors' calculations based on data explained in Section 3.

The per capita thresholds (panels a and b) yield results similar to the baseline specification. Mean losses in the aggregate sample are around 15% (left panels), with losses of about 10% in the peaceful sample (middle panels) and 25% in the conflict-prone sample (right panels). Although higher violence thresholds imply larger contemporaneous conflict effects, they have a lower conflict persistence, which offsets these effects and helps explain why overall long-run losses remain similar.

A notable difference appears when using the absolute 1,000-deaths definition (panel c). While outcomes in the conflict-prone sample are very similar to those under the other definitions, around 25% (right panel), the peaceful sample exhibits full recovery (middle panel). This result is driven by the strong post-conflict recovery shown in Table 5. As a consequence, the aggregate sample (left panel), which combines both groups, also exhibits substantially smaller long-run losses, averaging around 10% (7 p.p. lower than in the main specification). This is consistent with findings showing that the absolute definition leads to lower estimates of the economic costs of conflict (Mueller, 2016; Novta & Pugacheva, 2021). In our setting, more than differences in the direct effect of conflict or in its persistence, it is the stronger growth rebound that drives the differences in long-run losses.

Finally, Figure 9 shows the standard deviation of growth for each definition. Under the per capita definitions (panels a and b), the conflict-prone sample exhibits higher volatility, with the distribution in the conflict-prone sample (lower panel) shifted to the right relative to the peaceful sample (middle panel). This pattern is consistent with the baseline model. In contrast, under the absolute definition, the pattern reverses and the peaceful sample exhibits higher volatility. This reflects the strong post-conflict growth rebound of the peaceful sample, which, together with the negative effect of conflict, generates higher growth volatility.

6 Conclusion

This paper studies the role of conflict trap dynamics in shaping the long-run economic costs of conflict. We develop and estimate a probabilistic model in which conflict trap dynamics follow a Markov process and growth depends on the realized state. We use a simulation approach to recover the distribution of long-run losses. Countries are classified as peace-prone or conflict-prone, and the model is estimated separately for each group.

While a conflict year reduces contemporaneous GDP per capita growth by about 3 percentage points, persistence and relapse risk cause these losses to accumulate over time. On average, a conflict outbreak leads to a GDP per capita loss of 17 percent after thirty years. Losses are highly dispersed and depend strongly on a country's underlying conflict trap dynamics. Peace-prone countries experience substantially smaller losses, whereas conflict-prone countries face much larger income gaps. Overall, recovery after conflict is rare, and more persistent conflict trap dynamics are associated with higher growth volatility. We also show that relapse risk is a key factor behind these outcomes.

This evidence has implications for both measurement and policy. From a measurement perspective, estimates of the long-term costs of conflict depend largely on underlying conflict trap dynamics, which can vary substantially. Approaches that focus on average effects miss the substantial dispersion, and approaches with short horizons understate long-run losses. Furthermore, we show that countries starting in the first post-conflict year accumulate losses through renewed conflict. Being in a post-conflict state is thus not a guarantee of recovery.

From a policy perspective, because the bulk of long-run damage is generated by conflict persistence rather than by the initial shock, interventions that reduce relapse risk can deliver disproportionate gains. This is especially true for conflict-prone countries, where persistence is most severe. Furthermore, post-conflict reconstruction frameworks that assume stable peace without directly addressing the drivers of recurrence may overstate the resulting development gains.

The framework developed here is deliberately parsimonious. Future work could extend it by allowing for a richer state space in which the Markov transition process responds endogenously to economic conditions, political institutions, or policy interventions. In addition, the model is modular in the sense that it can incorporate estimates obtained using different methodologies. While we rely on cross-country fixed-effects regressions, better-identified estimates—such as those derived from natural experiments—could easily be incorporated to simulate long-run outcomes. The framework could also be applied to other development outcomes, such as inequality or poverty, instead of GDP per capita.

References

Abadie, A., & Gardeazabal, J. (2003). The economic costs of conflict: A case study of the basque country. *American Economic Review*, *93*(1), 113–132. https://doi.org/10.1257/000282803321455188

Aguiar, M., & Gopinath, G. (2007). Emerging market business cycles: The cycle is the trend. *Journal of Political Economy*, *115*(1), 69–102. https://doi.org/10.1086/511283

Akresh, R., Bhalotra, S., Leone, M., & Osili, U. O. (2012). War and stature: Growing up during the nigerian civil war. *American Economic Review*, *102*(3), 273–277. https://doi.org/10.1257/aer.102.3.273

Arias, M. A., Ibáñez, A. M., & Zambrano, A. (2019). Agricultural production amid conflict: Separating the effects of conflict into shocks and uncertainty. *World Development*, *119*, 165–184. https://doi.org/10.1016/j.worlddev.2017.11.011

Barro, R. J., & Sala-i-Martin, X. (2004). *Economic growth* (Second). The MIT Press.

Bazzi, S., & Blattman, C. (2014). Economic shocks and conflict: Evidence from commodity prices. *American Economic Journal: Macroeconomics*, *6*(4), 1–38. https://doi.org/10.1257/mac.6.4.1

Berg, A., Ostry, J. D., & Zettelmeyer, J. (2012). What makes growth sustained? *Journal of Development Economics*, *98*(2), 149–166. https://doi.org/10.1016/j.jdeveco.2011.08.002

Berman, N., Couttenier, M., Rohner, D., & Thoenig, M. (2017). This mine is mine! how minerals fuel conflicts in Africa. *American Economic Review*, *107*(6), 1564–1610. https://doi.org/10.1257/aer.20150720

Besley, T., Fetzer, T., & Mueller, H. (2024). How big is the media multiplier? evidence from dyadic news data. *The Review of Economics and Statistics*, 1–45. https://doi.org/10.1162/rest_a_01415

Besley, T., & Mueller, H. (2012). Estimating the peace dividend: The impact of violence on house prices in Northern Ireland. *American Economic Review*, *102*(2), 810–833. https://doi.org/10.1257/aer.102.2.810

Besley, T., & Persson, T. (2011a). The logic of political violence. *The Quarterly Journal of Economics*, *126*(3), 1411–1445. https://doi.org/10.1093/qje/qjr025

Besley, T., & Persson, T. (2011b). *Pillars of prosperity: The political economics of development clusters*. Princeton University Press.

Blattman, C., & Annan, J. (2010). The consequences of child soldiering. *The Review of Economics and Statistics*, *92*(4), 882–898. https://doi.org/10.1162/REST_a_00036

Bove, V., Elia, L., & Smith, R. P. (2017). On the heterogeneous consequences of civil war. *Oxford Economic Papers*, *69*(3), 550–568. https://doi.org/10.1093/oep/gpw050

Brakman, S., Garretsen, H., & Schramm, M. (2004). The strategic bombing of German cities during World War II and its impact on city growth. *Journal of Economic Geography*, *4*(2), 201–218. https://doi.org/10.1093/jeg/4.2.201

Callaway, B., & Sant'Anna, P. H. C. (2021). Difference-in-differences with multiple time periods. *Journal of Econometrics*, *225*(2), 200–230. https://doi.org/10.1016/j.jeconom.2020.12.001

Cerra, V., & Saxena, S. C. (2008). Growth dynamics: The myth of economic recovery. *American Economic Review*, *98*(1), 439–457. https://doi.org/10.1257/aer.98.1.439

Chen, S., Loayza, N. V., & Reynal-Querol, M. (2008). The aftermath of civil war. *The World Bank Economic Review*, *22*(1), 63–85. https://doi.org/10.1093/wber/lhn001

Collier, P. (1999). On the economic consequences of civil war. *Oxford Economic Papers*, *51*(1), 168–183. https://doi.org/10.1093/oep/51.1.168

Collier, P. (2007). *The bottom billion: Why the poorest countries are failing and what can be done about it*. Oxford University Press.

Collier, P., Elliott, V. L., Hegre, H., Hoeffler, A., Reynal-Querol, M., & Sambanis, N. (2003). *Breaking the conflict trap: Civil war and development policy* (Vol. 41181). World Bank Publications.

