Terminating Civil War*

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Abstract

The paper takes as its point of departure contributions that argue that war and violence in general has been declining over the past centuries (e.g., Gat, Pinker, and Goldstein) and my own work that indicates this trend is likely to continue into the future for internal armed conflicts. The main driver of an expected future decline in internal armed conflict is continued socio-economic development. A crucial assumption, however, is that the observed correlation between development and peace reflects a causal effect going from development to peace. The paper challenges this assumption with a number of statistical tests, and conclude that development indeed has a causal effect on peace.

1 Introduction

This paper takes as its point of departure some recent contributions that argue that war and violence in general has been declining over the past centuries (Gat, 2006; Pinker, 2011; Goldstein, 2011) and my own work that indicates this trend is likely to continue (Hegre et al., 2013). These studies point to several explanations for the decline in violence, but all point to the importance of socio-economic changes: War has become particularly rare in the richer parts of the world. This is particularly true for internal armed conflict. At the same time, conflict frequencies have declined the most in the regions that have seen the most consistent economic growth over the past decades (South-east Asia and Latin America).

Section 2 briefly reviews this literature as well as work that indicates that economic growth, poverty reduction, and diffusion of technological innovations is expected to continue over the next decades. Does this mean that conflicts will also continue to decline in frequency and lethality? A crucial assumption underlying the predictions shown in Figure 1 is that the relationship is *causal*. Section 2 also shows projections for the incidence of armed conflict that follow if we accept that assumption.

The remainder of the paper critically examines this assumption. A necessary condition for the relationship to be causal, is that one can formulate theoretical reasons for an effect to flow from socio-economic development to the absence of armed conflict. In Section 3.2, I review seven sets of plausible explanations and

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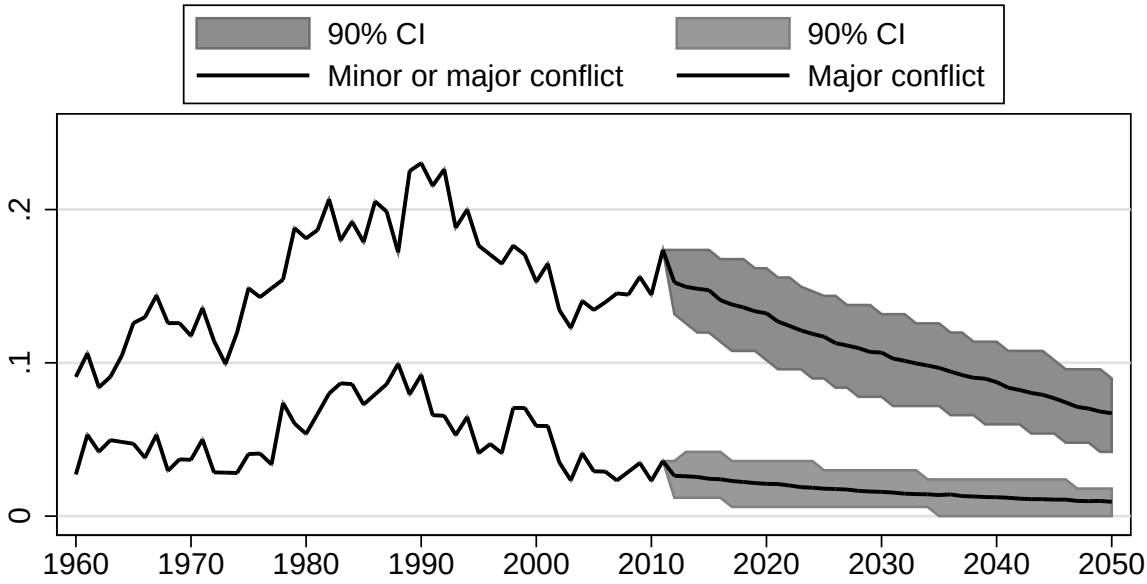
Figure 1: Observed and predicted global incidence of internal armed conflict, 1960–2011/2012–2050



Sources: Historical conflicts: Themnér and Wallensteen (2012); Predicted conflicts: Hegre et al. (2013)

discuss some of the empirical evidence supporting these explanations. This empirical evidence is supported in the initial analyses reported in Section 4.

One obvious counter-argument is that there exist factors or variables that are correlated with both development and conflict and that can be said to be causally prior to both of them. In Section 3.3, I briefly review such arguments and look into the evidence that suggest it is important. In part based on Hegre and Nordkvelle (N.d.), I explore this objection in Section 4.2.

Moreover, there are also good reasons to believe that conflicts adversely affect development, in which case our predictions would be much less valid. In Section 3.4, we discuss the empirical evidence and theoretical arguments that suggest this is a powerful counter-argument. In Section 4.3, I explore the impact of this by means of a distributed-lag analysis.

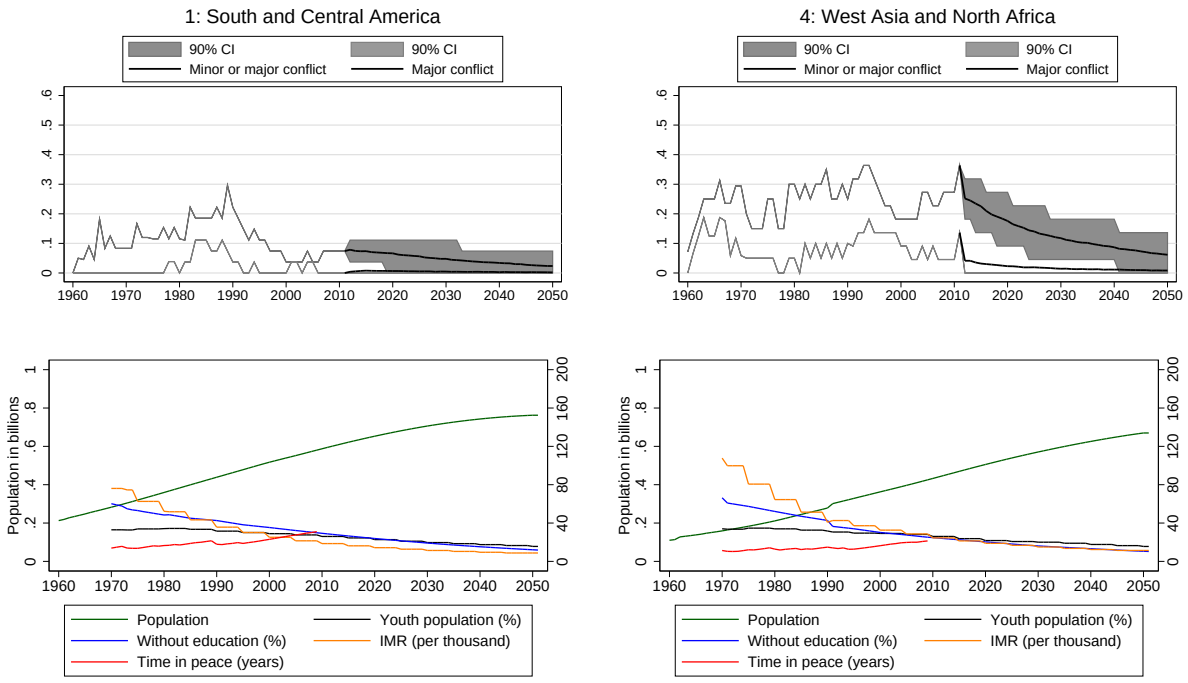
One additional aspect that is unlikely to invalidate the conflict forecasts but that is clearly related to the slow process of socio-economic development is the effect of state consolidation and the aftermath of past conflict. Section 3.5 looks into the theoretical arguments, and Section 4.2.1 explores them empirically.

2 The future of armed conflict

2.1 Past trends and a forecast for the future

Figure 1 shows the past trends in the global incidence of conflict, measured as the proportion of the countries in the world that had an ongoing internal armed conflict causing at least 25 battle-related deaths per year. The figure also shows a projection for this incidence up to 2050 based on our recent study in *International*

Figure 2: Predicted share of countries in conflict and average predictor values, South and Central America (left) and Middle East and North Africa (right), 1960–2050



Studies Quarterly (Hegre et al., 2013).[1] The forecast is based on existing research on the trends and causes of armed conflict.[2] Internal armed conflict is a conflict over a political incompatibility between a government and an organized opposition that leads to at least 25 battle-related deaths per year.[3] Our dataset distinguishes between minor conflict (25–999 deaths per year) and major conflict (more than 1,000 deaths per year) and covers all historical conflicts in independent countries back to 1946.

The upper line in the figure shows the proportion of countries in the world that had such a conflict going on in each year from 1960 to 2011, and our predicted proportion from 2012 to 2050. The grey shades represent the variability in our simulations. We use the UCDP conflict data from Uppsala University. These data show that the share of countries in conflict increased steadily up to 1992, declined to about 2003, and increased somewhat afterwards. In 2011, about 17% of all countries had an internal conflict. We project this share to decline steadily to about 7% in 2050.

The lower line shows the proportion of countries in *major* conflicts. This global war measure peaked at 10% in 1988 and declined to about 4% by 2011. We project this decline to continue, to about 1% of the world's countries in 2050.

[1] Figure 1 is based on Hegre et al. (2012). Other results referred to are from Hegre et al. (2013).

[2] The research team consisted of myself, Joakim Karlsen, Håvard Mokleiv Nygård, Håvard Strand, and Henrik Urdal. The initial study is published as Hegre et al. (2013). See `http://www.prio.no/Projects/Project/?x=834` for more information.

[3] See `http://www.pcr.uu.se/research/ucdp/definitions/definition_of_armed_conflict/` for details of the definition.

Figure 2 shows the historic observations and projections for the incidence of conflict as well as for the predictors for South and Central America (to the left) and for the Middle East and North Africa region (to the right). The Americas used to be very violent, but after the mid-1990s the region has become much more peaceful. Over the last decade, only Colombia and Peru have seen conflicts. We predict that also these conflicts will disappear over the next 30 years. The lower-left figure indicates why – South and Central America has developed into mostly middle-income countries in which conflicts are rare. Infant mortality rates are under 20 per thousand in this region, well below the global average of 35, and the proportion without secondary education close to the global average of 28%.

The Middle East/North Africa region has remained much more violent over the past fifteen years, with internal conflicts in about a quarter of the countries in every year. The underlying predictors, however, are very close to those in South and Central America. Infant mortality rates, for instance, are about 25 per thousand, and only 25% are without secondary education. Reflecting the turbulent history of the region, we predict a much higher incidence of conflict than the Americas, but a rapid decrease over the next few decades.

Figure 3 shows the same for two regions in Sub-Saharan Africa – West Africa and East/Central Africa. The two plots in the lower row reflect how poor and under-developed these regions are – infant mortality rates are about 90 in West Africa and 75 in East and Central Africa today, and about 55% of the male population in the 20–24 year group are lacking secondary education in both regions. The East and Central African region in particular has been very violent, with conflicts in up to 60% of the countries. Even though the UN and the IIASA expect the predictors to improve sharply over the next forty years, the heavy conflict history and the low level of socio-economic development means that our simulations do not yield any clear reduction in the incidence of conflict until 25 years from now.

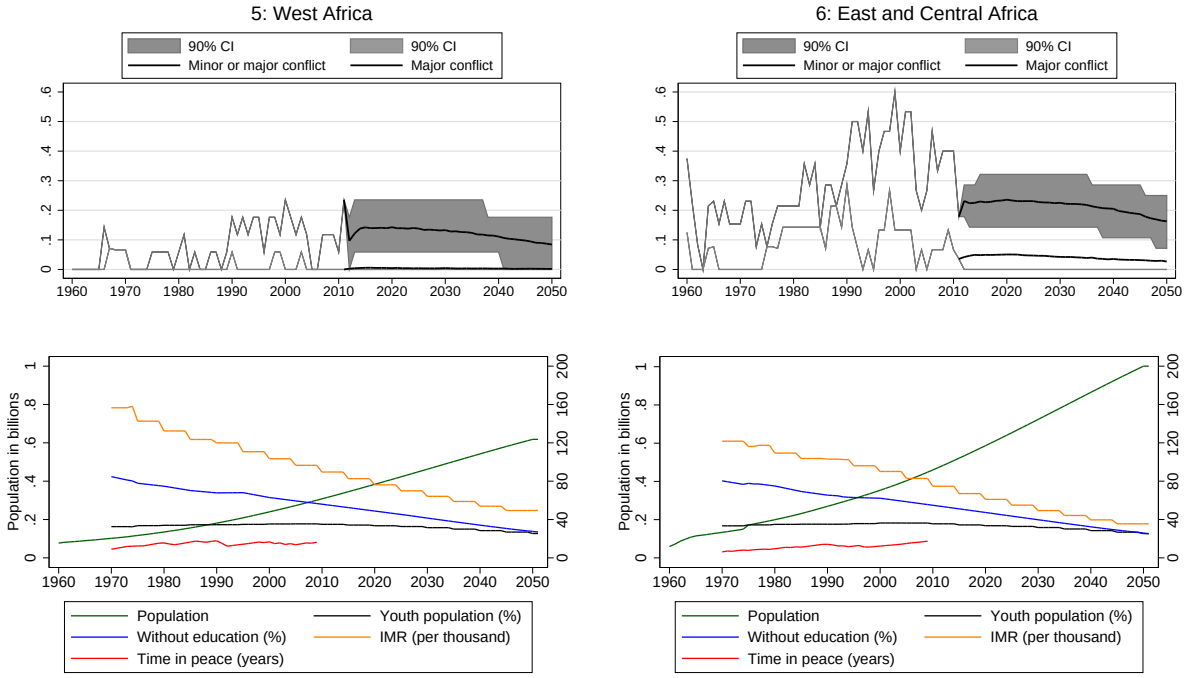
2.2 Forecasting methodology

Our projections are derived from two components: A statistical model of the relationship between a set of predictors and the probability of onset, termination, escalation, and deescalation of armed conflict; and projections for these predictors. All the countries in the world are units of analysis, and they are observed once every year. The statistical model is a multinomial logistic regression model which allows estimating the probabilities of no conflict as well as major and minor conflict.

