

# **Data Issues in the Study of Conflict**

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The findings, interpretations, and conclusions expressed in this paper are entirely those of the author. They do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent.

## Abstract

We review the data availability for the study of violent conflicts in a panel data framework. We concentrate on three main issues. We discuss different definitions of civil wars and measures of their severity. Battle related death thresholds are commonly used to define violent conflict. We suggest that this method is most suited to the analysis of the causes of war. Data on the duration of conflicts very much depends on the definition of civil war used. Recently collected data on trigger events and on international interventions will help to analyse the start and end of civil wars in more detail. Furthermore, we discuss the data availability on the human cost of conflicts as well as on the geographical spread of the conflict. In contrast to the analysis of the causes and duration of civil wars there is very little data available to investigate the sustainability of peace in post-conflict societies. Many policy variables are not sufficiently detailed to distinguish between different legal, economic and policy reforms. Lastly, we highlight the problems regarding the use of military expenditure data. There is no authoritative source for worldwide military expenditures available and we encourage a new data collection effort facilitating further research of the demand for military expenditures.

## **1. Introduction**

As users of various data sets on civil wars and military expenditures we want to highlight a number of data issues. This paper does not aim to provide a comprehensive overview of the existing data sets, instead we focus on a few issues to encourage the debate of existing definitions and ongoing data collection efforts.

The paper is organized as follows. In the second section we discuss conflict data issues. We focus on the definition of civil wars and the severity of civil wars. The severity measures discussed include the human cost of conflict, the duration of conflict and their geographic spread. In the third section we highlight some of the data issues regarding political events, transitions and reforms. We conclude that measures of objective grievances are scarce and that the existing policy indicators are not detailed enough to study the sequencing of reforms in post-conflict countries. In Section 4 we discuss the concept of military expenditures. There is no authoritative source for worldwide military expenditures and we support new efforts to collect military expenditure data. The last section concludes.

## **2. Conflict Data**

We first discuss the issues regarding the definition of civil wars and data quantifying the severity of the conflicts such as the duration, the geographic spread and the scale of the conflict in terms of the number of combatants, fatalities and refugees. We review only a small number of the commonly used data sets. Thus, this paper does not provide a comprehensive survey of the available data sets but simply aims to highlight some of the data issues. For a recent survey of the existing conflict data sets see Gleditsch et al (2001).

### **2.1 Definition of Civil War**

One of the most commonly used data sets is the Correlates of War (COW) project as described in Singer and Small (1984, 1992). We used this data set in Collier (1999) and Collier and Hoeffler (1998). COW is a seminal data collection effort and the distribution in electronic format has enabled many researchers to work with the data.

The definition of civil war used in the COW data set is based on the use of violence and not on the aims of the protagonists or on the outcome of the conflict. The COW definition of civil wars is based on the following main characteristics:

- Military action was involved
- At least 1,000 battle deaths resulted during the civil war
- The national government at the time was actively involved
- Effective resistance (as measured by the ratio of fatalities of the weaker to the stronger forces) occurred on both sides

The requirement that the state has to be one of the main participants leads to the exclusion of a number of internal wars from the civil war definition. For example Angola (1961-75), Mozambique (1964-75), Eritrean (1974-91), Tigrean (1978-91), Ogaden (1976-83) and Western Sahara (1975-83) are not defined as civil wars but are instead listed as 'extra-systemic wars'. In extra-systemic wars the adversary is not a member of the interstate system but is an independent non-member of the system or a non-independent national entity. However, these extra-systemic wars have many of the same characteristics as civil wars and we decided to include them in our analysis of civil wars. One problem with the inclusion of these extra-systemic wars is that they are categorized as international wars in the COW data set. For international wars the death threshold is different to the threshold set for civil wars. Instead of 1,000 battle related deaths *per annum* the conflict threshold is 1,000 battle related deaths for the entire conflict. A further difference is that the civil war definition includes military as well as civilian battle related deaths whereas the international war definition only includes battle related fatalities among military personnel only (Singer and Small 1984, p 71).

A number of data sets set lower thresholds for battle related deaths than the COW project. The data set collected by Uppsala University (Wallensteen and Sollenberg, 2000) and the recent extension by Gleditsch et al includes conflicts with 25 or more battle related deaths. Conflicts are classified into three different groups. 'Minor armed conflicts' resulted in 25 to 1,000 battle related deaths during the course of the conflict, 'intermediate armed conflicts' resulted in a minimum of 1,000 deaths per conflict while 'wars' resulted in a minimum of 1,000 deaths *per annum*.