Collier, P., & Hoeffler, A. (2004). Aid, policy and growth in post-conflict societies. *European economic review*, *48*(5), 1125–1145. https://doi.org/10.1016/j.euroecorev.2003.11.005

Corral, P., Irwin, A., Krishnan, N., & Mahler, D. G. (2020). *Fragility and conflict: On the front lines of the fight against poverty*. World Bank Publications.

Costalli, S., Moretti, L., & Pischedda, C. (2017). The economic costs of civil war: Synthetic counterfactual evidence and the effects of ethnic fractionalization. *Journal of Peace Research*, *54*(1), 80–98. https://doi.org/10.1177/0022343316674340

Couttenier, M., Monnet, N., & Piemontese, L. (2022). The economic costs of conflict: A production network approach [CEPR Press, Paris & London]. *CEPR Discussion Paper*, (16984).

Crippa, A., d'Agostino, G., Dunne, J. P., & Pieroni, L. (2025). The price of war: A cross-country analysis on the conflict-growth nexus. *World Development*, *195*, 107087. https://doi.org/10.1016/j.worlddev.2025.107087

Davis, D. R., & Weinstein, D. E. (2002). Bones, bombs, and break points: The geography of economic activity. *American Economic Review*, *92*(5), 1269–1289. https://doi.org/10.1257/000282802762024502

De Chaisemartin, C., & d'Haultfoeuille, X. (2020). Two-way fixed effects estimators with heterogeneous treatment effects. *American Economic Review*, *110*(9), 2964–2996. https://doi.org/10.1257/aer.20181169

De Chaisemartin, C., & d'Haultfoeuille, X. (2023). Two-way fixed effects and differences-in-differences with heterogeneous treatment effects: A survey. *The Econometrics Journal*, *26*(3), C1–C30. https://doi.org/10.1093/ectj/utac017

De Groot, O. J., Bozzoli, C., Alamir, A., & Brück, T. (2022). The global economic burden of violent conflict. *Journal of Peace Research*, *59*(2), 259–276. https://doi.org/10.1177/00223433211046823

Dube, O., & Vargas, J. F. (2013). Commodity price shocks and civil conflict: Evidence from colombia. *The Review of Economic Studies*, *80*(4), 1384–1421. https://doi.org/10.1093/restud/rdt009

Easterly, W., Kremer, M., Pritchett, L., & Summers, L. H. (1993). Good policy or good luck? *Journal of Monetary Economics*, *32*(3), 459–483. https://doi.org/10.1016/0304-3932(93)90026-C

Esteban, J.-M., & Ray, D. (1994). On the measurement of polarization. *Econometrica*, *62*(4), 819–851. https://doi.org/10.2307/2951734

Fearon, J. D. (2005). Primary commodity exports and civil war. *Journal of conflict Resolution*, *49*(4), 483–507. https://doi.org/10.1177/0022002705277544

Fernández, M., Ibáñez, A. M., & Peña, X. (2014). Adjusting the labour supply to mitigate violent shocks: Evidence from rural colombia. *The Journal of Development Studies*, *50*(8), 1135–1155. https://doi.org/10.1080/00220388.2014.919384

Garcia-Cicco, J., Pancrazi, R., & Uribe, M. (2010). Real business cycles in emerging countries? *American Economic Review*, *100*(5), 2510–2531. https://doi.org/10.1257/aer.100.5.2510

Gates, S., Hegre, H., Nygård, H. M., & Strand, H. (2012). Development consequences of armed conflict. *World Development*, *40*(9), 1713–1722. https://doi.org/10.1016/j.worlddev.2012.04.031

Hegre, H., Karlsen, J., Nygård, H. M., Strand, H., & Urdal, H. (2013). Predicting armed conflict, 2010–2050. *International Studies Quarterly*, *57*(2), 250–270. https://doi.org/10.1111/isqu.12007

Hegre, H., Nygård, H. M., & Ræder, R. F. (2017). Evaluating the scope and intensity of the conflict trap: A dynamic simulation approach. *Journal of Peace Research*, *54*(2), 243–261. https://doi.org/10.1177/0022343316684917

Ichino, A., & Winter-Ebmer, R. (2004). The long-run educational cost of World War II. *Journal of Labor Economics*, *22*(1), 57–87. https://doi.org/10.1086/380403

International Monetary Fund. (2026, April). The macroeconomics of conflicts and recovery. In *World economic outlook: Global economy in the shadow of war*.

Johnson, P., & Papageorgiou, C. (2020). What remains of cross-country convergence? *Journal of Economic Literature*, *58*(1), 129–175. https://doi.org/10.1257/jel.20181207

Korovkin, V., Makarin, A., & Miyauchi, Y. (2024). Supply chain disruption and reorganization: Theory and evidence from ukraine's war. *MIT Sloan Research Paper*, (7068-24).

León, G. (2012). Civil conflict and human capital accumulation: The long-term effects of political violence in Peru. *Journal of Human Resources*, *47*(4), 991–1022. https://doi.org/10.3368/jhr.47.4.991

Michalopoulos, S., & Papaioannou, E. (2016). The long-run effects of the scramble for Africa. *American Economic Review*, *106*(7), 1802–1848. https://doi.org/10.1257/aer.20131311

Miguel, E., & Roland, G. (2011). The long-run impact of bombing Vietnam. *Journal of Development Economics*, *96*(1), 1–15. https://doi.org/10.1016/j.jdeveco.2010.07.004

Montalvo, J. G., & Reynal-Querol, M. (2005). Ethnic polarization, potential conflict, and civil wars. *American Economic Review*, *95*(3), 796–816. https://doi.org/10.1257/0002828054201468 Data retrieved from http://www.econ.upf.edu/~reynal/data_web.htm.

Mueller, H. (2012). Growth dynamics: The myth of economic recovery: Comment. *American Economic Review*, *102*(7), 3774–3777. https://doi.org/10.1257/aer.102.7.3774

Mueller, H. (2016). Growth and violence: Argument for a per capita measure of civil war. *Economica*, *83*(331), 473–497. https://doi.org/10.1111/ecca.12193

Mueller, H., & Rauh, C. (2022). The hard problem of prediction for conflict prevention. *Journal of the European Economic Association*, *20*(6), 2440–2467. https://doi.org/10.1093/jeea/jvac025

North, D. C., Wallis, J. J., & Weingast, B. R. (2009). *Violence and social orders: A conceptual framework for interpreting recorded human history*. Cambridge University Press. https://doi.org/10.1017/CBO9780511575839

Novta, N., & Pugacheva, E. (2021). The macroeconomic costs of conflict. *Journal of Macroeconomics*, *68*, 103286. https://doi.org/10.1016/j.jmacro.2021.103286

Organski, A. F. K., & Kugler, J. (1977). The costs of major wars: The phoenix factor. *American Political Science Review*, *71*(4), 1347–1366. https://doi.org/10.2307/1961484

Pinotti, P. (2015). The economic costs of organised crime: Evidence from southern Italy. *The Economic Journal*, *125*(586), F203–F232. https://doi.org/10.1111/ecoj.12235

Ramey, G., & Ramey, V. A. (1995). Cross-country evidence on the link between volatility and growth. *American Economic Review*, *85*(5), 1138–1151. https://doi.org/10.3386/w4959

Robinson, J. A., & Acemoglu, D. (2012). *Why nations fail: The origins of power, prosperity and poverty*. Profile Books.