We have data or forecasts for all predictor variables from 1970 up to 2050. Our independent variables are of two types. First, we include variables that several studies have shown are correlated with conflict: two development indicators – infant mortality rates and education levels; two demographic variables – population size and the size of the population in age group 15–24 years as a proportion of population in age groups 15–65 years; an indicator of ethnic dominance/polarization and whether the country is an oil producer. We assume that all these are exogenous to conflict.

Second, the model includes information on whether the country was in conflict the year before. We also

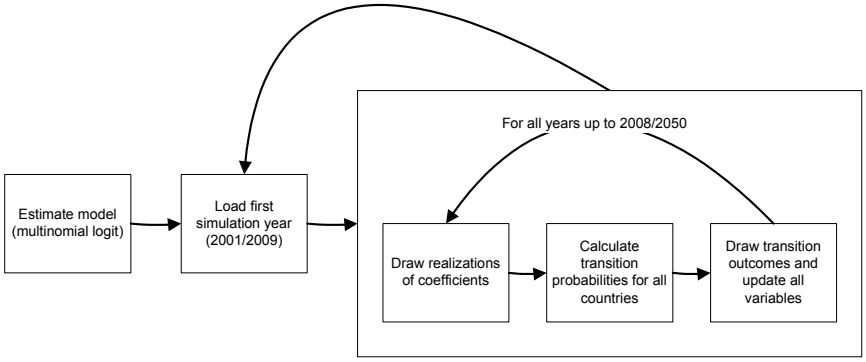
Figure 3: Predicted share of countries in conflict and average predictor values, West Africa (left) and East/Central Africa (right), 1960–2050



code for how long time the country had been independent or at peace or war up to two years earlier, and whether any neighboring countries are at conflict. These variables are obviously endogenous to conflict.

We have forecasts for all countries 2012–2050 for the demographic variables from the UN demographic division. We use projections for the proportion of population with completed secondary education developed by the IIASA in Vienna.[4] For ethnic composition and oil production we simply assume that these factors remain unchanged over the next forty years.

Figure 4: Simulation flow chart



[4] http://www.iiasa.ac.at/web/home/research/researchPrograms/WorldPopulation/news.html

Figure 5: Historic and forecasted global trends in main predictors

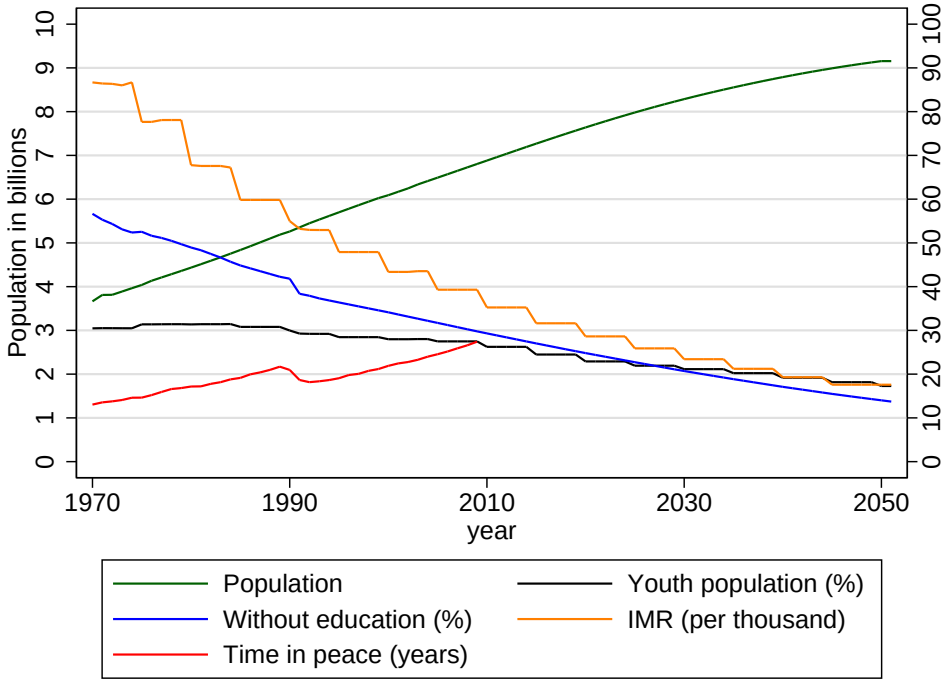


Figure 4 shows how a computer program combines the statistical model with the projections to obtain our conflict predictions.[5] First, we estimate the statistical model. Then we load the last observed status (in 2011) for the dependent and independent variables. To account for uncertainty concerning our statistical model, we draw a 'realization' of the coefficients based on the estimates and the estimated variance/covariance matrix. We then pair the realized coefficients and the observed predictors to calculate the probability of minor or major conflict. The program then draws an outcome for the next year (no conflict, minor or major) based on these predicted probabilities. Before moving to the subsequent year, the program recalculates the variables representing conflict history and neighboring conflicts based on the simulated outcome and retrieves the projections for the exogenous variables. Then all of this is repeated until 2050. To even out the impact of random draws, this procedure is repeated several thousand times.

2.3 Main drivers of the decline in conflict

Is the projected decline in internal armed conflict at all plausible? Our predicted trend in conflict is a function of the trends in our predictor variables. Some of these trends indicate an increase in conflict, whereas others suggest a decrease. Figure 5 shows the historic and forecasted trends in the most important predictors.

One factor that points to an increase in conflict is population size. Statistical studies of internal armed conflict typically find that a 1% increase in population is associated with a 0.3% increase in the risk of conflict. The green line in Figure 5 shows that the UN forecasts that the global population will increase from 7 billion

[5]The program was written by Joakim Karlsen.

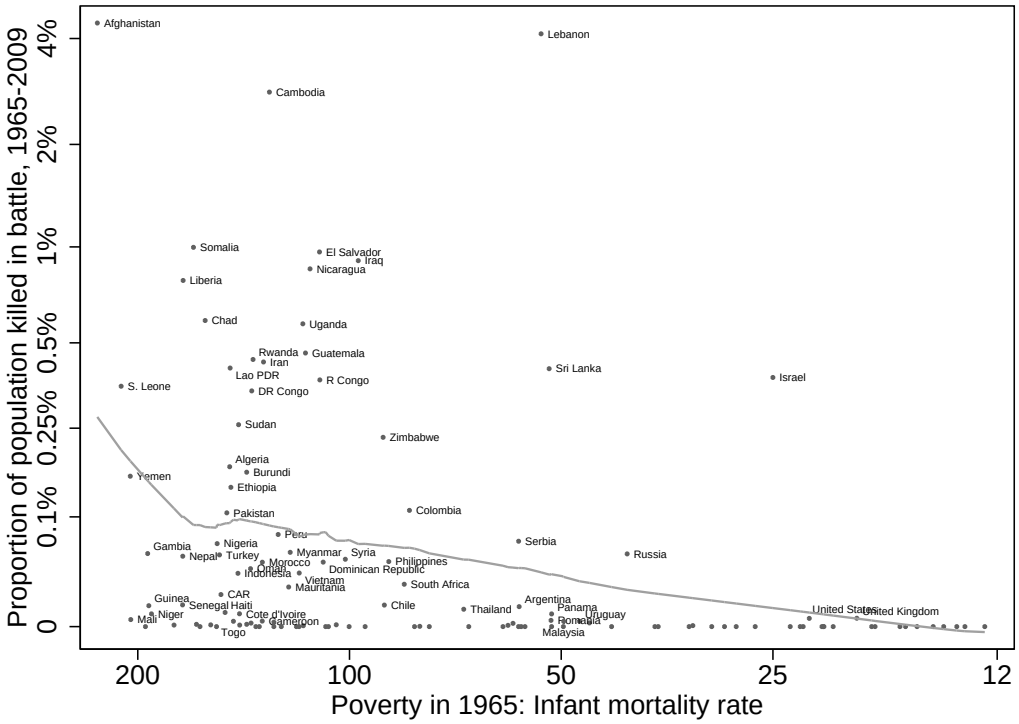
today to about 9.5 billion in 2050.[6] The population growth will be particularly strong in Africa south of Sahara.

This population growth, if not countered by other factors, indicates a considerable increase in conflict in the future. Fortunately, other trends work to counter the impact of demographic changes.

2.3.1 Development or poverty eradication

According to our statistical models, the effects of global improvements to our development variables – education and infant mortality rates – more than outweigh population growth. The world has developed steadily since the 1950s and will continue to do so over the next 40 years. The blue line in Figure 5 shows that on average more than half of countries' male population in age group 20–24 years did not have secondary education in 1970. In 2009, this share was reduced to 30%, and the IIASA expects it to decline to less than 15% in 2050.[7] Average infant mortality rates (the orange line) have decreased from about 85 in 1970 to 35 today and the UN expects it to be reduced by another 50% over the next 40 years. The proportion of population that is young will also continue to decline (the black line).

Figure 6: Deaths in internal conflicts 1965–2009 vs. poverty in 1965



Sources: Battle deaths: Lacina and Gleditsch (2005). Infant mortality rates: UN Population Division (United Nations, 2007).

[6]Since we wrote our initial article, the UN has adjusted these estimates and expect a somewhat higher population growth than indicated here.

[7]The averages reported here are not weighted by population size.

Figure 6 demonstrates the strength of the relationship between development and armed conflict.[8] It shows the log infant mortality rate (IMR) in 1965 for all countries along the x-axis, and the number of battle deaths in internal conflicts over the 1965–2009 period divided by the population in 1965 along the y-axis. The line is the average proportion killed as a smoothed function of IMR. Most conflict countries are marked with country names in the figure, whereas countries with no or very minor conflicts appear only with non-marked dots.

The figure shows that conflicts have disproportionally occurred in countries that had high infant mortality rates in 1965. The main exceptions are the conflicts in Northern Ireland, in the Basque countries, the attacks in New York of 9/11 2001, and the Israel-Palestine conflict.[9] The remainder of the 50 or so countries are almost all in the poorer half of the world's countries. The figure also shows that conflicts typically were most lethal in the poorest countries.

2.3.2 Time since independence

Another of our predictors is a variable capturing the number of years in peace in a country up to the present. The red line in Figure 5 shows the average number of years countries have been in continuous peace either since independence or since the most recent conflict. This average doubled from about 13 years in 1970 to 27 in 2009. Internal armed conflicts typically last for several years, and the risk of conflict recurrence is high for many years after an initial ceasefire. Several countries have succeeded in escaping this 'conflict trap', as indicated by the red line in Figure 5.

Decolonialization in Asia and Africa provides a partial explanation of the increase in the proportion of countries in conflict up to 1990 seen in Figure 1. It generated a large number of newly independent low-income countries that soon fell into conflict. This caused a steady accumulation of conflicts up to 1990. The 1990s was a turning point partly because of the end of the cold war and its hot proxy wars, and the new-found ability of the UN to set up effective peacekeeping operations.[10] But the 1990s was also a time when the positive effects of socio-economic development and consolidation of states in Africa and Asia started to roughly outweigh the impact of population growth, decolonialization, and the troubles generated by recent conflicts in countries and their immediate neighborhoods.