The State Failure Project at the University of Maryland lists three different categories of conflicts. The first group, 'revolutionary and ethnic wars' is defined as an organized conflict with at least 1,000 supporters and 100 annual deaths. One of the other categories, 'genocides and politicides' does not rely on an absolute, but on a relative death threshold. The third category 'abrupt or disruptive regime changes' is based on information in the Polity III data base and does not require particular levels of violence.

Other data sets, such as the Kosimo databank, do not primarily define conflicts with respect to violence. Instead, Kosimo provides data on the dimensions of conflict and distinguishes between non-violent conflict and violent conflict. Non-violent conflict includes latent conflict and crises and violent conflict includes severe crisis and war. Severe crisis includes the use of force whereas a crisis is defined as tensions below the threshold of violence. The difference between a war and a severe crisis is not defined as a minimum number of deaths but as "systematic and collective use of force of some duration and extent between comparable opponents". Like the State Failure Project the databank tries to provide a categorization of conflicts based on the different causes of conflict. For each conflict Kosimo lists the 'issues of the conflict' such as: territory, land and sea-borders, national independence or decolonization, ethnic, religious or regional autonomy, ideology and system conflicts, national power conflicts, international and geo-strategic power conflicts and conflicts over the access to and the distribution of resources.

To summarize, the absolute number of deaths as a threshold criteria is commonly used to define conflicts. Relative thresholds, such as categorizing wars according to the proportion of a country's population killed in the conflict, are rarely used. A relative threshold would lead to categorizing conflicts of widely varying intensities as wars. In small countries only a few deaths would be interpreted as a civil war while a very large number of deaths would have to occur in larger countries.

The new data set on civil wars by Gleditsch et al (2001) offers different categorizations of conflicts based on different death thresholds and thus allows the user to chose his or her own criterion for the definition of conflict and offers more flexibility than the COW project.

On the other hand, some data sets define conflicts not primarily in terms of violence but in terms of the underlying issues of the conflict. The classification of conflicts according to their causes does not seem helpful to us if we want to analyse the causes of civil war. For our work on the causes of civil war (Collier and Hoeffler, 1998, 2000) we have therefore used the COW project data<sup>1</sup>.

However, there is one type of conflict we would see as distinct. In most data sets conflict is defined as the organization of a rebellion against the state. Not all rebellions are organized and there are a number of popular uprisings which lead to large scale violence. This type of rebellion, i.e. popular uprising has been analysed in detail in the theoretical work by Kuran (1989, 1991). Examples include the Iranian revolution 1978-79, the revolution in Romania and other East European revolutions in 1989. Since there is no organized rebel movement starting the violence we would see these conflicts as distinct from other conflicts. Rather than using a structural model the analysis of these popular uprisings could be analysed the approach suggested by Epstein, Steinbruner and Parker (2001). Their agent-based computational model offers an explanation of the dynamics of decentralized upheaval, rather than it's political substance, i.e. this approach does not model organized rebellion.

## **2.2 Quantitative Measures of the Severity of Civil Wars**

Closely related to the definition of civil war is the issue of measuring the severity of the civil war. As already discussed above, many definitions of civil wars are based on the absolute number of battle related deaths. Fatalities are one measure of the severity of the civil war, however there are many other dimensions researchers may want to analyze. Here we concentrate on the duration, the geographic spread and the human costs of conflict.

### **2.2.1 Duration**

Recent work (Fearon 2001 as well as Collier, Hoeffler and Söderbom, 2001) analyses the duration of civil war. Issues in the analysis of the duration of civil war are why some

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<sup>1</sup> For Collier and Hoeffler (2000) we used an extended and updated data set. Nicholas Sambanis extended the COW project data according to their rules and definitions.