Rodrik, D. (1999). Where did all the growth go? external shocks, social conflict, and growth collapses. *Journal of Economic Growth*, *4*(4), 385–412. https://doi.org/10.1023/A:1009863208706

Rohner, D., & Thoenig, M. (2021). The elusive peace dividend of development policy: From war traps to macro complementarities. *Annual Review of Economics*, *13*, 111–131. https://doi.org/10.1146/annurev-economics-073120-102652

Rohner, D., Thoenig, M., & Zilibotti, F. (2013). War signals: A theory of trade, trust, and conflict. *The Review of Economic Studies*, *80*(3), 1114–1147. https://doi.org/10.1093/restud/rdt003

Ross, M. L. (2004). What do we know about natural resources and civil war? *Journal of peace research*, *41*(3), 337–356. https://doi.org/10.1177/0022343304043773

Sun, L., & Abraham, S. (2021). Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. *Journal of Econometrics*, *225*(2), 175–199. https://doi.org/10.1016/j.jeconom.2020.09.006

Tapsoba, A. (2023). The cost of fear: Impact of violence risk on child health during conflict. *Journal of Development Economics*, *160*, 102975. https://doi.org/10.1016/j.jdeveco.2022.102975

Vesco, P., Baliki, G., Brück, T., Döring, S., Eriksson, A., Fjelde, H., Guha-Sapir, D., Hall, J., Knutsen, C. H., Leis, M. R., Mueller, H., Rauh, C., Rudolfsen, I., Swain, A., Vassiliou, P. T. B., von Schreeb, J., von Uexkull, N., & Hegre, H. (2025). The impacts of armed conflict on human development: A review of the literature. *World Development*, *187*, 106806. https://doi.org/10.1016/j.worlddev.2024.106806

World Bank. (2011). *World development report 2011: Conflict, security, and development*. http://hdl.handle.net/10986/4389

World Bank. (2023). *Classification of fragility and conflict situations (FCS) for World Bank Group Engagement* (Technical Report). World Bank. https://thedocs.worldbank.org/en/doc/fb0f93e8e3375803bce211ab1218ef2a-0090082023/original/Classification-of-Fragility-and-Conflict-Situations-FY24.pdf

Appendices

A Clustering diagnostics

Figure A1 shows the elbow plot, which reports the within-cluster sum of squares as a function of the number of clusters. The elbow is clearly located at two clusters, indicating that most of the gain in fit is achieved when moving from one to two clusters. We also compute the silhouette index, which is a measure of clustering quality that evaluates how closely an observation is related to its own cluster (cohesion) relative to the nearest alternative cluster (separation). The index ranges from -1 to 1, with 1 indicating perfect clustering. The average silhouette score is 0.78, indicating strong separation between the two groups.

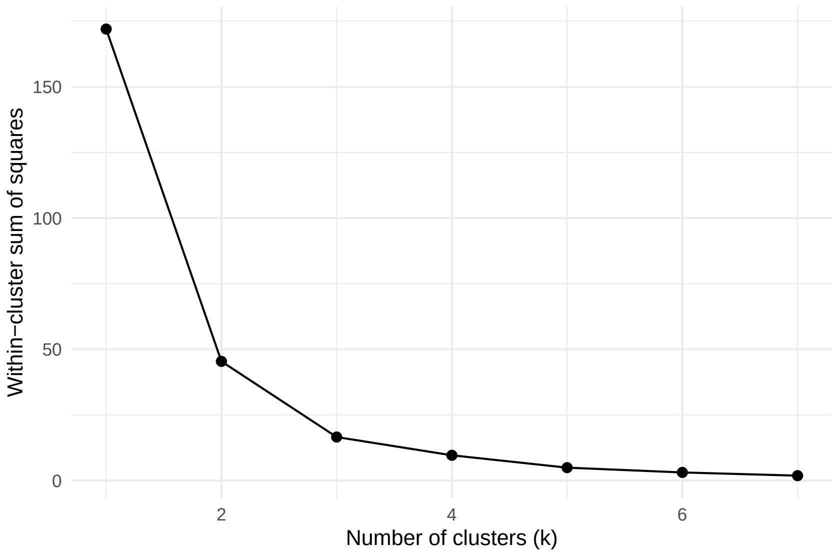


Figure A1: Elbow criterion for the number of clusters

Notes: The figure reports the within-cluster sum of squares for different numbers of clusters using k-means clustering.
Source: Authors' calculations based on data explained in Section 3.

B Additional results and robustness checks

B.1 Distinguishing conflict outbreaks

A conflict outbreak is a conflict event that follows a period of peace, while conflict continuation is a conflict episode that follow previous years of conflict. This expands the state space of the Markov process.

To preserve the interpretation from the baseline model, the notation is adapted as follows: $s_t = 0$ corresponds to *conflict outbreak*; $s_t = k$, for $k \in [1, \tau]$, represent the *k-th consecutive year of post-conflict peace*. $s_t = \tau + 1$ denotes *stable peace*; and $s_t = \tau + 2$ is *conflict continuation*.

Assuming a conflict trap length of 7 years, as in the base model ($\tau = 7$), the transition matrix takes the following form:

$$
\mathbf{\Pi} = \begin{pmatrix}
0 & 1-\pi_0 & 0 & 0 & \cdots & 0 & 0 & \pi_0 \\
\pi_1 & 0 & 1-\pi_1 & 0 & \cdots & 0 & 0 & 0 \\
\pi_2 & 0 & 0 & 1-\pi_2 & \cdots & 0 & 0 & 0 \\
\vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\
\pi_7 & 0 & 0 & 0 & \cdots & 0 & 1-\pi_7 & 0 \\
\pi_8 & 0 & 0 & 0 & \cdots & 0 & 1-\pi_8 & 0 \\
0 & 1-\pi_9 & 0 & 0 & \cdots & 0 & 0 & \pi_9
\end{pmatrix}
$$

The corresponding estimations of the transition matrix, the growth vector, and the results from simulating countries in this Markov process are presented below.

Table B1: Estimated transition probabilities — outbreak model

	Stay in Conflict		Unstable Peace to Conflict							Stable Peace to Conflict
	$\hat{\pi}_0$	$\hat{\pi}_9$	$\hat{\pi}_1$	$\hat{\pi}_2$	$\hat{\pi}_3$	$\hat{\pi}_4$	$\hat{\pi}_5$	$\hat{\pi}_6$	$\hat{\pi}_7$	$\hat{\pi}_8$
AS	0.49	0.81	0.22	0.15	0.08	0.04	0.08	0.06	0.06	0.02
PS	0.37	0.58	0.15	0.05	0.06	0.01	0.03	0.03	0.07	0.01
CS	0.63	0.86	0.30	0.30	0.14	0.10	0.19	0.14	0.06	0.08

Notes: The table shows the estimated transition probabilities for each sample: the aggregate sample (AS), the peaceful sample (PS), and the conflict sample (CS). $\hat{\pi}_i$ denotes the probability of transitioning to conflict from state i, where $i = 0$ is conflict outbreak, $i = k$ s.t. $k \in [1, 7]$ is the kth number of consecutive years in post-conflict peace, $i = 8$ is stable peace, and $i = 9$ is conflict continuation. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants. Conflict outbreak is a conflict event that follows a period of peace, while conflict continuation is a conflict episode that follow previous years of conflict. Stable peace is defined as either no prior conflict or more than seven consecutive years of post-conflict peace.
Source: Authors' calculations based on data explained in Section 3.

Table B2: Estimation of the growth vector — outbreak model

	Aggregate Sample	Peaceful Sample	Conflict Sample
	GDP per capita Growth		
Conflict Outbreak	-0.0354***	-0.0471***	-0.0229
	(0.0104)	(0.0124)	(0.0198)
Conflict Continuation	-0.0251***	-0.0265*	-0.0246**
	(0.00795)	(0.0158)	(0.0108)
1st Year Post-conflict Peace	0.0103	0.0104	0.0103
	(0.00802)	(0.00977)	(0.0117)
2nd Year Post-conflict Peace	-0.00234	-0.000131	-0.00850
	(0.00682)	(0.00949)	(0.00932)
3rd Year Post-conflict Peace	-0.00291	0.00280	-0.0190
	(0.00561)	(0.00621)	(0.0129)
4th Year Post-conflict Peace	0.00241	0.00564	-0.00816
	(0.00496)	(0.00607)	(0.00925)
5th Year Post-conflict Peace	-0.00385	-0.00624	-0.000353
	(0.00513)	(0.00621)	(0.0108)
6th Year Post-conflict Peace	-0.00126	-0.000263	-0.0117
	(0.00406)	(0.00440)	(0.0104)
7th Year Post-conflict Peace	-0.000237	-0.00247	0.00502
	(0.00454)	(0.00523)	(0.0110)
Observations	6080	5041	1039
Country FE	✓	✓	✓
Time FE	✓	✓	✓
(Within country) R^2	0.103	0.122	0.106

Notes: The table shows the regression results from Equation 2 for each sample: the aggregate sample, the peaceful sample, and the conflict sample. GDP per capita growth is regressed on a set of dummies representing each state, with country and year fixed effects. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants. Conflict outbreak is a conflict event that follows a period of peace, while conflict continuation is a conflict episode that follow previous years of conflict. The base category is stable peace, defined as either no prior conflict or more than seven consecutive years of post-conflict peace. Robust standard errors are in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Source: Authors' calculations based on data explained in Section 3.