[8] The figure is taken from Hegre and Holtermann (2012). Battle-deaths data are from Lacina and Gleditsch (2005), and IMR data from United Nations (2007).

[9] In the latter case, IMR is probably under-estimated as the IMR figures exclude mortality in the Palestine territories that were occupied in 1967 and are at the core of the conflict.

[10] See `http://folk.uio.no/hahegre/Papers/PKO_Prediction_2012.pdf`.

3 Theoretical background

3.1 Definitions

Development is a multi-faceted concept (Przeworski et al., 2000; Lipset, 1959; Dahl, 1971, 1–4).[11] The literature on the relationship between conflict and development is equally multi-faceted, and considering what development is helps discussing the explanations of the relationship.

Developed societies typically have an economy predominantly based on manufacturing and service production, whereas non-developed ones derive most of its income from agriculture and other forms of natural resource extraction. Extensive manufacturing and service production necessitate deep economic diversification – various sectors of the economy specialize and exchange goods and services with each other. Associated with this widespread specialization is a population and work force that is skilled and educated – developed economies cannot function unless it can draw on extensive human capital. This skilled labor is relatively well paid – development, in most cases, means there is considerably less poverty and a sizeable middle class. Manufacturing, in particular, also requires easy access to financial capital, and banking is typically an important part of the service sector of a developed country. Non-developed countries, on the other hand, rely on capital in the form of land that yield agricultural produce or other natural resources.

Development is also associated with demographic changes. High education levels lead to lower fertility rates, and the absence of poverty to high life expectancy. When the demographic transition is complete, developed societies have modern demographic profiles with large amounts of elderly and a relatively small young population.

Development also requires some specific forms of political organization. Most importantly, adequate property rights protection and a legal system that protects economic actors is necessary to stimulate investments and protect the economic transactions essential to a diversified economy. Moreover, governments are required to invest in essential infrastructure such as ports, roads, and telecommunications. There is also a strong tendency that this political organization takes the form of democratic government (Lipset, 1959; Przeworski et al., 2000, 1–4).

All these aspects of development tend to go together. When the population is educated, financial capital is likely to be important, and infant mortality rates low. Some sources of income, however (in particular, oil extraction), can produce wealth and other societal changes that is less widely diffused throughout society. As the review below shows, it is the widely diffused aspects of 'development' which is important here, not the presence of isolated pockets of highly wealthy and developed activities.

[11] Section 3 draws heavily on Hegre (forthcoming).

3.2 Why development might reduce the risk of conflict

3.2.1 Empirical evidence of the correlation

A string of recent studies have identified the 'correlates' of civil conflict by means of time-series cross-national statistical studies designed to assess the effect of variables on the risk of civil conflict onset controlling for other variables. All these studies find a strong link between development and internal conflict, measured as GDP per capita (Collier and Hoeffler, 1998; Fearon and Laitin, 2003), energy consumption per capita (Hibbs, 1973; Hegre et al., 2001), or infant mortality rates (Urdal, 2005). The pattern apparent in Figure 6 cannot simply be attributed to other factors such as political system, former colonial power, geographical location, or a pre-existing history of conflict. Hibbs (1973) and Hegre et al. (2001) indicate that the relationship between development indicators and political violence or the risk of armed conflict may be curvilinear, with the highest amount of violence in middle-income countries. At least, it seems that the difference between the poorest countries and lower-middle income countries is smaller than between lower- and upper-middle income countries.

The strong relationship between development and conflict applies to governmental conflicts as much as to territorial or secessionist ones (Buhaug, 2006). Similarly, clear negative correlations have been found between development (typically measured as GDP per capita) and the risk of military coups (Belkin and Schofer, 2003; Rød, 2012), and the risk of violence against civilians perpetrated by insurgents (Wood, 2010) as well as governments (Sundberg, 2009, 21). Harff (2003) find trade openness – at least partly an aspect of development as defined – to be associated with a lower risk of genocides among failed states.

It seems that what matters is primarily the poverty of the country as a unit. Indicators of individual-level economic inequality have not been found to have a robust association with the risk of civil conflict (Collier and Hoeffler, 2004; Hegre and Sambanis, 2006). This conclusion has recently been challenged, however. Boix (2008) find countries with a large proportion of small family farms (in contrast to large land-owner estates) have a lower risk of political violence. Moreover, studies such as Stewart (2002), Østby (2008), and Cederman, Weidmann and Gleditsch (2011) indicate that ethnic groups that are relatively disadvantaged have a higher propensity for involvement in conflict. Reflecting the group nature of conflict, group-level measures are more relevant to assess the importance of more localized patterns of violence. Possibly contradicting this conclusion, a couple of studies indicate that conflict events tend to occur in relatively centralized and well-to-do parts of conflict countries (Raleigh and Hegre, 2009; Hegre, Østby and Raleigh, 2009), but these studies only capture the targets of violent events, not the poverty of the perpetrators. Moreover, several studies indicate that oil dependence increases the risk of conflict controlling for GDP per capita and other factors (e.g., Fearon and Laitin, 2003). This may not be so much because oil in itself is conducive to conflict as the fact that a country that is rich due to oil may be less developed as defined above than a country with the same GDP per capita that primarily relies on labor-intensive services and manufacturing.

Most internal conflicts have taken place in countries that were poor in the 1960s. Figure 6 suggests

the most lethal conflicts predominantly have occurred in the poorest countries – examples are those in Afghanistan, Cambodia, Liberia, and El Salvador, all with direct death tolls exceeding one percent of the population. There are several exceptions, however, most notably the conflicts in Lebanon, Sri Lanka, and Israel. Lacina (2006) do not identify any correlation between poverty and the number of battle deaths per capita per year. What she finds is that wars are particularly severe in non-democracies and when they last long.

3.2.2 Theoretical arguments

Just as armed conflict hurts economic activity and public health through several pathways, there are several mechanisms through which development reduces the risk of conflict. Internal armed conflicts, moreover, are complex processes and are likely to have a complex pattern of explanations. As discussed above, development is a multi-faceted concept, and societal changes that are theoretically distinct often occur together. Hence, scholars often disagree about the relative importance of these mechanisms. Currently, sufficiently detailed data are not available to allow cross-national studies to distinguish clearly between them.

Below, I list seven distinct but related arguments for why socio-economic development should lead to conflict.

1: Poverty as motivation for conflict

Poverty may itself lead to conflict. In the words of Marx and Engels (2010/1848, 34), the ends of poor workers 'can be attained only by the forcible overthrow of all existing social conditions ... The proletarians have nothing to lose but their chains'. A large gap between people's actual 'need satisfaction' and what they expect can lead to frustration, a strong sense of injustice, and a revolutionary 'mood' (Davies, 1962). However, partly based on another Marx argument, Davies explicitly argues that 'absolute need satisfaction' is not what drives revolutions. What is crucial is *relative* satisfaction. Davies introduces the 'J-curve', reflecting that revolutions occur when the gap between actual and expected need satisfaction increases, either due to economic crises or to increasing inequalities. An early empirical assessments of this claim is Gurr (1968), who finds a positive correlation between social strife and economic discrimination, political discrimination, and short-term deprivation. Gurr's 'persisting deprivation' measure is also positively correlated with civil strife. This to some extent captures absolute poverty such as the proportion of the population that lacks education.

Up to recently, no studies found a clear link between 'relative deprivation' due to within-country economic inequality and internal armed conflict. More recent work support to a larger degree deprivation-based arguments, showing associations between conflict and specific forms of inequality (Boix, 2008; Østby, 2008; Cederman, Weidmann and Gleditsch, 2011). Consistent with this idea, most rebel groups do indeed state revolution, democratization, or poverty reduction as their goal. The relationship between poverty and rebellion is complex, however. For one thing, rebel group *leaders* are often from more well-to-do segments of the population. Che Guevara was a middle-class medical student, John Garang of the SPLA had a PhD in

Agricultural economics, and Prachandra of the Nepalese maoist insurrection was from a Brahmin landlord family.

Foreshadowing the curvilinear relationship found by Hibbs (1973), Davies (1962, 7) adds another qualification to the idea that poverty leads to conflict. Revolutions do not occur when a society is generally impoverished. Evils 'are endured in the extreme case because the physical and mental energies of people are totally employed in the process of merely staying alive. ... When it is a choice between losing their chains or their lives, people will mostly choose to keep their chains'.

Empirical studies such as Collier and Hoeffler (2004) and Fearon and Laitin (2003) find little relation between 'grievance-related' measures such as inequality, ethnic diversity, dictatorship, religious discrimination. Consequently, they argue that the explanation for the correlation between average income and risk of armed conflict must be sought outside how the absence of development affects motivation for conflict.

2: Opportunities for violence entrepreneurs

The lack of a clear relationship between 'extent of grievance' and armed conflict is likely due to the 'rebel's dilemma' (Lichbach, 1995): A civil war must be fought before justice is achieved, the rebel army must be sufficiently strong to defeat the government, and must be hierarchally organized to be militarily successful. This gives rise to a collective action problem (Olson, 1965), since any potential rebel group recruit knows he or she will be better off if someone else fights to bring about the revolution – fighting is costly and the revolution is a public good.

In his account of the development-conflict relationship, Paul Collier primarily stress how aspects of development affects the *feasibility* of internal conflict. Partly echoing the arguments of Lichbach (1995), Collier dismisses the explanatory power of *motivation* for conflict.[12] Even if the collective action problem somehow could be solved, Collier (2000) also point to a commitment problem. Since it is necessary to organize a rebel army hierarchically, a rebel leader that successfully overturns a dictator will be in a position to merely replace him upon victory, and maintain the unjust political system since it now benefits him. Being aware of this incentive, the potential recruit must be skeptical to the expected utility of revolution.

Given the problems of recruiting merely on the basis of a revolutionary agenda, Collier argues, rebel leaders have to rely on private incentives to be able to recruit. A regularly salary or 'bonus payment' in the form of opportunities for looting are among such incentives.[13] This links rebellion to development since salary costs for rebel groups are low where there is an abundance of poor, unemployed, young males (Lichbach, 1995, 44).[14] Indeed, studies find conflict onset to be more frequent where populations have large 'youth bulges' (Urdal, 2006), and where education levels are low (Thyne, 2006), controlling for other development indicators. Several studies find economic incentives to be important. Studies using systematic data on rebel

[12] See Collier (2000); Collier et al. (2003); Collier and Hoeffler (2004); Collier, Hoeffler and Rohner (2009).

[13] See Lichbach (1994; 1995, 228–) for a detailed and nuanced discussion of the importance of selective incentives. Relatedly, many rebel groups rely on forced recruitment, and some may recruit individuals that value violent behavior for its own sake.

[14] Opportunity costs of becoming a government soldier, are also lower, of course. However, this may be of relative advantage to the rebels, since the governments usually face less recruitment constraints due to their greater resources and opportunity to conscript soldiers (Collier, 2000).

combatant backgrounds suggest that the poor tend to be over-represented among rebel as well as government forces (Arjona and Kalyvas, 2006; Humphreys and Weinstein, 2008; Viterna, 2006, 10).

Obviously, an evaluation of the financial sustainability of a rebellion must compare salary costs with the potential gain from fighting. Collier and Hoeffler (2004) list three sources of revenue that all can be linked to a relative absence of economic development. The first is to use violence to enable extraction of natural resources. In low-income countries, primary commodities are relatively important to the economy. Many primary commodities make up useful sources of finance for rebel groups. Exports of alluvial diamonds fueled and prolonged the conflicts in Sierra Leone and Angola, opium in Burma, and coca in Colombia (Fearon, 2004; Lujala, Gleditsch and Gilmore, 2005). A second source is donations from migrants. Remittances from migrant workers make up an important proportion of international capital flows of many economies – more than 5% is not uncommon (Giuliano and Ruiz-Arranz, 2005, 5). An unknown proportion of such remittances flow to rebel groups – such flows seem to have been important in Eritrea, Sri Lanka, and Kosovo. A third source is support from other governments. All of these sources of revenue are particularly promising in low-income countries where they typically are large relative to the total economy.

3: Poor state capacity

Hobbes (1651/1968) saw anarchy as the main explanation for war, and called for a 'leviathan' to keep citizens from killing each other. Gat (2006) and Pinker (2011) reviews accounts of how the emergence of early states reduced substantially the propensity for humans to kill each other. Translated into the domain of modern (although poor) states, the feasibility of rebellion obviously depends not on the absolute amount of soldiers and resources available to a rebel group, but on the resources available relative to what the government can invest in the contest. In line with Collier and Hoeffler (2004), Fearon and Laitin (2003) stress the conditions that favor insurgency. They, however, place somewhat more emphasis on the strength of the governments opposing the insurgents.