wars last much longer than others and whether the duration of conflict can be explained by the same determinants as the causes of conflict. Duration analysis of conflict requires that the start and the end of the conflict can be dated. Often trigger events can be dated and thus the beginning of the violence dated, e.g. the assassination of Rwanda's president on 6 March 1994 marks the start of the civil war. If the conflict ended in a peace treaty, cease fire or military defeat it is also easy to date the end of the civil war. However, often the violence escalates over some period of time before it reaches the relevant threshold and thus be defined as a civil war. On the other hand military victories and peace treaties are relatively rare in civil wars and dating the end of the civil wars is often difficult. In many cases the number of fatalities falls beneath the threshold and is thus not counted as a civil war although the country is not at peace. For many conflicts the COW project offers start and end dates and thus can be used for duration analysis. However, as discussed above the primary definition used in the COW data set are 1,000 battle related deaths. Due to this high threshold the duration of civil wars is shorter on average if the COW data is used than from other data sets. For example in the Collier, Hoeffler, Söderbom (2001) paper we use mainly COW data and the mean of the civil wars is 8.1 years while the civil wars in Fearon's (2001) sample have an average of 11.9 years. Furthermore, a higher threshold leads to a higher number of repeat war episodes. Take for example a conflict during which the number of battle related deaths is lower than the per annum threshold for some period before the level of violence escalates again. A rigid application of the absolute threshold criterion would lead to the classification of two conflicts for a high threshold definition and to the classification of one conflict for a low threshold definition. For example in the COW data set the start of the conflict in Chad is dated as 1980 and the end as 1988. Fearon (2001) treats the violence in Chad as one long civil war starting in 1965 and ongoing as of 2000. Gleditsch et al (2001) classify Chad as a country at war from 1965-1988. The violence is then coded as an intermediate conflict in 1989 and as a war for 1990 and for 1991-94 and 1997-99 as a minor armed conflict. Using the war definition of 1,000 deaths annually Chad would have experienced two wars. Thus, the problems with respect to dating the start and end of the conflict are not only of importance for the analysis of the duration of conflicts and peace but also for the analysis of the recurrence of civil wars. Walter (2001) uses COW data and defines recurrent civil wars as was fought by the same combatants for the same goals as the original war. Fearon (2001) uses a lower death threshold for his war definition (1,000 deaths per conflict) and uses a similar definition for recurrent wars. A peace agreement, a cease fire, military destruction or disbanding of one side followed by at least three years of peace marks the end of a civil war.

Gleditsch et al (2001) provides a detailed discussion of the wars included in the data set, but so far the start and end dates of the conflicts have not been coded. In its current form the intensity level can be determined for each year which is an improvement on the existing data sets. However, the two thresholds used (25 and 1,000 deaths) are annual aggregates and no precise timing for the shifts in intensity level is coded.

### 2.2.2 Human Cost

As discussed in Section 2.1 the number of battle related deaths is one of the main defining characteristics of civil war. Exact numbers are difficult to obtain because both parties in the conflict tend to understate their fatalities and overstate the opponent's fatalities. The COW and other data set provide estimated numbers of fatalities. These figures vary widely. Some publications include deaths caused by the indirect effects of war rather than only battle-related deaths. However, as Herbst (2001) and Cairns (1997) points out in many civil wars battles between the opposing forces are rare but both sides injure and kill civilians. The State Failure Project offers some data on the geographical spread of conflicts. Annual data for the variable MAGFATAL provides an indicator for the number of fatalities. This variable takes the values from 0 to 4 where 0 indicates that there were less than 100 fatalities, 1 indicates 100 to 500 fatalities, 2 indicates 1,000 to 5,000 fatalities, 3 indicates 5,000 to 10,000 fatalities and 4 indicates more than 10,000 fatalities.

Similarly, data on the size of the rebel forces are difficult to obtain. The State Failure Project provides an indicator for the size of the rebel combatants or activists on a scale from 0-4. 0 indicates that the organization has less than 100 supporters, 1 indicates that the number of supporters is between 100 and 1,000, 2 shows that the rebel forces are between 1,000 and 5,000, 3 indicates that the rebel movement has between 5,000 and 15,000 active supporters and 4 indicates that the movement has more than 15,000 combatants. Data on the size of the regular armed forces is more easily obtained and in general more precisely measured. For example the Global Development Network Data Base provides the number of armed personnel per 1,000 inhabitants. However, in a number of countries the armed forces also carry out police duties which makes comparisons across countries difficult.

The human costs of conflict have of course many dimensions. The UNHCR provides some statistics on 'people of concern' across countries and over time.<sup>2</sup> Persons of concern to the UNHCR include refugees, asylum seekers, returned refugees and internally displaced persons. The most detailed and reliable data series are probably the number of asylum seekers in industrialized countries. The OECD also provides data for asylum seekers. The UNHCR lists asylum seekers by origin as well as by countries of asylum. Furthermore, relatively detailed data is available for refugees. Refugees are defined as persons who are outside their country and cannot return owing to a well-founded fear of persecution because of their race, religion, nationality, political opinion or membership of a particular social group. This mandate includes persons who have fled because of war or civil conflict. The UNHCR's refugee statistics are mainly based on the number of people they have assisted. However, there is a large number of refugees not receiving aid from the UNHCR. Thus, UNHCR figures should be seen as conservative estimates. Currently the number of refugees is estimated at more than 11.5 millions. The UNHCR lists refugees by country of origin as well as by country of asylum. Data is only available for 1970 onwards and only data for the 1990s is easily available via internet access. Data from 1970-90 can be requested from the UNHCR. Susanne Schmeidel from the Swiss

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<sup>2</sup> <http://www.unhcr.ch/>

Peace Foundation has also constructed a panel data set for refugees organized by country of origin using US and UNHCR sources. This data is available from the 1960s to most recent years.