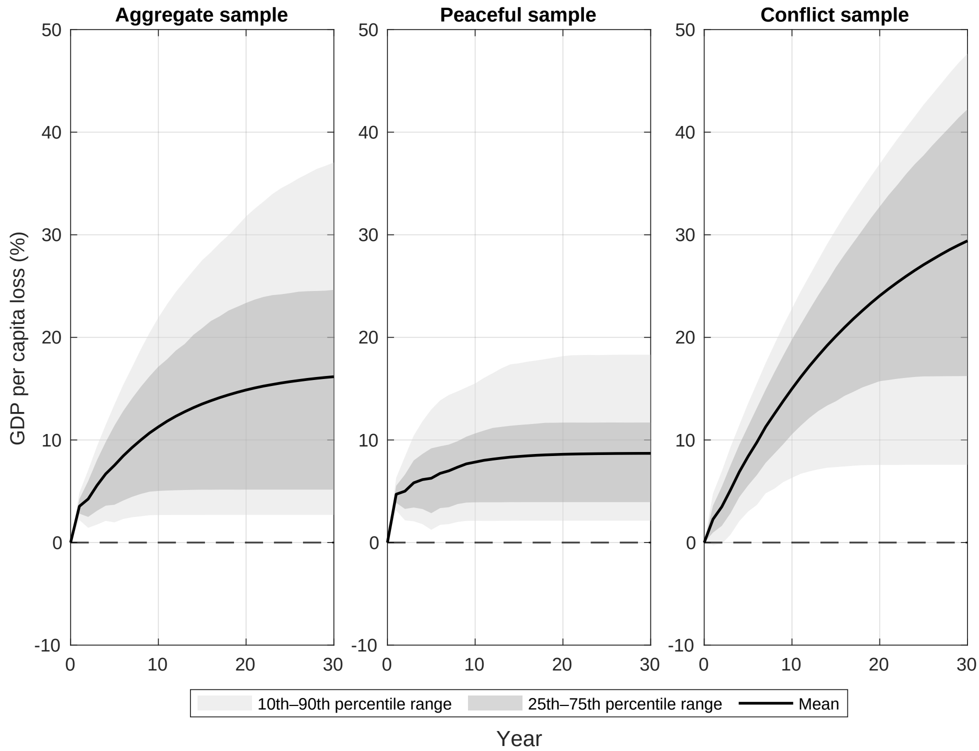


Figure B1: Evolution of GDP per capita loss — outbreak model

Notes: The figure shows the evolution of the distribution of GDP per capita losses following a conflict outbreak, for each sample: the aggregate sample, the peaceful sample, and the conflict sample. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants.

Source: Authors' calculations based on data explained in Section 3.

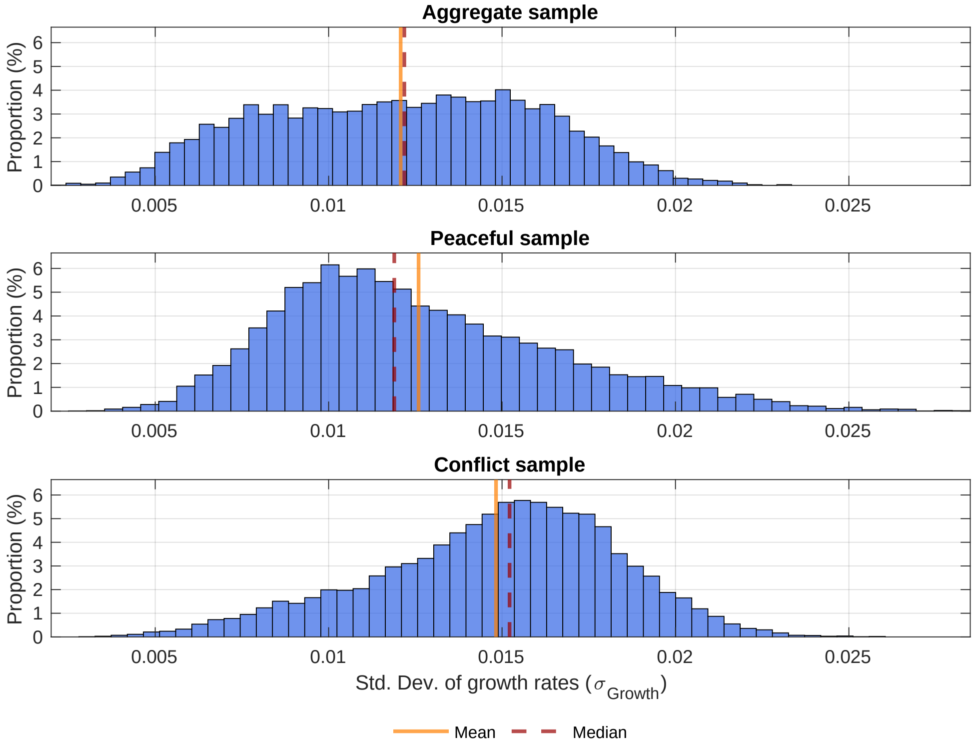


Figure B2: Growth volatility — outbreak model

Notes: The figure shows the distribution of the standard deviation of GDP per capita growth (σ_{Growth}), for each sample: the aggregate sample, the peaceful sample, and the conflict sample. For each simulation, σ_{Growth} is computed using the growth rates observed in all simulated years following a conflict outbreak. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants.
Source: Authors' calculations based on data explained in Section 3.

B.2 Shorter trap duration

We reduce the length of the conflict trap from 7 years to 4 ($\tau = 4$).

Table B3: Estimated transition probabilities — shorter trap duration

	Stay in Conflict	Unstable Peace to Conflict				Stable Peace to Conflict
	$\hat{\pi}_0$	$\hat{\pi}_1$	$\hat{\pi}_2$	$\hat{\pi}_3$	$\hat{\pi}_4$	$\hat{\pi}_5$
AS	0.74	0.22	0.15	0.08	0.04	0.02
PS	0.49	0.15	0.05	0.06	0.01	0.01
CS	0.83	0.30	0.30	0.14	0.10	0.09

Notes: The table shows the estimated transition probabilities for each sample: the aggregate sample (AS), the peaceful sample (PS), and the conflict sample (CS). $\hat{\pi}_i$ denotes the probability of transitioning to conflict from state i, where $i = 0$ is conflict, $i = k$ s.t. $k \in [1, 4]$ is the kth number of consecutive years in post-conflict peace, and $i = 5$ is stable peace. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants. Stable peace is defined as either no prior conflict or more than seven consecutive years of post-conflict peace.

Source: Authors' calculations based on data explained in Section 3.

Table B4: Estimation of the growth vector — shorter trap duration

	Aggregate Sample	Peaceful Sample	Conflict Sample
	GDP per capita Growth		
Conflict	-0.0278***	-0.0355***	-0.0237**
	(0.00638)	(0.00928)	(0.00983)
1st Year Post-conflict Peace	0.0106	0.0111	0.0107
	(0.00787)	(0.00959)	(0.0115)
2nd Year Post-conflict Peace	-0.00197	0.000585	-0.00789
	(0.00650)	(0.00913)	(0.00811)
3rd Year Post-conflict Peace	-0.00250	0.00352	-0.0184
	(0.00531)	(0.00598)	(0.0115)
4th Year Post-conflict Peace	0.00280	0.00627	-0.00763
	(0.00455)	(0.00565)	(0.00762)
Observations	6080	5041	1039
Country FE	✓	✓	✓
Time FE	✓	✓	✓
(Within country) R^2	0.103	0.121	0.106

Notes: The table shows the regression results from Equation 2 for each sample: the aggregate sample, the peaceful sample, and the conflict sample. GDP per capita growth is regressed on a set of dummies representing each state, with country and year fixed effects. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants. The base category is stable peace, defined as either no prior conflict or more than four consecutive years of post-conflict peace. Robust standard errors are in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Source: Authors' calculations based on data explained in Section 3.