At least four aspects of state capacity are relevant, and all are partly linked to socio-economic development. The first concerns physical access to the territory of the state, the second the military capabilities of the government and the intelligence required for effective counter-insurgency activities, and the fourth the state's ability to implement policies designed to reduce support for the opposition.[15]

Guerillas can operate more easily if governments have problems accessing physically parts of the territory they govern. Both Fearon and Laitin (2003) and Collier and Hoeffler (2004) stress the importance of 'safe havens' – rural regions where the terrain is mountainous or forested or poorly served by roads. Development as defined above remove such havens through the development of infrastructure and migration into cities. Governments of poor countries, in particular in Africa, tend to control core areas but have weak presence in the 'hinterlands' (Herbst, 2000). In many countries, and particularly in those that inherited their borders from former colonial powers, the population is very unevenly distributed geographically. The Democratic

[15]See Sobek (2010) and Hendrix (2010) for a discussion of state capacity in relation to civil conflict.

Republic of Congo is a prime example, with a large population concentration in the East separated from the capital by thousands of kilometers of inaccessible jungle. Such physical-demographic features add to the challenges posed by poor governments (Herbst, 2000; Kocher, 2004; Buhaug, Gates and Lujala, 2009; Holtermann, 2012).

In addition to accessibility, governments must have sufficient military capabilities to put down rebellions. Governments of poor countries also often command relatively small armies that are lightly armed and often poorly trained and organized. States with large armies relative to their populations tend to have shorter wars if they break out (Mason and Fett, 1996; DeRouen and Sobek, 2004). Obviously, armies are also more effective the better equipped and organized they are. Relatedly, government armies faced with insurgents relying on elusive guerilla tactics depend on an ability to obtain information about who the insurgents are and where they can be attacked. In the absence of adequate information, governments are often compelled to make use of indiscriminate force against local populations. Such violence often strengthens insurgencies since young males consider themselves more safe as soldiers in the rebel army than as civilians in their home villages.

State capacity is not limited to governments' coercive capacity, but also on their abilities to implement conflict-reducing policies. In many cases, an important component of the struggle between the government and an insurgency is a contest over the 'hearts and minds' of local populations. A well-organized government with adequate government budgets is able to provide basic services to populations in order to strengthen their support for the government relative to potential insurgents. Such basic services include health services, infrastructure that develop economic opportunities, and security against crime and natural disasters. Many rebel groups rely on a combination of persuasion and public-goods provision (c.f., Popkin, 1988; Viterna, 2006; Wood, 2003; Young, 1998) for eliciting part-time collaboration.

4: Decreased lootability in diversified economies

Another aspect of development is the importance of 'lootability'. In the context of interstate conflict, Rosecrance (1986) argues that commerce is gradually replacing conquest as a means of advancing the 'national interest'. When land is the major factor in both production and power, a territory can be seized and made profitable by means of physical force – 'labor, capital, and information is mobile and cannot be definitely seized' (Rosecrance, 1996, 48). Conquest used to be the major cause of interstate war since states could improve their position by building empires or invading other nations to seize territory. When mobile factors of production – capital and labor – surpass land in importance for productive strength, land becomes relatively less valuable, and states are better off trading with other states than attempting to conquer them. According to Gat (2006, 658), '[r]ather than the cost of war becoming prohibitive [...], it was mainly the benefits of peace that increased dramatically once the Malthusian trap was broken, tilting the overall balance between war and peace for [...] industrializing and industrial societies, regardless of their regime, for which wealth acquisition ceased to be a zero-sum game.'

This development-related change has an analogy in internal conflicts. When land-based assets, such as most primary commodities, are economically dominant, states have strong incentives to use physical force to retain control, and potential insurgents have similar incentives to try to seize control over the central power or to obtain larger autonomy for a region. This argument reflects the importance placed on primary commodity exports by Collier and Hoeffler (2004) and Fearon and Laitin (2003). Several rebel economic activities require high rebel territorial control, such as taxation of natural resource production, rich landowners, or household incomes (Fearon and Laitin, 2003).

Boix (2008, 432) expands this to a much more complete explanation:

> Modern political violence (particularly violence of an organized nature) occurs in states in which assets are immobile and unequally distributed. In relatively equal societies, peaceful, democratic means of solving conflict are advantageous to all parties and violence happens with little probability. In economies where wealth is either mobile or hard to tax or confiscate, sustained political violence to grab those assets does not pay off since their owners can either leave in response to the threat of confiscation or are indispensable to the optimal exploitation of assets.

Boix (2008) finds strong empirical evidence for this account. Theoretically, he builds on a related argument in the literature on democratization, where the models of Boix (2003) and Acemoglu and Robinson (2006) provide an explicit link to civil war. In both accounts, elites agree to democratization because they fear a revolution staged by the poor. Democratization, they argue, is most likely when inequality is moderate, since the tax rate preferred by the median voter would then be lower than if the poor are much worse off than the rich. The implication for internal conflict is that revolutions will be more frequent in inequal societies, since the elites have a stronger incentive to resist democratization.

Boix (2003) adds the concept of 'asset specificity' to this. If the assets that the rich control are in the form of land or other resources that cannot be moved out of the country, the poor will be able to impose radical taxes if they get to control the tax rate (either through democratic institutions or through a successful revolution). If most of the wealth is in the form of financial capital, a larger fraction of it is 'safe' from taxation, and democratization is less threatening. Revolutions, then, will also be less frequent where capital is mobile, since the poor can more easily obtain the maximum redistribution they can hope for by means of democratization than through revolution. Moreover, where lootable assets are predominant, rebel groups have incentives to stage limited campaigns not to entirely take over the government, but to secure access to profitable natural resources.

5: Higher costs to violence in densely interacting societies

Interstate conflict has become increasingly rare since the end of World War II. Russett and Oneal (2001) highlight the importance of the expansion of interstate trade for this decline. As noted by Rosecrance (1986), however, the emergent predominance of 'trading states' is partly a function of economic development. Just as

countries become more dependent on trade with other countries and thereby more reluctant to use violence against them, the incentives to use organized violence against other groups is likely to change when groups engage more frequently in economic exchange. Economic exchange has a dual effect, according to Rosecrance. Trade becomes a more cost-effective way of getting access to resources and reduces the benefit of obtaining political control over territories by means of force. At the same time, trade relationships require a minimum of confidence that trading partners mutually respect property rights, so that considerable 'reputation costs' add to the financial and human costs of warfare.

6: Indirect effect through political institutions

A couple of studies (Hegre, 2003; Collier and Rohner, 2008) find that the relationship between poverty and the risk of armed conflict is contingent on the political system of a country. This runs counter to the argument that development mainly works through its effect on financial sustainability. Hegre (2003) finds that increased economic development only reduces the risk of armed conflict in democracies. In non-democracies, development does not change the risk of conflict. This regularity should be seen in conjunction with the fact that that 'the more well-to-do a nation, the greater the chances that it will sustain democracy' (Lipset, 1959, 75). At least up to the last decade or two, very few poor countries have had stable, well-functioning democratic political systems. Perhaps reflecting the limited capacity for political action among impoverished citizens, pressures for political liberalization is typically weak in poor countries. In middle-income countries, on the other hand, autocratic leaders face much more forceful demands for democratization. As recently seen in Syria and Libya, such demands sometimes escalate into large-scale armed conflict. In autocracies, then, the conflict-reducing effect of of development through the strengthening of the state apparatus is offset by the conflicts due to political demands. In consolidated democracies where most citizens support the political system, stronger states and more complex economies effectively reduce the opportunities and incentives for armed conflict.

This finding sets some of the previous explanations in a new light. The opportunities for rebellion and military state capacity explanations are somewhat weakened, since they should not be contingent on the design of the political system. Grievance-related explanations, on the other hand, are strengthened if demands for democratization is what drives the contingent relationship. The counter-argument posed by the collective action problem may be less important here, since middle-income populations typically are better educated and networks of interaction are denser, helping the opposition to solve collective action problems.

7: Education and the cognitive ability to maintain peaceful relations

I noted that Thyne (2006) found education to decrease the risk of civil conflict, controlling for other aspects of socio-economice development. Pinker (2011, 172) argues that education and the wide dissemination of literature following the invention of the printing press helped set off the 'humanitarian revolution'. With literacy, '[t]he pokey little world of village and clan, accessible through the five senses and informed by a

single content provider, the church, gave way to a phantasmagoria of people, places, cultures, and ideas.' This lead to a widening of the 'empathy circle'; the group of people whose interests people value as they value their own. Moreover, Pinker argues that *reason* is another of the 'better angels of our nature' (in addition to empathy) that explains the decline in violence. Reason helps individuals to control themselves, but also help 'integrative complexity' (Suedfeld and Tetlock, 1977) – the degree to which political discourse acknowledges multiple points of view, tradeoffs or compromises between them, and refer to higher principles or systems. Integrative complexity is negatively related to violence, and positively to education. Moreover, reason is clearly related to education, and a factor that has changed sufficiently quickly and systematically to qualify as an explanation of declining trends of violence globally as well as differences between various regions of the world.

3.3 Omitted variable bias?

As reviewed above, there are clearly a strong correlation between economic development and the absence of internal armed conflict. However, development and peace may also be correlated because they both are due to the pre-existing presence of other factors.[16]

Acemoglu, Johnson and Robinson (2001) and Acemoglu and Johnson (2005) stress the importance of pre-existing property rights and contracting institutions. Property rights institutions, they find, are particularly important. They show that settler mortality for the 1500–1900 period and whether the country has an English legal origin as instruments are strong predictors of economic development in 1995, and they may also be good predictors of absence of armed conflict.

Other sources of omitted variable bias may differences between countries in terms of religion, culture, or pre-colonial institutions, as well as factors that change globally over time that are largely independent of individual countries. Examples of the latter include the emergence of norms such as those that ban slavery or torture, or the emergence of global institutions such as the UN or the ICC.

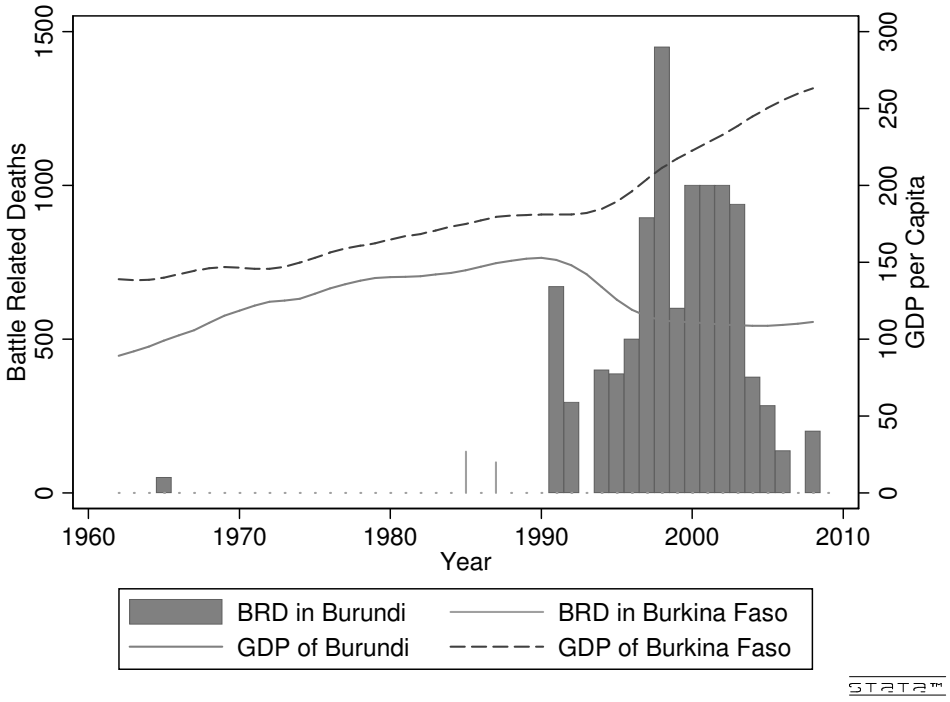
3.4 Why peace leads to poverty eradication, and the implications of this

3.4.1 Empirical evidence for how conflict increases poverty

The studies cited so far simply assume that variations in development is causally prior to conflict, but this is not necessarily the case. Conflicts might be development in reverse: 'In such condition, there is no place for Industry, because the fruit thereof is uncertain', as recognized by Hobbes (1651/1968, 186) hundreds of years ago. Several studies find a strong, adverse effect of conflict on GDP. Figure 6 plots deaths in internal conflicts for the 1965–2009 period as a function of the development level at the beginning in this period, but it is possible that conflicts before 1965 both increased the subsequent risk of conflict and undermined development.