Since the nature of war has changed over the past decades from interstate wars to internal wars the number of internally displaced persons has increased significantly and there are nearly 7 million persons displaced in their own country who are assisted by the UNHCR. Due to civil wars the exact number of IDPs is difficult to determine, the UN Representative for IDPs estimates that there are between 20-25 million IDPs worldwide.

### **2.2.3 Geographic Spread**

One important question is the location of the conflict. First, primary participants and interventions have to be distinguished. Many of the industrialized countries have supported military action outside their own national borders since World War II. However, data sets such as COW and the Uppsala provide information on the primary participants and interventions as well as where the war was fought. Thus, making it possible to treat intervening countries differently from the countries in which the war was fought. However, there is very little information on the nature of the interventions, i.e. whether countries only supported the military intervention logistically or whether troops were sent.

We would also like to analyse in more detail where in the country the war was fought and what proportion of the country was directly affected by the violence. De Soysa and Gleditsch (1999) provide a map with detailed locations of the conflicts rather than just shading the entire conflict country in one colour. Their map suggests that there are regional clusters of conflict. Only Africa seems different from other regions, in Africa the civil wars seem less clustered and more widely distributed geographically. Our recent work (Collier and Hoeffler, 2001) seems to support this hypothesis of conflict clusters. Our paper examines the regional spillovers of civil wars and the results suggests that a country is more likely to experience a civil war if one of the neighbours is at war.

The State Failure Project offers some data on the geographical spread of conflicts. Annual data for the variable MAGAREA provides an indicator for the proportion of the country affected by fighting. However, the data set does not provide information which part of the country was affected. Like the other magnitude variables in this data set it is scaled from 0-4. Higher values indicate that a larger part of the country and major urban areas and cities are affected by the fighting. Since this data is provided annually it can in principle be used to analyse the geographical spread of the conflict over time.

## **3. Political Events, Regime Transitions and Reforms**

We now turn to a brief discussion of political data. The use of data on political systems and institutions as well as interventions has been suggested in the analysis of the causes

and the duration of conflict. It is also important for the examination of post conflict societies and the question of the most important determinants of sustained peace.

Hegre et al (2000) found democracy to be an important explanatory variables for the outbreak of civil wars. In contrast Collier and Hoeffler (2000) does not confirm this result. In both cases democracy is measured as the openness of political institutions and data from Polity III is used (see Jagers and Gurr, 1995 for a description). Reynol-Querol (2001) refines the analysis by combining data from Polity III with information from Colomer (2000). She finds that countries with majoritarian rule are more likely to experience a civil war than countries with proportional representation.

Investigations of the causes of conflict are only able to explain a proportion of cross-country variation. One possibility to improve the explanatory power of the existing models is to use data on trigger events. Polity III and the recently updated Polity IV data sets provide the dates for regime transitions (see McLaughlin et al, 1998). Human rights data could also be integrated in the analysis of conflict in order to study the escalation of violence. Although NGOs such as Amnesty International and Human Rights Watch provide very detailed information on human rights violations this information is not available in data sets which can be readily used in statistical analysis.

Grievances are often interpreted as one of the main causes of conflict. However, there are very few measures of objective grievances available. In our work (Collier and Hoeffler 1998, 2000) we found no evidence that neither income nor land inequality have an effect on the risk of conflict. So far there is insufficient data to analyze the relationship between the level and distribution of public expenditure across regions. However, we found some evidence that ethnic dominance, i.e. when one ethnic group makes up 45-90 percent of the population, increases the risk of civil war. The Minorities at Risk data set provides some information on disadvantaged groups, however, the classification of grievances in very broad categories makes the use of standard econometric techniques difficult.

The new data set by Regan (2001) on third party intervention provides detailed information on the date and the type of intervention. He distinguishes between military, economic and diplomatic interventions. This type of data could provide more detailed variables in the analysis of the duration on conflict. To our knowledge there is so far no cross-country investigation on the impact of third party interventions on the length of civil wars.

Once a civil war has ended we have little systematic data on the economic and political reform processes. Most economic data is outcome data but does not provide information on economic reform. No data bank provides systematic data on the timing and sequencing of economic reform.

Kaufmann, Kraay, and Zoido-Lobaton (2000) provide an overview of the different policy measures. They use data from a large number of different data sources and distinguish three different groups of indicators: bureaucratic quality, rule of law and graft. For a large

number of policy indicators there is no or little time series data available, thus, making panel studies of post conflict impossible.