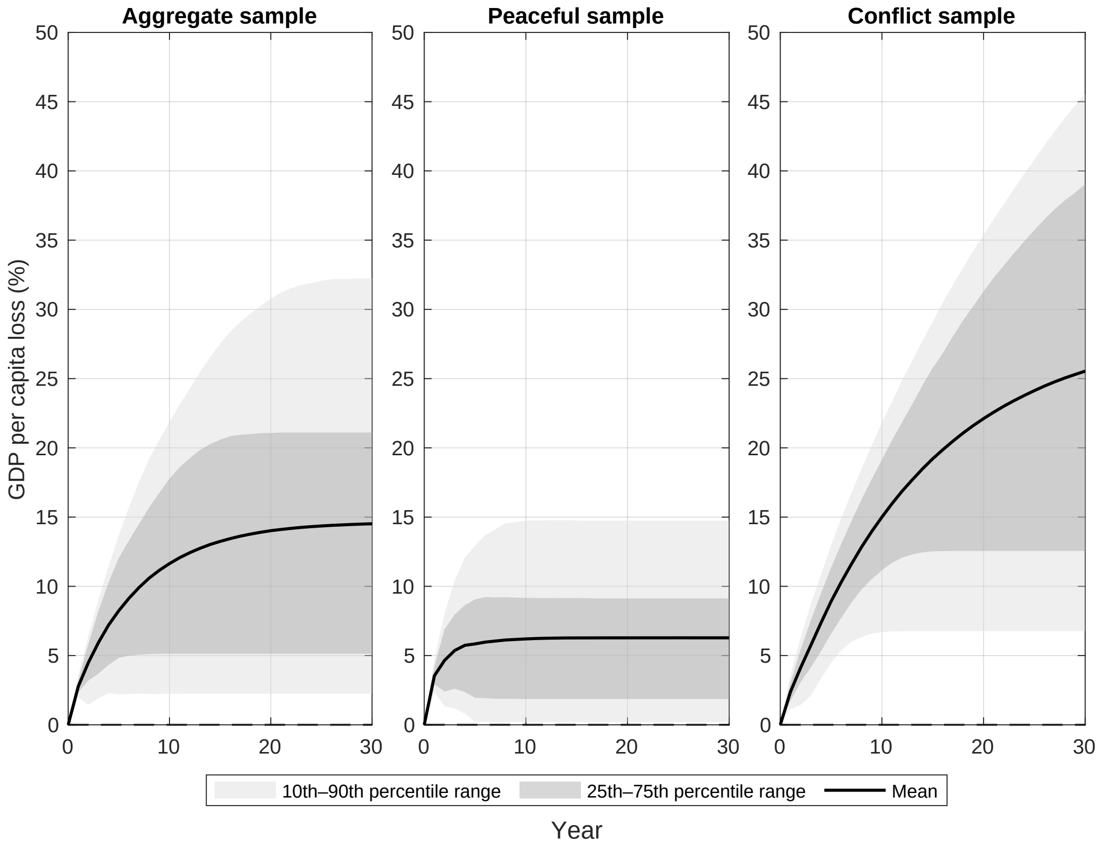


Figure B3: Evolution of GDP per capita loss — shorter trap duration

Notes: The figure shows the evolution of the distribution of GDP per capita losses following a conflict year, for each sample: the aggregate sample, the peaceful sample, and the conflict sample. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants.

Source: Authors' calculations based on data explained in Section 3.

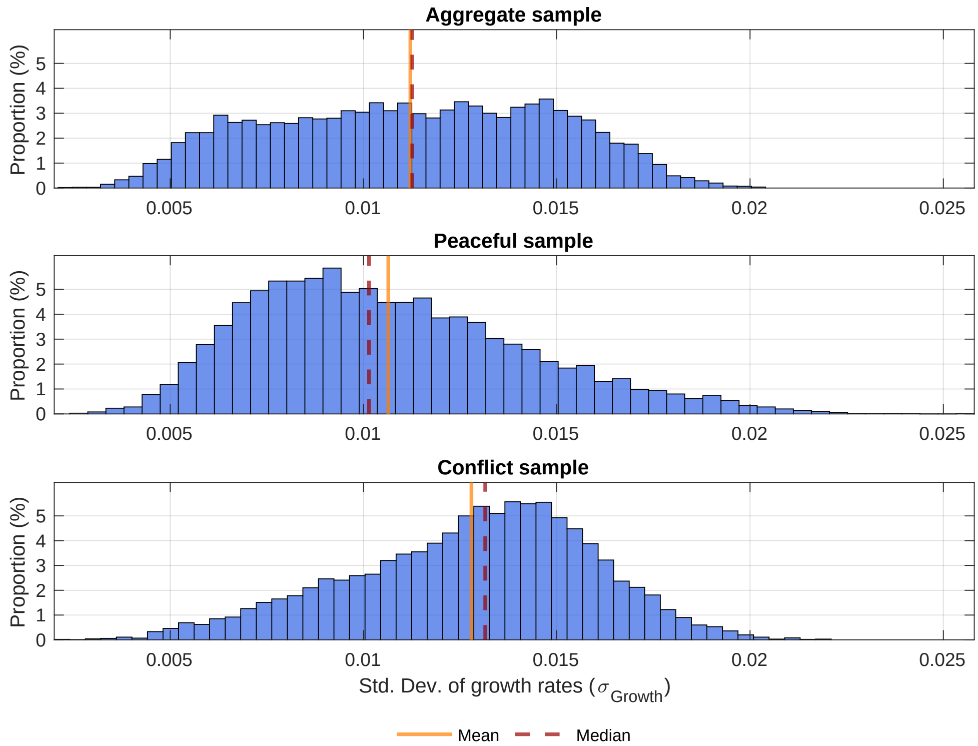


Figure B4: Growth volatility — shorter trap duration

Notes: The figure shows the distribution of the standard deviation of GDP per capita growth (σ_{Growth}), for each sample: the aggregate sample, the peaceful sample, and the conflict sample. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants.

Source: Authors' calculations.

B.3 Conflict defined as more than 150 deaths per million inhabitants

Table B5: Estimated transition probabilities — 150 deaths per million inhabitants

	Stay in Conflict	Unstable Peace to Conflict							Stable Peace to Conflict
	$\hat{\pi}_0$	$\hat{\pi}_1$	$\hat{\pi}_2$	$\hat{\pi}_3$	$\hat{\pi}_4$	$\hat{\pi}_5$	$\hat{\pi}_6$	$\hat{\pi}_7$	$\hat{\pi}_8$
AS	0.63	0.10	0.07	0.08	0.11	0.05	0.03	0.03	0.01
PS	0.43	0.00	0.04	0.00	0.04	0.04	0.00	0.00	0.00
CS	0.71	0.18	0.10	0.16	0.20	0.07	0.07	0.08	0.08

Notes: The table shows the estimated transition probabilities for each sample: the aggregate sample (AS), the peaceful sample (PS), and the conflict sample (CS). $\hat{\pi}_i$ denotes the probability of transitioning to conflict from state i, where $i = 0$ is conflict, $i = k$ s.t. $k \in [1, 7]$ is the kth number of consecutive years in post-conflict peace, and $i = 8$ is stable peace. Conflict is defined as experiencing more than 150 battle-related deaths per million inhabitants. Stable peace is defined as either no prior conflict or more than seven consecutive years of post-conflict peace.

Source: Authors' calculations based on data explained in Section 3.