[16] This section needs expansion.

Figure 7: Effect of conflict on GDP per capita: Burundi vs. Burkina Faso



Source: Gates et al. (2012)

Figure 7 illustrates how detrimental conflicts often are. The two lines show that GDP per capita for Burundi (solid line) and Burkina Faso (dashed line) were roughly similar from independence up to 1990. The bars represent the conflicts that occurred in the two countries. The narrow bars show the very minor conflict in Burkina Faso in the mid-1980s, and the wide bars the severe Burundian conflicts from 1991 and onwards. After 1990, Burkina Faso increased its growth rate along with several other African countries. Burundi, on the other hand, saw a severe depression in income during the first years of the conflict and a subsequent econonomic stagnation.

Burundi's trajectory is typical. Collier (1999) and Gates et al. (2012) estimate that civil wars on average reduce GDP growth by more than 2% for each year of the war duration. Murdoch and Sandler (2002; 2004) find effects of a similar magnitude and also demonstrate that civil wars have adverse growth effects in neighboring countries. Blomberg and Hess (2002) show that recessions may increase the risk of both internal and external conflict, which in turn raise the probability of recessions. Blomberg and Hess (2006); Bayer and Rupert (2004); Long (2008) and Magee and Massoud (2011) find that political violence reduces international trade, which in turn depresses growth.

Koubi (2005) studies the effect of both inter- and intranational wars on average growth in per capita real output. She finds that a war's severity, measured in battle deaths, has a significant negative impact on growth. When she conducts the analysis for interstate wars only, the statistical significance disappears,

indicating that the 'association between war and economic growth is due to civil wars' (Koubi, 2005, 76–77).

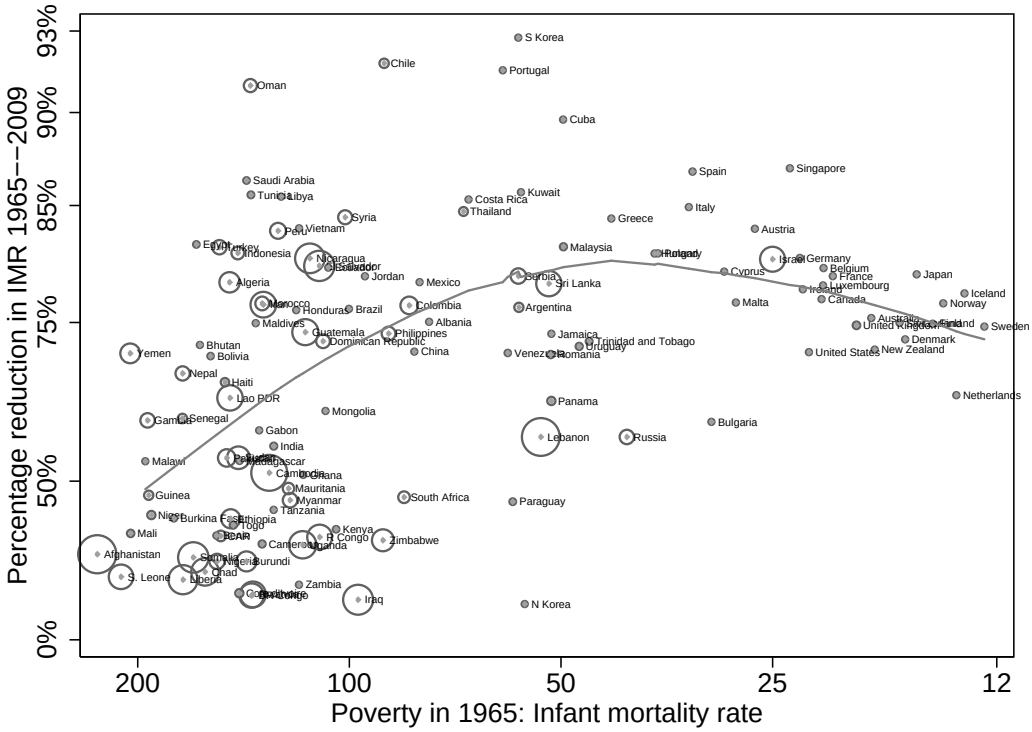
Collier (1999) also examined the differential effects of war duration. He finds that while short wars 'cause continued post-war [GDP] decline, [...] sufficiently long wars give rise to a phase of rapid growth' (Collier, 1999, p. 175–176), reflecting a 'Phoenix effect' (Organski and Kugler, 1980). Collier attributes the continued decline in GDP after short wars to post-war environments being less capital-friendly than before the war. Indeed, capital flight is a big problem in post-conflict economies (Davies, 2008). Koubi (2005, 78) and Chen, Loayza and Reynal-Querol (2008, p. 71) corroborate Collier's findings. After 'the destruction from war, recovery is achieved through above average growth' but this growth follows the pattern of 'an inverted U, with the strongest results achieved in the fourth or fifth year after the onset of peace' (Chen, Loayza and Reynal-Querol, 2008, p. 72, 79). Likewise, Blomberg and Hess (2002) find a strong negative effect of both external and internal conflict on growth. Flores and Nooruddin (2009) examine the special problems democracies face when trying to implement economic policy reforms in a post-conflict environment.

The economic effects of civil war also tend to spill over into neighboring countries (Buhaug and Gleditsch, 2008; Salehyan and Gleditsch, 2006). Murdoch and Sandler (2002; 2004) focus on the spillover effects from conflicts in neighboring countries and the magnified costs of being located near a more widespread set of wars that constitute a regional conflict. Murdoch and Sandler (2002, p. 96) show that a neighboring civil war affects GDP directly and indirectly. The direct effect is from the collateral damage whereby battles close to the border destroy infrastructure and capital. The indirect effect occurs by increasing the 'perceived risk to would-be investors and divert foreign direct investment away from neighbors at peace'. They further find that a civil war creates 'significant negative influence on short-run growth within the country and its neighbors' (Murdoch and Sandler, 2002, p. 106–107). In Murdoch and Sandler (2004) they argue that 'owing to regional economic integration and regional multiplier effects', the spillover effects may go beyond a country's immediate neighbors. For neighbors within a radius of 800 km they find that 'a civil war at home is associated with a decline in economic growth of 0.1648, while an additional civil war in a neighbor is associated with a decline of approximately 0.05 or about 30 % of the home-country effect' (Murdoch and Sandler, 2004, 145). This implies that 'a country in a region with three or more civil wars may be equally impacted as a country experiencing a civil war" (Murdoch and Sandler, 2004, 150).

Figure 8 indicates that the adverse effects of conflict are by no means limited to the merely economic sphere.[17] The figure places the countries of the world according to their infant mortality rate in 1965 along the horizontal axis and the proportional decrease in IMR over the 1965–2009 period along the vertical. Some poor countries, such as Oman, Chile, and South Korea have experienced dramatic reductions in poverty according to this measure. The conflict histories of countries are represented by circles with area proportional to the number of battle-related deaths in percent. Several war countries have also seen considerable improvements in IMR, e.g. the countries in Central America, Algeria, and Sri Lanka. But a disproportionate number of the countries that were poor in 1965 and remain poor today have had long and destructive civil wars.

[17] This figure is also taken from Hegre and Holtermann (2012).

Figure 8: Poverty reduction 1965–2009 vs. deaths in internal conflicts 1965–2009



Source: Battle deaths: Lacina and Gleditsch (2005).
Infant mortality rates: UN Population Division (United Nations, 2007)

Afghanistan, Somalia, Burundi, and Cambodia are evident examples.

The direct death tolls of civil wars are typically a few thousand fatalities. These deaths are nearly always accompanied with a large amount of indirect deaths. In the most comprehensive study of the health consequences of war, Iqbal (2010) shows that fertility rates increase and life expectancies decrease as a result of conflict. Gates et al. (2012) demonstrate that conflict increases undernourishment, infant mortality rates, and access to safe water, in addition to depressing income. Lai and Thyne (2007) find civil wars to reduce educational expenditures, and by an amount sufficiently large to reduce enrollment in all educational levels. Ghobarah, Huth and Russett (2003) show that the adverse health effects linger on for several years after the conflict has ended. Both Plümper and Neumayer (2006) and Ghobarah, Huth and Russett (2003) report that the health consequences of conflict are more severe for women than for men, despite that fewer women are killed directly in battle.

3.4.2 Theory: Why conflict reduces development

Collier (1999) classifies the routes through which conflict reduces development into destruction, disruption, diversion, and dis-saving. War actions destroy production and health facilities, war-related deaths and maiming reduces the workforce, destruction of roads hinders economic exchange and increase transportation

costs. Disruption occurs through the insecurity created by violence and a general breakdown of the social order, as well as the effect of large population groups that flee their homes and thereby their jobs. Particularly devastating for public health is the increased difficulty of obtaining safe drinking water in conflict zones (Gates et al., 2012). In many instances, large refugee populations are exposed to epidemic diseases through crowding, bad water, poor sanitation, and malnourishment (Ghobarah, Huth and Russett, 2003, 192).

Civil wars lead to massive diversion of public funds. Increased military spending shifts public resources from expenditures that promote growth and public health (Ghobarah, Huth and Russett, 2003, 192). Finally, war economies suffer from dis-saving and massive capital flight. The effects on capital is due to the destruction of infrastructure as well as the increases in transaction costs. 'The ability to enforce contracts is reduced as the institutions of civil society is weakened, trust declines, time horizons shorten due to uncertainty, and opportunism becomes more profitable' (Collier, 1999, 178). In a study of the national accounts of Uganda 1971–1986, he shows that arable subsistence agriculture, a relatively war-invulnerable sector, increased from 20.5 to 36% of GDP, and that war-vulnerable sectors (construction, transport, distribution, finance, manufacturing) decreased from 42.5 to 24%. In an analysis focusing specifically on capital flight, Davies (2008) shows that capital flight is high in conflict and post-conflict countries, in particular in combination with high inflation.

Armed conflict also adversely affects the *structure* of the economy. Since land-specific capital such as agriculture and other primary commodity extraction is less mobile, the flight of mobile capital means that conflict transforms economies into more primary-commodity dependent economies (Collier et al., 2003, 84). The erosion of incentives to invest in the conflict country applies at all levels of the economy. Skilled labor migrates, middle-class citizens with savings move them abroad, foreign companies close down all activities if the costs of protecting investments become to high, and governments become short-sighted and opportunistic – in the terms of Olson (1993), if conflict countries were lucky enough to have a 'stationary bandit' before, war tends to reinstall the roving ones. The income losses due to war are typically of the kind that increases the future risk of new conflicts. Supplies of financial and human capital contract relative to land, natural resource extraction, and unskilled labor. The breakdown of government control opens up for production of illegal drugs as happened in Colombia and Afghanistan.

There clearly is an impact from conflict on development. However, this may not be as strong as the effect that runs in the opposite direction. For instance, most countries have seen improvements in our development indicators. Lebanon, Laos, and Cambodia all reduced infant mortality rates by more than 50% from 1965 to 2009 despite their extremely destructive conflicts. Even Afghanistan has reduced infant mortality rates by about 30%. The apparent tendency for development to be more fundamental than conflict in this respect is the fact that several factors affect development independently of domestic conflicts. Global and regional economic growth stimulates growth and affects incentives even in fairly marginalized countries – the growth of China and India is eventually bound to affect Myanmar, for instance. International development assistance is another exogenous source of growth (to the extent that it is effective).

3.4.3 Conflict traps

It is clear from the previous sections that conflict and poverty are endogenous to each other. Poverty is among the most important structural conditions that facilitate internal armed conflict (Collier and Hoeffler, 2004; Fearon and Laitin, 2003; Hegre and Sambanis, 2006). The detrimental effect of conflict on the economy, then, increases the risk of continued or renewed conflict. The changes to the structure of the economy – away from capital-based production to natural resource extraction, further increase the vulnerability to conflict and to more authoritarian politics (Collier and Hoeffler, 2004; Boix, 2003). Collier et al. (2003) argues that about a fifth of the world's countries are caught in a 'conflict trap' where intermittent fighting effectively prevents countries from escaping the poverty that facilitates conflict. Collier et al. (2003, 111) estimates that by 2050, only about 10% of 50 or so 'marginalized countries' will have been able to escape the trap.

It is hard to quantify precisely how strong the trap is, but Figure 6 above indicated that it is less impossible to escape the conflict trap than indicated by Collier et al. (2003). Most conflict countries are found in the bottom left in the figure. Conflict countries such as Afghanistan, Liberia, and Burundi were poor in the 1960s and have reduced infant mortality by much less than comparable countries. However, even Afghanistan and Somalia have clearly lower infant mortality rates in 2009 than in 1965. Some war countries, such as Laos, Nicaragua, and Colombia have reduced poverty at a quicker rate than comparable countries.