Previous research indicates that in order to make peace sustainable policy reforms will have to be sequenced in post-conflict societies. However, current research on this topic is hampered by the availability of policy indicators. Many policy variables are based on a variety of economic and social indicators and are not sufficiently detailed to distinguish between different legal, economic and policy reforms.

#### **4. Military Expenditure**

The last issue we want to highlight in our paper is the availability of military expenditure data. Brzoska (1995) provides a detailed overview of world military expenditures. Military expenditures measure the cost of maintaining a military establishment in war and peace. Many studies investigate the relative strength of the military in a cross-country and/or time series analysis. Military strength is an output measure but military expenditures are an input measure, the aggregation of payments for military personnel and equipment. Components of military expenditures are often treated as state secrets and due to the concentrated or nationalized structure of the defence industry it is difficult to obtain data or even good price estimates for military equipment. As Brzoska (1995) points out there is no authoritative source on worldwide statistics of military expenditures, instead there are a number of interested institutions providing data on military expenditures. The Stockholm International Peace Research Institute (SIPRI) provides some data on military expenditures and their definition is mainly based on the NATO definition.

##### **Definition of Military Expenditure (SIPRI)<sup>3</sup>**

Military expenditure includes current and capital expenditure on:

- the armed forces, including peace keeping forces
- defence ministries and other government agencies engaged in defence projects
- paramilitary forces when judged to be trained, equipped and available for military operations
- military space activities

this should include:

- personnel (current and retired, social services)
- operations and maintenance
- military research and development
- military construction, procurement and military aid

excluded from this definition are:

- civil defence

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<sup>3</sup> <http://projects.sipri.se/milex>

- current expenditure for previous military activities (veteran benefits, demobilization, conversion, destruction of weapons)

The exclusion of expenditures for previous military activities can be high for some post-conflict countries and it may be problematic to exclude these expenditures. Other organizations include these expenditures in their definition of military expenditures.

Comparisons across time are difficult due to the lack of suitable deflators while comparisons across countries are difficult due to different definitions used by the individual countries. According to SIPRI their data series pre and post Cold War are not consistent and thus time series analysis using SIPRI data is difficult. In Collier and Hoeffler (2001) we use SIPRI data for years up to 1990 and World Bank data for 1990 and later years. Dunne and Perlo-Freeman (2001) in their model of demand for military spending in developing countries use data from the American Arms Control and Disarmament Agency (ACDA).

Just these few remarks on the problems and availability of military expenditure show that the investigation of worldwide military expenditures is difficult with the existing data sets and we welcome the initiative by Jörn Brömmelhörster to compile a new data set on military expenditures.

## **5. Conclusion**

In our paper we highlighted some data issues in the study of conflict. Data on battle-related deaths are commonly used to define conflicts. However, exact data on fatalities is difficult to obtain, not at least because in many civil wars civilians make up the majority of the fatalities (Cairns, 1997 and Herbst, 2001). In spite of these problems we prefer the definitions of civil wars which are primarily based on the level of violence experienced. If we want to analyse the causes of conflict we should not use data which categorizes the type of conflict according to the proclaimed goals of the rebels. We only see one category of rebellion as distinct and thus suitable for a different methodological approach. This different category are popular uprisings because unlike the other rebellions they are spontaneous and do not rely on an organized rebel force. The computational model by Epstein, Steinbruner and Parker (2001) seems to provide a good tool for the analysis of such conflicts.

The new data base by Gleditsch et al (2001) is an inclusive data collection effort. Rather than creating yet another war data base they build on the definitions of the Uppsala data set and provide a panel data set for the study of civil war. Different thresholds make it possible for the user to decide which definition of civil war s/he wants to use. In general it seems desirable to provide as much detailed data on conflicts as possible and allow the user to narrow it down to a particular definition. This new data base does not provide the start and end dates of the conflicts. However, the authors plan to include these dates in future, thus, making their data set in principle suitable for the study of war and peace duration.

Trigger event may help to explain more of the variation of the causes of conflicts in cross-country studies. Polity IV contains data on the dates of regime transitions. Data on human rights violations could also be used, although so far no data set exists. Regan's (2001) new data base on interventions opens new possibilities in the study of the duration of conflicts. There is very little data on measures of objective grievances and we also find that many policy variables are not sufficiently detailed to distinguish between different legal, political and economic reforms. These data would facilitate a cross-country analysis of post-conflict situations. Currently, little is known about the sequencing of reforms and their ability to stabilize the peace.

We conclude with a brief discussion of military expenditure. No authoritative data source exists and we encourage a new data collection effort to provide a comprehensive data set on global military expenditures.

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