Table B6: Estimation of the growth vector — 150 deaths per million inhabitants

	Aggregate Sample	Peaceful Sample	Conflict Sample
	GDP per capita Growth		
Conflict	-0.0570***	-0.0767***	-0.0493**
	(0.0148)	(0.0252)	(0.0170)
1st Year Post-conflict Peace	0.0251	0.0176	0.0340
	(0.0242)	(0.0354)	(0.0317)
2nd Year Post-conflict Peace	0.0130	0.0172	0.0213
	(0.0150)	(0.0258)	(0.0138)
3rd Year Post-conflict Peace	-0.00101	0.0187	-0.0158
	(0.0127)	(0.0153)	(0.0158)
4th Year Post-conflict Peace	0.00846	0.00789	0.00388
	(0.0104)	(0.0111)	(0.0234)
5th Year Post-conflict Peace	0.000864	-0.00211	-0.00351
	(0.00486)	(0.00696)	(0.0115)
6th Year Post-conflict Peace	0.00326	0.00482	-0.0181
	(0.00727)	(0.00949)	(0.0187)
7th Year Post-conflict Peace	-0.00545	-0.0124	-0.00306
	(0.00915)	(0.0105)	(0.0202)
Observations	6080	5590	490
Country FE	✓	✓	✓
Time FE	✓	✓	✓
(Within country) R^2	0.110	0.123	0.149

Notes: The table shows the regression results from Equation 2 for each sample: the aggregate sample, the peaceful sample, and the conflict sample. GDP per capita growth is regressed on a set of dummies representing each state, with country and year fixed effects. Conflict is defined as experiencing more than 150 battle-related deaths per million inhabitants. The base category is stable peace, defined as either no prior conflict or more than seven consecutive years of post-conflict peace. Robust standard errors are in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Source: Authors' calculations based on data explained in Section 3.

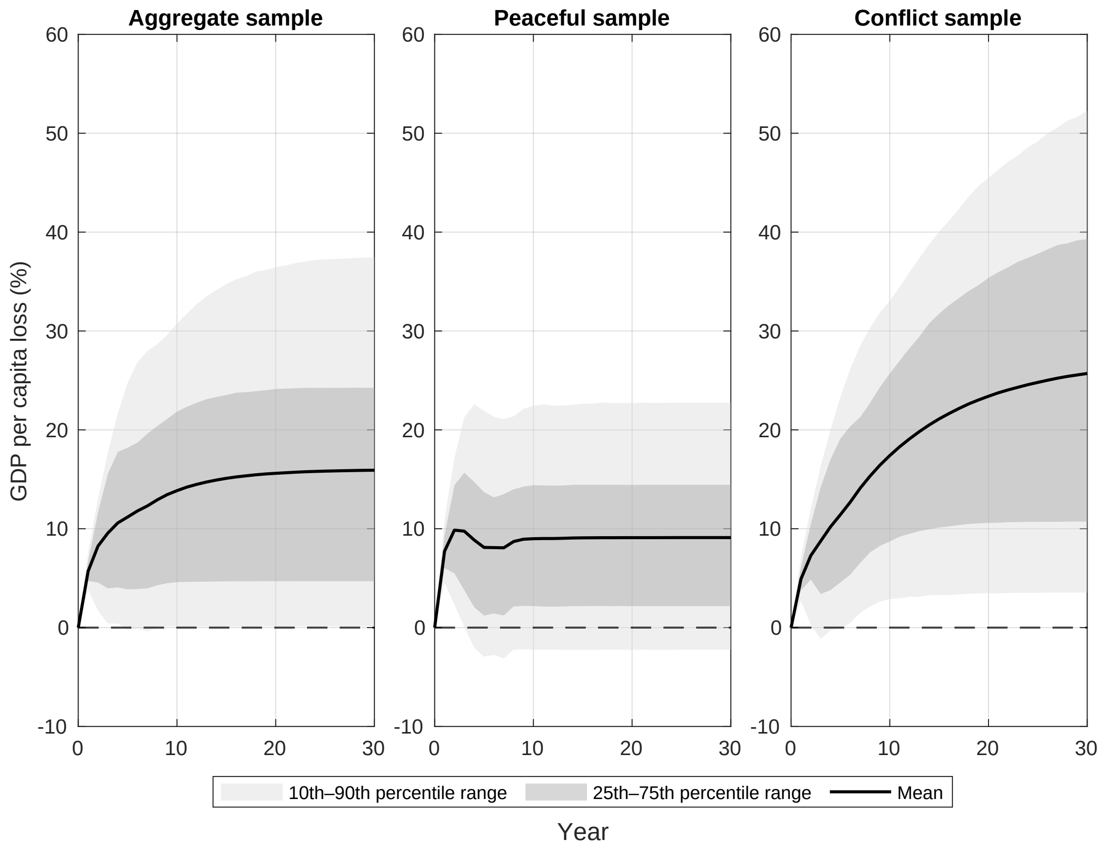


Figure B5: Evolution of GDP per capita loss — 150 deaths per million inhabitants

Notes: The figure shows the evolution of the distribution of GDP per capita losses following a conflict year, for each sample: the aggregate sample, the peaceful sample, and the conflict sample. Conflict is defined as experiencing more than 150 battle-related deaths per million inhabitants.

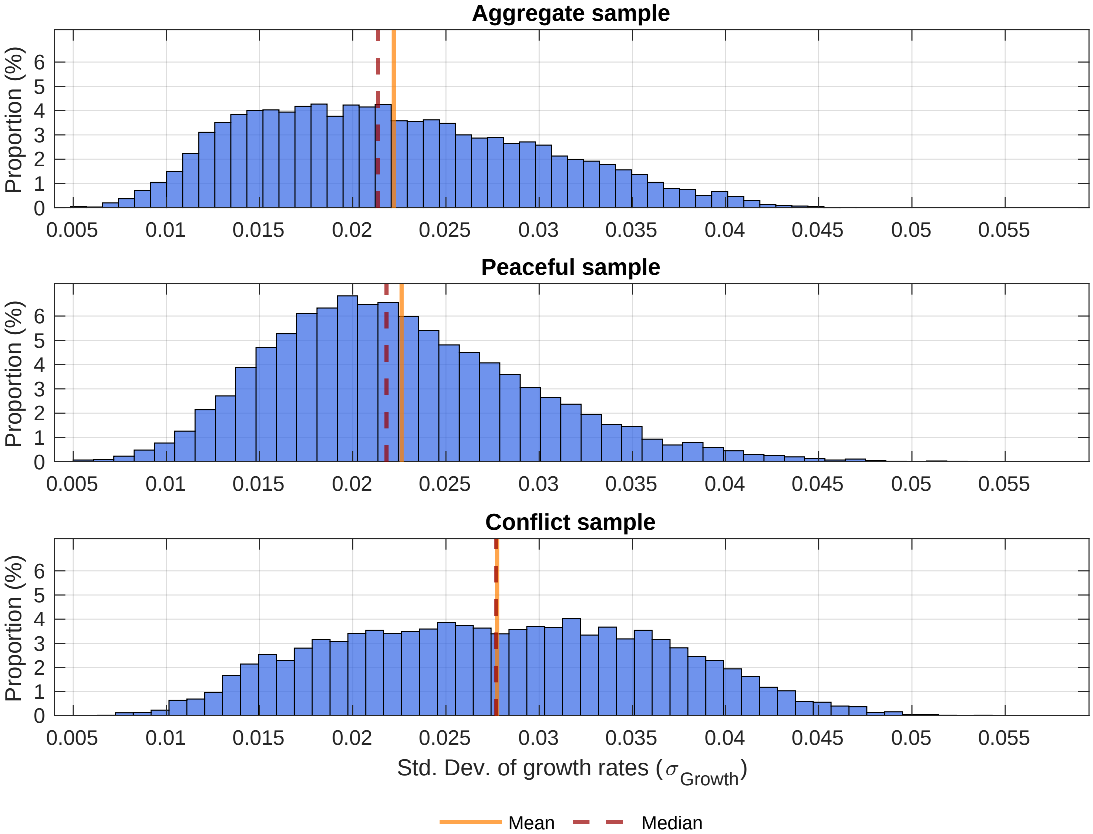


Figure B6: Growth volatility — 150 deaths per million inhabitants

Notes: The figure shows the distribution of the standard deviation of GDP per capita growth (σ_{Growth}), for each sample: the aggregate sample, the peaceful sample, and the conflict sample. Conflict is defined as experiencing more than 150 battle-related deaths per million inhabitants.