3.5 Why state consolidation should lead to peace

The predicted decline in global conflict shown in Figure 1 is mainly driven by the expected improvements in infant mortality and education as well as the decline of youth bulges.[18] An obvious objection to this prediction is that infant mortality and education were improving also in the 1970–1990 period, at a time when the incidence of conflict increased strongly. How can we claim that what occurred in this period will not occur in the next few decades?

Two processes can explain the increase in conflict incidence within the confines of this model. The first is the process of decolonization. In 1970, the median age of countries was 43 years. In 2009, it was 60 years. This is reflected in the 'time in peace' variable included in the model, which has a low value when countries have existed for only a few years and is estimated to be a powerful predictor. The average value for this variable in 2009 is much lower than in the 1970s and the 1980s, partly explaining that conflicts accumulated at a higher pace then than they will in the future.[19] As time passes by, the new states strengthen their security apparatus as well as softer conflict resolution mechanisms, and actors gradually learn whether any attempts to challenge competing elites by military means will only lead to costly and stalemated contests.

The second process is a slow convergence toward a *steady-state incidence* of conflict (Collier et al., 2003, 95).[20] Few countries had conflict in the first year of independence.[21] Initially, 'too few' countries were in

[18] This section needs expansion.

[19] Moreover, the newly independent countries in the 1990s have a lower underlying risk of conflict according to this model than the new countries in the 1960s.

[20] See Taylor and Karlin (1998, 199–205) for a general discussion of such convergence processes.

[21] Among the countries that became independent in the 1950s and 1960s, the exceptions were Vietnam, Malaysia, Cameroon,

conflict, and the process of falling into conflict is relatively slow. The risks of conflict onset in many newly independent countries were high according to our model, but typically only about 0.10. It takes 2–3 decades before most countries have fallen into the 'conflict trap'. As soon as they fall into it, it takes a long time to escape the conflict trap. Collier, Hoeffler and Söderbom (2008) estimate the risk of conflict reversal to be around 40% during the first post-conflict decade, and Elbadawi, Hegre and Milante (2008) find an even higher rate using a more inclusive definition of conflict. Collier et al. (2003, ch. 4) estimate that about half of all post-conflict countries return to conflict. A third of the post-conflict countries succeed in keeping the peace beyond the first 10 years, but these enter a category classified as 'marginalized countries at peace' (roughly the same as the 'bottom billion' countries without conflict; cf. Collier, 2007). This group of countries is characterized by low incomes and sluggish growth, and has a markedly higher risk of conflict than other countries. Only one sixth of post-conflict countries end up in the group of 'successful developers', drastically reducing conflict risk (Collier et al., 2003, 109).

4 Analysis

In this section, I reanalyze the model in Hegre et al. (2013) using a slightly different dataset. I then look into the omitted-variable bias problem by means of models capturing invariant heterogeneity between countries as well as between different points in time. I look into how global trends in development affect estimated country-level risks, and look into the problem of reverse causation by means of a distributed-lag model.

4.1 Data

The dependent variable: The conflict data are from the 2010 update of the UCDP/PRIO Armed Conflict Dataset (Themnér and Wallensteen, 2011; Gleditsch et al., 2002). I merge the two UCDP conflict levels into one, i.e. I include all conflicts that pass the 25 battle-related deaths threshold. I only look at internal armed conflicts, and only include the countries in the primary conflict dyad (i.e., exclude other countries that intervene in the internal conflict). In some of the models, I restrict attention to *onset* of armed conflict. In that case, the conflict variable is coded 1 in the first year of a conflict and 0 in all other cases. In other models, I look at *incidence*, where the conflict variable is coded 1 in the first and all subsequent year with at least 25 battle-related deaths, and 0 if not. I also include in many models information on conflict status (conflict or no conflict) at $t-1$, the year before the year of observation.

GDP per capita: I use the GDP data of Maddison (2007), which are measured in 1990 International Geary-Khamis dollars – referred to as 'Int$' (Maddison, 2010). To reduce missingness, these data are supplemented with GDP data from World Bank (2011) and Gleditsch (2002). In order to obtain comparability between the three latter sources and Maddison we have used their common observations to 'translate' their values to

Zaire, and Angola.

Maddison values.[22]

Time since conflict (ltsc0): To capture the impact of conflict history further back in time we also record the log of the number consecutive years without conflict up to $t-2$. When a conflict erupts, it is reset at 0. Countries that have recently become independent also have low values for this variable.

Time since independence: The variable is the log number of years since the country gained independence. The variable was coded on basis of an updated version of Gleditsch and Ward (1999). The variable is highly correlated with 'Time since conflict' (ltsc0) because this also starts at 0 at independence.

Democracy The SIP score, taken from (Gates et al., 2006) and Strand et al. (2012), condenses a three-dimensional conceptualization of democracy to one dimension.[23] The SIP is the average of the three (normalized) components of the three-dimensional indicator. The entire scale of the index ranges from 0 (a perfect autocracy) to 1 (a perfect democracy). The dashed line in Figure 10 shows the average SIP score in the system for the 1960–2008 period.

I also add the square of the SIP score to capture the curvilinear relationship between democracy and conflict found in earlier studies (Hegre et al., 2001; Hegre and Sambanis, 2006).

4.2 Omitted-variable bias

Table 1, column 1 shows the results from estimating a standard pooled logit regression model with the *onset* of internal armed conflict as the dependent variable, and with log infant mortality rate as the indicator of development. The fourth column shows the same using log gdp per capita rate as the main independent variable. The risk of conflict decreases with higher GDP per capita and increases with higher infant mortality rates. In both models, the development variable is statistically strongly significant. The magnitude of the coefficient is sufficiently large to produce aggregate effects like that in Figure 1. Controlling for differences in population size, the estimated odds of conflict onset based on column 1 is about 2.3 times higher in Nigeria than in Brazil. Based on the GDP per capita model, estimated odds of conflict in Nigeria is 60% higher than in Brazil.

The models in Table 1 seek to reduce omitted variable bias by controlling for a set of variables that have been shown to be robustly associated with the probability of armed conflict onset (Hegre and Sambanis, 2006).Growth in GDP per capita (only in the GDP per capita models) has a strong negative impact on the risk of conflict onset (Collier and Hoeffler, 2004). According to the estimate in Column 4, a 1% increase in the growth rate decreases odds of conflict by 2.2%.

[22]The exact conversion procedure is documented in an online Appendix to Strand et al. (2012).

[23]The index combines aspects of the Polity (Jaggers and Gurr, 1995) and Polyarchy (Vanhanen, 2000) by integrating a weighted measurement of political participation from Polyarchy with the Polity measures of executive constraints and executive recruitment.

Table 1: Conflict onset models with infant mortality rate and per capita GDP as development indicator; pooled (1, 4), fixed effects (2, 5), and random effects (3, 6), 1960–2008

	onset					
	logistic		generalized linear mixed-effects	logistic		generalized linear mixed-effects
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	−8.596***		−9.423***	−3.188***		−3.430***
	(1.059)		(1.219)	(1.087)		(1.236)
limr	0.556***	0.620*	0.603***			
	(0.118)	(0.317)	(0.129)			
gdpcap				−0.329***	−0.260	−0.385***
				(0.095)	(0.306)	(0.108)
gdpgrowth				−2.200**	−2.391**	−2.169**
				(1.057)	(1.166)	(1.101)
ltsc0	−0.094	0.439***	−0.036	−0.130**	0.447***	−0.060
	(0.061)	(0.088)	(0.066)	(0.060)	(0.088)	(0.066)
ltimeinde	−0.005	0.176	−0.014	−0.032	0.207	−0.042
	(0.070)	(0.203)	(0.079)	(0.074)	(0.213)	(0.084)
population	0.174***	0.245	0.202***	0.155***	−0.333	0.184***
	(0.053)	(0.497)	(0.063)	(0.054)	(0.393)	(0.064)
sip2	1.556	1.013	1.538	1.468	1.425	1.373
	(0.961)	(1.317)	(1.019)	(0.960)	(1.318)	(1.022)
sipsq	−1.616	−0.218	−1.527	−1.767*	−0.802	−1.621
	(1.024)	(1.420)	(1.090)	(1.022)	(1.408)	(1.093)
N	6,724	6,724	6,724	6,642	6,642	6,642
Log Likelihood	−777.058	−656.805	−775.988	−773.341	−651.236	−772.140
AIC	1,568.115	1,653.610	1,567.975	1,562.683	1,640.471	1,562.281
BIC			1,622.483			1,623.491

*p < .1; **p < .05; ***p < .01

Other control variables are log number of years in peace up to $t-1$ (*ltsc0*), and the log number of years since independence (*ltimeinde*). The probability of conflict onset is lower the longer the country has been in peace. The estimate in Column 4 indicates that doubling the time in peace reduces odds of conflict onset by 18%. Beyond that, the time since independence explains little – the estimate for 'ltimeinde' (log of number of years since independence) is not statistically significant.

Large countries have a higher risk of conflict onset, but the estimate is relatively small. In fact, the per-capita risk of dying in armed conflict is on average smaller in large countries than in small ones (Raleigh and Hegre, 2009).

The estimates for regime type indicate an inverted U as typically found for armed conflict onset (Hegre et al., 2001). The estimates are roughly similar in Columns 1 and 4, but statistically significant only in the latter.

But may the conclusion that development reduces conflict rather be due to omitted country-specific variables that are correlated with development as well as the country's conflict propensity? Columns 2 and 5 in Table 1 estimate the same model adding indicator variables for all countries to the models. The estimate for GDP per capita is substantially smaller in this 'fixed-effects' model – it changes from –0.329 to – 0.260. The estimate for log IMR, on the other hand, becomes somewhat larger. In both models the estimated standard error is much larger than in the pooled models.

So, in the GDP per capita model at least the fixed-effects specification suggests that a considerable portion of the effect is due to omitted country-specific variables. Does this mean we cannot regard the correlation between development and conflict as causal? The answer is not straightforward. Obviously, the results in column 5 shows that most of the covariance that drives the estimate in column 4 is between countries, not within countries over time. Conflicts occur in Afghanistan and Rwanda and not in Denmark or Japan. The difference in income between these two pairs of countries is much larger than the change within each country over the 1960–2008 period, and the statistical analysis cannot rule out that some unobserved difference between the countries explain the differences in conflict frequency.

However, as suggested by the increase in the estimated standard error for all variables, the fixed-effects model is very inefficient. This is partly due to the fact that observations from countries without variance for the dependent variable (most of them being no-conflict countries) do not contribute at all to the estimates. It is possible that some unobserved factors have a considerable impact on both GDP per capita and the risk of conflict, but unlikely that they explain everything. In that case, a fixed-effects model implies a lot of 'throwing the baby out with the bath water' (Beck and Katz, 2001). Relatedly, the country dummies that function as controls in column 5 are estimated based on a limited number of observations since there is no pooling of data for these terms (Gelman and Hill, 2007, p. 253). Typically, each of them are underpinned by only one or two conflict onsets. In terms of predictions, the model implies that the risk of conflict in Tanzania is about 100 times less likely than in Kenya. In order to believe in these estimates, we must believe that it is just not a lucky coincidence that Tanzania has avoided any armed conflicts whereas Kenya did not. The

interpretation of the remaining estimates in the model in column 5 to some extent depend on these uncertain estimates to be correct.

Table 2: Conflict incidence models with GDP per capita and GDP growth rate as development indicators; pooled (1), fixed effects (2), and random effects (3, 4), 1960–2008

	incidence			
	logistic		generalized linear mixed-effects	
	(1)	(2)	(3)	(4)
Constant	−3.436***		−5.387***	−6.252***
	(0.932)		(1.468)	(1.428)
gdpcap	−0.455***	−0.075	−0.528***	−0.413***
	(0.092)	(0.247)	(0.129)	(0.116)
incidencelag1	−0.042	1.509	0.499	2.920***
	(0.921)	(1.075)	(1.069)	(0.186)
I(incidencelag1 ∗gdpcap)	0.429***	0.188	0.326**	
	(0.123)	(0.142)	(0.142)	
gdpgrowth	−3.180***	−5.106***	−4.230***	−4.220***
	(0.895)	(1.072)	(0.979)	(0.982)
ltsc0	−0.674***	−0.246***	−0.502***	−0.522***
	(0.068)	(0.084)	(0.079)	(0.078)
ltimeinde	0.188***	0.175	0.167*	0.162*
	(0.056)	(0.159)	(0.086)	(0.087)
population	0.275***	0.252	0.402***	0.404***
	(0.043)	(0.303)	(0.079)	(0.080)
sip2	−0.600	0.655	0.313	0.388
	(0.736)	(0.991)	(0.886)	(0.895)
sipsq	0.738	−0.818	−0.517	−0.603
	(0.788)	(1.064)	(0.957)	(0.962)
N	6,642	6,642	6,642	6,642
Log Likelihood	−1,111.798	−935.469	−1,083.168	−1,085.795
AIC	2,243.595	2,212.938	2,188.335	2,191.590
BIC			2,263.148	2,259.601

*p < .1; **p < .05; ***p < .01

The random-effects model allows for 'partial pooling' (Gelman and Hill, 2007, p. 253). These models have a much more conservative attitude to how much you can infer from the non-observance of a rare event in a particular country. In the simulations reported in Hegre and Nordkvelle (N.d.), random-effects models handle omitted-variable bias due to unobserved coutnry-spcific variation well but is considerably more efficient than the fixed-effects model. The results from this model are reported in column 3 for IMR and column 6 for GDP per capita. These results are very close to those in the completely pooled model, both in terms of the estimated coefficients and their standard errors. Even when allowing for substantial between-country variance (where there is sufficient information to assess this), increasing GDP per capita and decreasing infant mortality rates are associated with a lower risk of armed conflict onset. The random-effects models completely support the conclusions drawn from Figure 1.

Table 3: Conflict incidence models with infant mortality rate as development indicator; pooled (1), fixed effects (2), and random effects (3, 4), 1960–2008

	incidence			
	logistic		generalized linear mixed-effects	
	(1)	(2)	(3)	(4)
Constant	−9.569***		−12.027***	−11.792***
	(0.899)		(1.392)	(1.384)
limr	0.607***	0.269	0.612***	0.533***
	(0.110)	(0.249)	(0.136)	(0.122)
incidencelag1	5.306***	3.153***	4.077***	2.968***
	(0.656)	(0.720)	(0.740)	(0.186)
I(incidencelag1 ∗limr)	−0.496***	−0.046	−0.259	
	(0.146)	(0.163)	(0.166)	
ltsc0	−0.660***	−0.254***	−0.533***	−0.541***
	(0.070)	(0.083)	(0.078)	(0.077)
ltimeinde	0.153***	0.022	0.118	0.116
	(0.054)	(0.152)	(0.080)	(0.081)
population	0.285***	0.641*	0.417***	0.422***
	(0.043)	(0.378)	(0.074)	(0.076)
sip2	−0.338	0.500	0.612	0.690
	(0.727)	(0.988)	(0.866)	(0.874)
sipsq	0.625	−0.606	−0.593	−0.664
	(0.779)	(1.070)	(0.932)	(0.937)
N	6,657	6,657	6,657	6,657
Log Likelihood	−1,120.509	−952.943	−1,098.254	−1,099.479
AIC	2,259.018	2,249.886	2,216.509	2,216.958
BIC			2,284.543	2,278.189

*p < .1; **p < .05; ***p < .01

In the analyses in Table 1, *onset* of internal armed conflict is the dependent variable. The proportion of countries in conflict at any time depicted in Figure 1 depends on the *incidence* of conflict – whether a conflict is ongoing in a country in a given year. If development has a different effect on the likely duration of conflict than on the probability of onset, an onset analysis may be insufficient. Tables 2 and 3 show similar analyses with the incidence of armed conflict as dependent variable. To account for the statistical dependence of conflict observations on observations for the preceding year, a lagged dependent variable has been added [incidencelag1]. Moreover, to capture that the effect of development on the duration of conflict may differ from that on onset, the models include a multiplicative interaction term between GDP per capita or infant mortality rate and the lagged dependent variable. As before, the tables include estimates for standard pooled logistic regression models in Column 1, fixed-effects models in Column 2, and random-effects models in columns 3 and 4. Colun 4 report results without the interaction between development and lagged conflict.

The incidence models yield conclusions very similar to the onset models. Again with the exception of the fixed-effects models, the development variables indicate that poverty is strongly associated with a high risk of conflict incidence. The interaction terms have the opposite signs of the development variables and are statistically significant in most models. Development reduces the risk of conflict onset considerably, but has a less clear relation to their durations. The most important difference between developed and non-developed countries is that conflicts more rarely erupt (or re-erupt) in the former. In both random-effects models, however, the interaction term is clearly smaller than the main term, implying that the estimated probability of continued conflict also decreases with development.

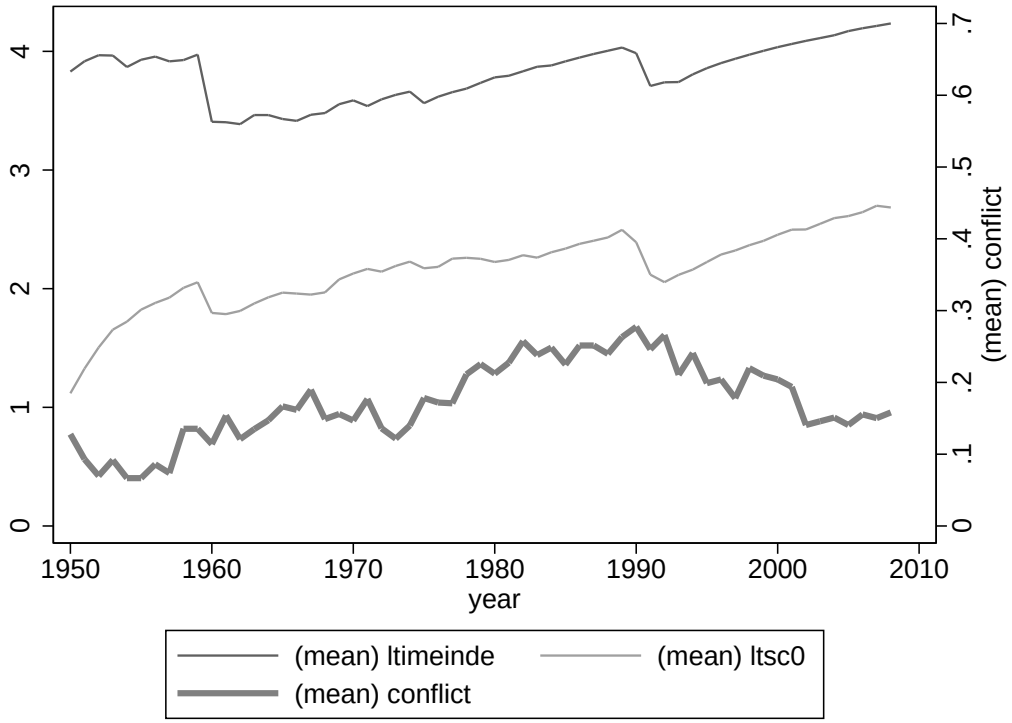
4.2.1 Time

May the beneficial effect of development rather be due to factors that have changed over time in parallel with domestic and global economic growth, but that are causally unrelated to the economic changes? One source of such possible confoundation is the consolidation of state structures as reflected in the time elapsed since the independence of the country. Another is that domestic economic growth simply reflects global normative changes.

To take the consolidation of state structures first: All of the preceding models have included two variables that indicate the time elapsed either since the end of an earlier conflict in the same country (ltsc0) or since the independence of the country (ltimeinde). Both variables are log-transformed. In all pooled and partially pooled models, the estimates for ltsc0 are negative and clearly significant. In the fixed-effects onset models, the estimates are smaller but negative. The estimate for log time since independence is positive in most models, but rarely statistically significant. Since this variable has a high and positive correlation with time in peace, the interpretation of the latter set of estimates is that there is no clear difference between peace periods following past wars and independence.

The strong impact of past conflict may be a partial explanation of the increase in conflict from 1960 and onwards. Figure 9 shows the global averages for log time since independence (top-most line) and log time

Figure 9: Global average log time in peace, log time since independence, and proportion of countries in conflcit



since conflict (middle line). The time since independence line shows two significant drops – one associated with the decolonialization of Africa in the 1960s and one with the break-up of the Soviet Union. The time since conflict shows drops at the same times. The increase in conflict incidence from 1960 to 1990 is partly due to the emergence of newly independent, poor countries that took some time before they broke the peace. The lack of a similar effect in the 1990s is probably due to that these new countries were considerably less poor.

Norms toward the use of violence for political purposes seem to have changed over time (Gat, 2006; Pinker, 2011). This *may* be due to global economic changes. Figure 10 shows how the global average GDP per capita has increased steadily over the past 50 years. In Table 4, we have reanalyzed the random-effects incidence model in Table 2. In Column 1 in Table 4, I add a variable for the global mean GDP per capita to the model in Column 3, Table 2.

The global GDP per capita variable is positive but not significant. Controlling for the other variables, the steady accrual of prosperity seen in Figure 10 does not seem to affect countries' conflict risk. Moreover, the estimate for GDP per capita and the interaction with lagged conflict changes very little when adding the variable. From this analysis, it seems that the risk of conflict has been changing 'proportionally' – poor countries remain constantly at higher risk than richer countries.

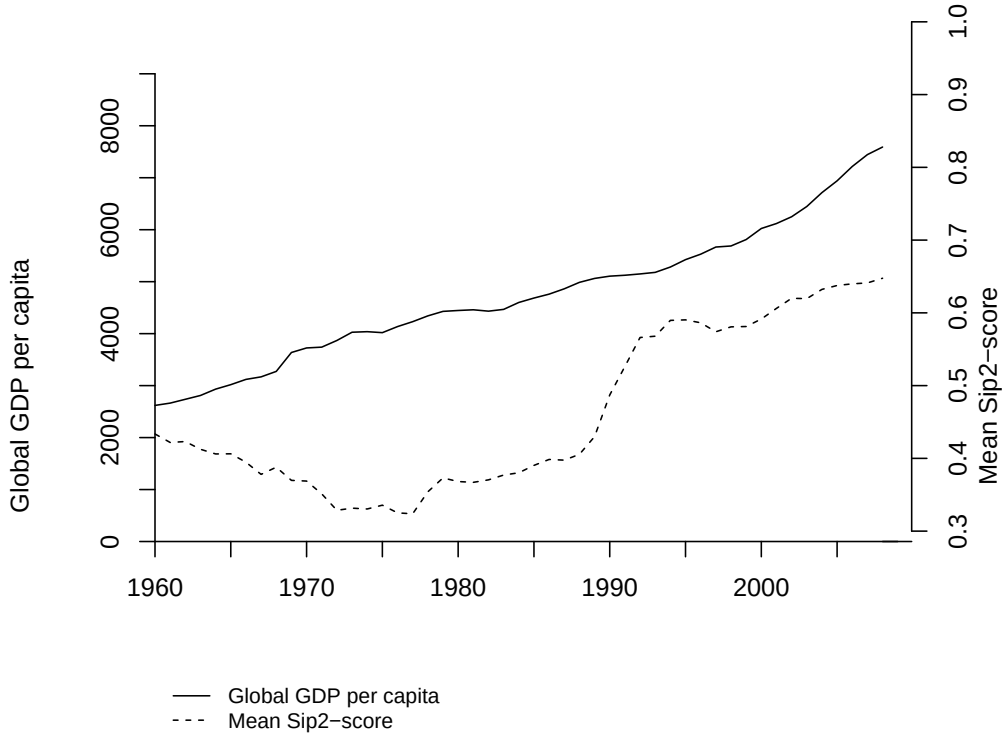
In Column 2, I add dummy variables for each quintade since 1960, with 1960–64 as the baseline period.

Table 4: Conflict incidence models with country-level and global GDP per capita as development indicators; random effects, 1960–2008

	incidence	
	(1)	(2)
Constant	−7.237***	−9.624**
	(2.444)	(4.130)
gdpcap	−0.541***	−0.575***
	(0.129)	(0.131)
incidencelag1	0.442	0.548
	(1.071)	(1.084)
I(incidencelag1 ∗gdpcap)	0.333**	0.308**
	(0.143)	(0.145)
gdpcap_global	0.260	0.517
	(0.275)	(0.494)
gdpgrowth	−4.205***	−3.646***
	(0.978)	(1.015)
ltsc0	−0.498***	−0.518***
	(0.079)	(0.079)
ltimeinde	0.145	0.142
	(0.089)	(0.091)
population	0.393***	0.405***
	(0.080)	(0.080)
sip2	0.102	0.553
	(0.915)	(0.939)
sipsq	−0.333	−0.643
	(0.978)	(0.995)
Y1965to1969		0.464
		(0.295)
Y1970to1974		0.098
		(0.310)
Y1975to1979		0.534*
		(0.307)
Y1980to1984		0.505
		(0.319)
Y1985to1989		0.595*
		(0.338)
Y1990to1994		0.399
		(0.341)
Y1995to1999		0.028
		(0.360)
Y2000to2004		−0.120
		(0.403)
Y2005to2008		−0.011
		(0.477)
N	6,642	6,642
Log Likelihood	−1,082.696	−1,075.686
AIC	2,189.392	2,193.372
BIC	2,271.006	2,336.197

*p < .1; **p < .05; ***p < .01

Figure 10: Global average GDP per capita and global average democracy



Most dummies from the 1965–69 through the 1990–94 period have estimates between 0.4 and 0.6, meaning that log odds of conflict was 50–80% higher in those three Cold-war decades than in the early 1960s. The last 15 years, on the other hand, have estimates around 0, implying the 'baseline risk' of conflict is back to the early decolonization period. Adding these temporal dummies have very little impact on the estimates for global or country-level GDP per capita.