Source: Authors' calculations based on data explained in Section 3.

B.4 Growth and violence intensity

Table B7: Violence intensity and economic growth

	GDP per capita Growth
1st Decile	0.00139
	(0.00316)
2nd Decile	0.00346
	(0.00321)
3rd Decile	-0.00403
	(0.00415)
4th Decile	-0.00476
	(0.00324)
5th Decile	-0.00279
	(0.00408)
6th Decile	0.00664
	(0.00824)
7th Decile	-0.0113*
	(0.00586)
8th Decile	-0.0142**
	(0.00666)
9th Decile	-0.0307***
	(0.00907)
10th Decile	-0.0681***
	(0.0151)
Observations	6080
Country FE	✓
Time FE	✓
(Within country) R^2	0.114

Notes: The table shows the impact on GDP per capita growth for different levels of violence intensity, categorized by deciles. GDP per capita growth is regressed on a set of dummies representing each decile, with country and year fixed effects. Violence intensity is quantified by the number of battle-related deaths per capita. Robust standard errors are in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.
Source: Authors' calculations based on data explained in Section 3.

B.5 Regression with country-specific time trends

Table B8: Estimation of the growth vector with country-specific time trends

	Aggregate Sample	Peaceful Sample	Conflict Sample
		GDP per capita Growth	
Conflict	-0.0307***	-0.0365***	-0.0238**
	(0.00699)	(0.0100)	(0.00963)
1st Year Post-conflict Peace	0.0111	0.00928	0.0165
	(0.00928)	(0.0109)	(0.0140)
2nd Year Post-conflict Peace	-0.000655	-0.000833	-0.000561
	(0.00718)	(0.00947)	(0.0102)
3rd Year Post-conflict Peace	-0.00200	0.00164	-0.0125
	(0.00644)	(0.00734)	(0.0139)
4th Year Post-conflict Peace	0.00405	0.00465	0.000151
	(0.00542)	(0.00678)	(0.00967)
5th Year Post-conflict Peace	-0.00254	-0.00783	0.00897
	(0.00562)	(0.00685)	(0.0101)
6th Year Post-conflict Peace	-0.00198	-0.00237	-0.00800
	(0.00477)	(0.00551)	(0.00890)
7th Year Post-conflict Peace	-0.00101	-0.00448	0.00872
	(0.00515)	(0.00603)	(0.0108)
Observations	6080	5041	1039
Country FE	✓	✓	✓
Time FE	✓	✓	✓
Country Time Trends	✓	✓	✓
(Within country) R^2	0.186	0.209	0.174

Notes: The table shows the regression results from Equation 2 for each sample: the aggregate sample, the peaceful sample, and the conflict sample. GDP per capita growth is regressed on a set of dummies representing each state, with country and year fixed effects, and country-specific time trends. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants. The base category is stable peace, defined as either no prior conflict or more than seven consecutive years of post-conflict peace. Robust standard errors are in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.
Source: Authors' calculations based on data explained in Section 3.

B.6 Removing volatility from growth estimates

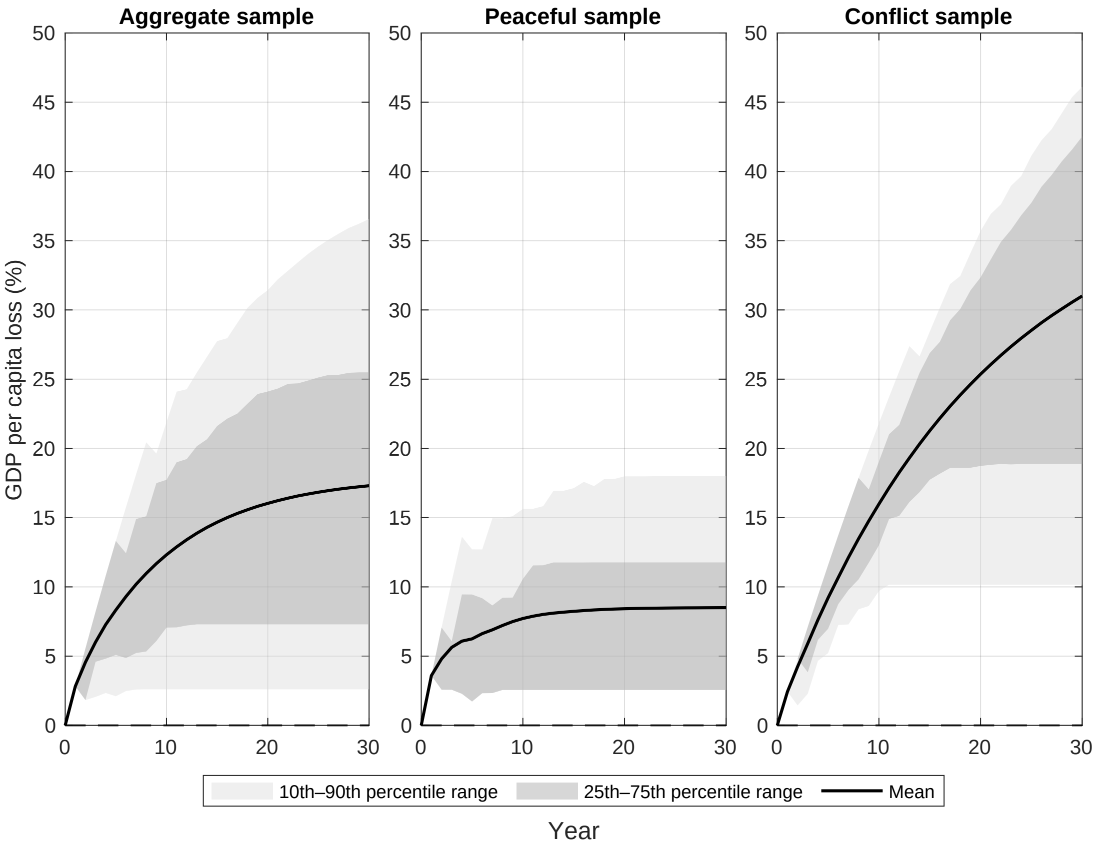


Figure B7: Evolution of GDP per capita loss — removing volatility from growth estimates

Notes: The figure shows the evolution of the distribution of GDP per capita losses following a conflict year, for each sample: the aggregate sample, the peaceful sample, and the conflict sample. Formally, for $h < \tau + 1$, we assume $\hat{f}_h \sim \mathcal{N}(\hat{\beta}_h, 0)$. Conflict is defined as more than 10 battle-related deaths per million inhabitants.
Source: Authors' calculations based on data explained in Section 3.