4.3 Distributed-lag analysis

As discussed above, it is clear that conflict affects development, although perhaps not as strongly as the effect in the opposite direction. Table 5 shows results from a distributed lag analysis that handles this endogeneity by including lagged values of both the dependent and main independent variables as variables to the model. The idea is that if conflict at $t-j$ affects GDP per capita at t, the inclusion of conflict at $t-j$ will take up the indirect effect of conflict at $t-j$ on conflict at t through development. If the indirect effect is substantial, the estimate for the independent variable will be considerably weakened.

The model includes lags back to $t-6$ of the conflict variable, the GDP per capita variable, the interaction terms between them, as well as six lags for the democracy variable. According to LR tests reported in Table 6, adding more lags do not improve the goodness of fit of the model.

Table 5: Distributed lag incidence model with 4 lags. 1965-2008

	incidence
Constant	-2.838^{**}
	(1.266)
gdpcap	-2.641^{**}
	(1.316)
ltsc0	-0.283^{***}
	(0.099)
ltimeinde	0.087
	(0.103)
population	0.204^{***}
	(0.056)
sip2	1.056
	(2.430)
sipsq	-1.459
	(2.738)
incidencelag1	2.919^{*}
	(1.595)
gdpcaplag1	4.523^{**}
	(1.791)
incidencelag2	-2.587
	(2.075)
gdpcaplag2	-2.683
	(1.835)
incidencelag3	3.119
	(2.379)
gdpcaplag3	-0.320
	(2.007)
incidencelag4	-0.859
	(2.431)
gdpcaplag4	1.007
	(1.922)
incidencelag5	-0.731
	(2.373)
gdpcaplag5	0.329
	(1.867)
incidencelag6	-2.013
	(2.203)
gdpcaplag6	-0.732
	(1.239)
sip2lag1	1.068
	(3.365)
sip2lag2	1.609
	(3.524)
sip2lag3	-5.123
	(3.555)
sip2lag4	8.803^{**}
	(3.463)
sip2lag5	-2.328
	(3.636)
sip2lag6	-4.151
	(2.896)
sipsqlag1	-1.472
	(3.826)
sipsqlag2	-0.613
	(4.018)
sipsqlag3	4.642
	(4.051)
sipsqlag4	-9.766^{**}
	(3.963)
sipsqlag5	1.579
	(4.167)
sipsqlag6	6.223^{*}
	(3.265)
incidencelag1:gdpcaplag1	0.041
	(0.204)
incidencelag2:gdpcaplag2	0.441
	(0.269)
incidencelag3:gdpcaplag3	-0.346
	(0.310)
incidencelag4:gdpcaplag4	0.139
	(0.316)
incidencelag5:gdpcaplag5	0.200
	(0.310)
incidencelag6:gdpcaplag6	0.256
	(0.287)
N	4,882
Log Likelihood	-665.299
AIC	1,406.598
BIC	1,653.344

*p $<$ .1; **p $<$ .05; ***p $<$ .01

	LL, prior	N, prior	LL, post	N, post	LR	df	P-value
1	-830.43	4900	-712.04	4900	236.76	5	< 0.0005
2	-712.04	4900	-694.86	4900	34.36	5	< 0.0005
3	-694.86	4900	-687.07	4900	15.57	5	0.0082
4	-687.07	4900	-680.52	4900	13.10	5	0.0224
5	-680.52	4900	-672.66	4900	15.72	5	0.0077
6	-672.66	4900	-670.28	4900	4.74	5	0.4478
7	-670.28	4900	-667.42	4900	5.71	5	0.3347
8	-667.42	4900	-664.42	4900	6.01	5	0.3050
9	-664.42	4900	-662.92	4900	2.98	5	0.7018
10	-662.92	4900	-661.71	4900	2.42	5	0.7872

Table 6: LR comparison between distlag models. 1965-2008

What do all these estimates mean? A first view comes from summing the estimates for GDP per capita, the non-lagged term as well as all lagged terms, as done in Oneal (2003). This sum is -0.517, very close to the estimates obtained for the non-lagged term above. The estimate for the interaction terms sum up to .731, suggesting that the risk of continued conflict increases more the higher income is.

Figures 11 and 12 further aid in interpreting the estimates from this model by showing predicted probabilities from the distributed lag model for a set of hypothetical countries. The probabilities are shown for a time period ranging from year $t = 7$ to $t = 30$. All hypothetical countries gained independence at $t - 10$, have log population = 16 (the size of Bolivia), and democracy score = 0.

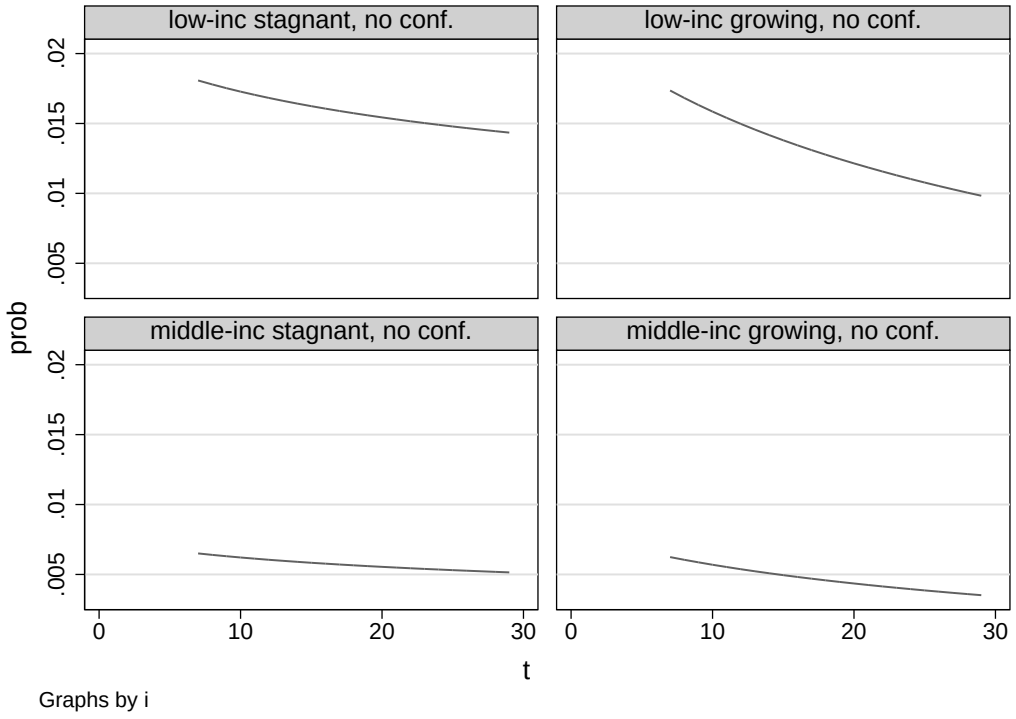
Figure 11 shows predicted probabilities of conflict onset for countries assumed to have had no conflicts. The upper row refers to low-income countries with GDP per capita at the level of Nigeria, the lower row to countries at the level of Mexico. The 'stagnant' countries have annual GDP per capita growth rates at 0%; the 'growing' ones at 3%. It is clear from this figure that low-income countries have a much higher risk of conflict onset than middle-income ones even when controlling for past conflicts. The probability of onset is about 0.015 in the poor country, and decreasing as consecutive years at peace accumulate. The corresponding estimate for middle-income countries is about the third of this level.

Countries that are growing reduce the risk of conflict onset much quicker than stagnant ones (this is due to the large positive coefficient at $t - 1$ in Table 5 in combination with the large negative one at t).

Figure 12 shows the predicted probability of continued conflict for a similar set of countries, except that they have all been at continuous conflict since $t = 0$. Consistent with the long conflicts in Israel, Colombia, and the UK, the estimates indicate that conflicts are harder to end in middle-income countries than in low-income ones. The probability of continued conflict is about 0.86 in the poor countries and 0.90 in the richer ones. If the countries see strong economic growth during the conflict, the probability of continued conflict increases further (this may be due to the fact that the conflicts then must be minor and of little consequence to the economy).

All in all, the distributed lag model indicates that the correlation between GDP per capita and the risk of conflict holds up when one uses this method to eliminate the effect going from conflict to economic growth.

Figure 11: Simulated probability of conflict, no previous conflict



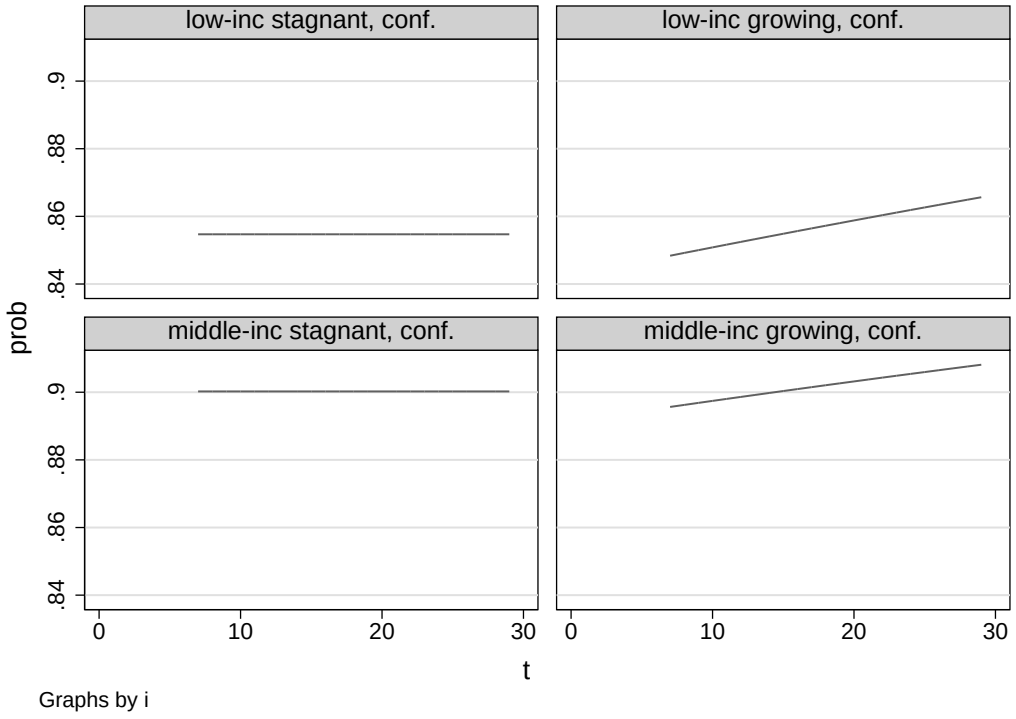
Source: Estimates in Table 5.

5 Conclusion

In this paper, I have shown simulations that suggest that the incidence of armed conflict will continue to decline over the next four decades. This predicted decline is mainly driven by an expected continued decline in poverty, as measured by infant mortality rates or GDP per capita. The paper has sought to assess the extent to which we can believe that the assumption that poverty reduction *causes* peace that underlies these projections.

The paper has addressed this issue by pointing to a set of fairly strong theoretical reasons for the causal arrow to flow in this direction, but has also shown that there are good reasons to believe the opposition causal direction also is in operation. It has then proceeded to an empirical analysis where I initially demonstrate that there is a negative correlation between poverty and peace. This initial relationship then was confronted with a set of tests that show that it is unlikely that there are any unobserved, country-specific and time-invariant factors such as colonial-period institutions or 'national cultures' that explain both poverty and conflict. Furthermore, there does not seem to be any time trends coinciding with trends in global GDP per capita that explains the correlation. Finally, a distributed lag analysis did not suggest that the causal arrow mainly runs in the opposite direction of what assumed here. All in all, the analyses indicate that peace may be likely to follow if the UN is right that poverty will continue to decline.

Figure 12: Simulated probability of conflict, previous conflict



Source: Estimates in Table 5.

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