B.7 Counterfactual exercise

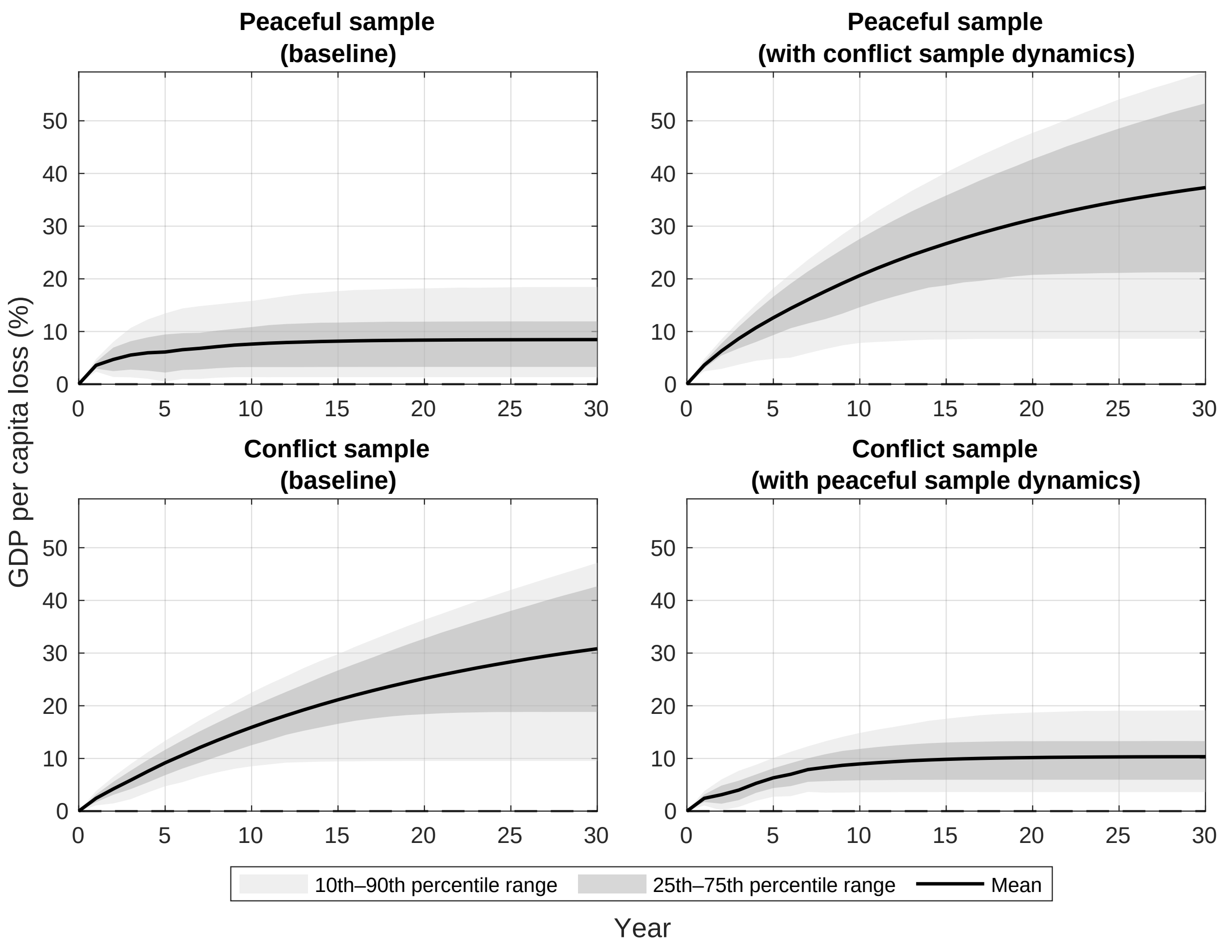


Figure B8: Evolution of GDP per capita loss

Notes: The figure shows the evolution of the distribution of GDP per capita losses following a conflict outbreak for the peaceful and conflict-prone samples, both under their own estimated conflict trap dynamics and under counterfactual dynamics obtained by interchanging them. Conflict is defined as experiencing more than 10 battle-related deaths per million inhabitants.
Source: Authors' calculations based on data explained in Section 3.

C Data summary

Table C1: Country data overview

ISO	Years	CS	ISO	Years	CS	ISO	Years	CS	ISO	Years	CS
AFG	2001-2023	1	DOM	1989-2024	0	LAO	1989-2024	0	QAT	1989-2024	0
AGO	1989-2024	1	DZA	1989-2024	1	LBN	1989-2023	1	ROU	1991-2024	0
ALB	1989-2024	0	ECU	1989-2024	0	LBR	1989-2024	1	RUS	1990-2024	0
ARE	1989-2024	0	EGY	1989-2024	0	LBY	1989-2024	0	RWA	1989-2024	1
ARG	1989-2024	0	ERI	1993-2011	0	LKA	1989-2024	1	SAU	1989-2024	0
ARM	1991-2024	0	ESP	1989-2024	0	LSO	1989-2024	0	SDN	1989-2024	1
AUS	1989-2024	0	EST	1991-2024	0	LTU	1991-2024	0	SEN	1989-2024	0
AUT	1989-2024	0	ETH	1989-2024	1	LUX	1989-2024	0	SGP	1989-2024	0
AZE	1991-2024	0	FIN	1989-2024	0	LVA	1991-2024	0	SLB	1989-2024	0
BDI	1989-2024	1	FJI	1989-2024	0	MAC	1989-2024	0	SLE	1989-2024	1
BEL	1989-2024	0	FRA	1989-2024	0	MAR	1989-2024	0	SLV	1989-2024	0
BEN	1989-2024	0	GAB	1989-2024	0	MDA	1991-2024	0	SOM	1989-2024	1
BFA	1989-2024	0	GBR	1989-2024	0	MDG	1989-2024	0	SRB	1996-2024	0
BGD	1989-2024	0	GEO	1989-2024	0	MDV	1989-2024	0	SSD	2009-2015	1
BGR	1989-2024	0	GHA	1989-2024	0	MEX	1989-2024	1	SUR	1989-2024	0
BHR	1989-2024	0	GIN	1989-2024	0	MKD	1991-2024	0	SVK	1991-2024	0
BHS	1989-2024	0	GMB	1989-2024	0	MLI	1989-2024	1	SVN	1991-2024	0
BIH	1991-2024	0	GNB	1989-2024	0	MLT	1989-2024	0	SWE	1989-2024	0
BLR	1991-2024	0	GNQ	1989-2024	0	MMR	1989-2024	1	SWZ	1989-2024	0
BLZ	1989-2024	0	GRC	1989-2024	0	MNE	1998-2024	0	SYR	1989-2023	1
BOL	1989-2024	0	GTM	1989-2024	0	MNG	1989-2024	0	TCD	1989-2024	1
BRA	1989-2024	0	GUY	1989-2024	0	MOZ	1989-2024	0	TGO	1989-2024	0
BRN	1989-2024	0	HKG	1989-2024	0	MRT	1989-2024	0	THA	1989-2024	0
BTN	1989-2023	0	HND	1989-2024	0	MUS	1989-2024	0	TJK	1989-2024	0
BWA	1989-2024	0	HRV	1991-2024	0	MWI	1989-2024	0	TKM	1989-2024	0
CAF	1989-2024	1	HTI	1989-2024	0	MYS	1989-2024	0	TLS	1991-2024	0
CAN	1989-2024	0	HUN	1989-2024	0	NAM	1989-2024	0	TTO	1989-2024	0
CHE	1989-2024	0	IDN	1989-2024	0	NER	1989-2024	1	TUN	1989-2024	0
CHL	1989-2024	0	IND	1989-2024	0	NGA	1989-2024	1	TUR	1989-2024	1
CHN	1989-2024	0	IRL	1989-2024	0	NIC	1989-2024	0	TZA	1989-2024	0
CIV	1989-2024	0	IRN	1989-2024	0	NLD	1989-2024	0	UGA	1989-2024	1
CMR	1989-2024	1	IRQ	1989-2024	1	NOR	1989-2024	0	UKR	1989-2024	0
COD	1989-2024	1	ISL	1989-2024	0	NPL	1989-2024	0	URY	1989-2024	0
COG	1989-2024	0	ISR	1989-2024	1	NZL	1989-2024	0	USA	1989-2024	0
COL	1989-2024	1	ITA	1989-2024	0	OMN	1989-2024	0	UZB	1989-2024	0
COM	1989-2024	0	JAM	1989-2024	0	PAK	1989-2024	0	VNM	1989-2024	0
CPV	1989-2024	0	JOR	1989-2024	0	PAN	1989-2024	0	VUT	1989-2024	0
CRI	1989-2024	0	JPN	1989-2024	0	PER	1989-2024	0	YEM	1991-2018	1
CUB	1989-2023	0	KAZ	1991-2024	0	PHL	1989-2024	0	ZAF	1989-2024	0
CYP	1989-2024	0	KEN	1989-2024	0	PNG	1989-2024	0	ZMB	1989-2024	0
CZE	1991-2024	0	KGZ	1989-2024	0	POL	1991-2024	0	ZWE	1989-2024	0
DEU	1989-2024	0	KHM	1989-2024	1	PRI	1989-2024	0			
DJI	2014-2024	1	KOR	1989-2023	0	PRT	1989-2024	0			
DNK	1989-2024	0	KWT	1989-2024	0	PRY	1989-2024	0			

Notes: The table shows the ISO codes of the countries included in the dataset, the years covered, and whether it belongs to the peaceful sample (CS=0) or the conflict sample (CS=1).
Source: Authors' calculations based on data explained in Section 3.