The Evolution of Conflict and Effectiveness of Aid

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Abstract

The effect of aid on civil war has been widely debated. In this paper we introduce a new framework to evaluate the effectiveness of aid on conflict. Using proxies for the evolution of conflict we show that over the course of the conflict aid significantly affects the escalation and de-escalation of conflicts and that both measures are also highly sensitive to the rate of change in the share of aid. These results provide useful indications from a policy point of view in terms of the timing of aid to countries experiencing a conflict. We also show that the evolution of conflict significantly affects economic growth providing evidence of a sort of indirect effect of aid on economic growth.

Keywords: Conflict; Aid; Development

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1) Introduction

Countries experiencing conflicts are among the largest recipients of foreign aid benefiting by an average share of ODA equal to almost 6 percent of GDP, compared with an average 5.6 percent for countries at peace. The share of ODA is particularly high for countries experiencing an extensive conflict (almost 12 percent of GDP) and for countries in which several groups are involved in the conflict (above 7 percent). The rate of growth of the share of ODA/GDP for these countries is also much larger, with an average growth equal to 0.2 percent compared to a mere 0.07 percent for countries at peace. It is not surprising therefore to wonder whether foreign aid has any effect on breaking the spell of conflict. And if aid is effective, how does it affect the evolution of the conflict?

The economic literature, from both the empirical and theoretical points of view, has for long tried to provide an answer to these questions often with puzzling results. At times aid is found to have a positive effect on conflict, sometimes the effect is negative and at other times it has no effect at all (see Easterly, 2009 for a survey on aid). This pattern of results depends on the fact that it is still difficult to understand the main channel(s) through which aid may affect the conflict. If we consider aid as a potential prize then it is possible that aid may affect opportunities shrinking the Potential Settlement Region (Hirshleifer, 1995, 2001) and therefore increasing the probability of conflict. Aid may represent a rent influencing the incentive for rebel groups to engage in a conflict as well as the incentive for the government to defend its rent (Grossman 1991, 1992, 1999). Aid may also spur economic growth (i.e., Burnside and Dollar, 2000; Collier and Dollar, 2002; Hansen and Tarp, 2001), creating opportunities in terms of employment, structural and distributional policies which then can have an effect on the cost opportunity of citizens to enrol in rebel groups. The higher opportunity cost makes conflict a less attractive option (Collier and Hoeffler, 2002). In addition, because aid is fungible (Feyzioglu et al., 1998; McGillivray and Morrissey, 2004; Pack and Pack, 1990; Devarajan, 1999) it may be diverted to military expenditure providing the government with a

clear military advantage, which in turn affects the opportunity for rebel groups to engage in conflict (Arcand and Chauvet, 2001).

From an empirical point of view the evidence is also not very convincing. De Ree and Nielsen (2010) look at a direct effect of aid on the probability of conflict using a 2SLS for a sample of 39 African countries over a 19-year period and they find a significant and direct effect of aid on the probability of conflict. A 10 percentage change in the share of aid reduces the probability by 6-8 percent per year. Savun and Tirone (2011) find that "*democracy aid*" considerably reduces the risk of conflict by affecting the commitment problem and uncertainty resulting from a democratic transition. Candland et al. (2011) look at aid shocks and find a positive effect of negative aid shocks on the risk of conflict. On the other hand, Collier and Hoeffler (2007), Djankov et al. (2008) and Nunn and Qian (2011) seem to be less optimistic. Collier and Hoeffler (2007) find that aid increases military expenditure but the latter has no effect on the probability of conflict. Djankov et al. (2008) show a negative effect of foreign aid on institutions which then may increase the probability of conflict (Djankov and Reynal-Querol, 2007). Nunn and Qian (2011) focus on the U.S. food aid programme and show that a change in the amount of aid increases the incidence, onset and duration of civil conflicts in recipient countries.

The main problem with evaluating the effect of aid on conflict derives from the fact that it is difficult to isolate the effect of aid in a regression where the latter changes with other important policy variables. As a result the effectiveness of aid may depend on the specification of the model and omitted variables bias. It may be more appropriate therefore to look at the effect of aid on conflict in a context where the national government has no room for manoeuvring while aid keeps changing (because its allocation is decided by foreign countries). The evolution of the conflict may therefore represent the ideal set-up given that the weakness of the government over the course of the

conflict provides a sort of political stalemate limiting its policy action (i.e. Fearon and Laitin, 2003) which then may result in a kind of dependence on foreign aid.

There are also other practical reasons why it may be worth focusing on the evolution rather than on the incidence, onset or duration of conflict. Most often, besides the importance of evaluating the effect of aid on the outbreak and incidence of civil war, we also want to know the implications of changing the share of foreign aid over the course of conflict. This can only be done by looking at the dynamics/evolution of the conflict, given that, unlike the incidence, the evolution allows us to evaluate whether the conflict either escalates or de-escalates when donors increase the amount of aid. Because the evolution is conditional on the probability of conflict, this also reduces biases which are due to the endogeneity of the onset and incidence (see Blatman and Miguel, 2010) and to the use of small samples typical of duration models (see Bleaney and Dimico, 2011). Considering the evolution also offers more insights than considering the duration, given that it is possible to distinguish between the escalation and the de-escalation of conflict providing useful insights from a policy point of view. It also may be considered as a primitive of the duration, given that the latter will depend on whether the conflict either intensifies or dies down[1].

There are several possible candidates that one can use in order to proxy the evolution. The extent of conflict, the number of groups in conflict with the government, and the number of fatalities are all possible and viable options. However, while the geographical extent and the number of groups in conflict have both important strategic implications, the same does not apply particularly well to the evolution of fatalities, which of course has important humanitarian consequences. Focusing on these two proxies we find that the level of foreign aid significantly deters conflicts from escalating (both in terms of the number of groups and in terms of geographical extent). The rate of change of ODA

[1] Cunningham (2006) and Cunningham et al. (2009) show that the duration of conflict largely depends on the number of groups in the conflict.

over the course of the conflict also seems to matter for the evolution of the conflict given that a larger change in the share of ODA is associated both with a lower probability of new groups entering in the conflict and a higher probability that the conflict de-escalates from a territorial point of view. These effects are extremely significant from an economic point of view, given that the entry of new groups in the conflict decreases the rate of growth of GDP per capita by almost 4 percent, while the exit of any contesting group increases the rate of growth by almost 3 percent.

Besides the economic importance of the evolution/dynamics of conflict there are other important policy implications which should be discussed. First, increasing the share of aid over the course of the conflict seems to be particularly useful in ethnic fractionalized countries where the entry of new groups seems to be more likely. Given that aid increases the probability of contesting rebel groups exiting from the conflict, then a change in the share of aid in ethnic fractionalized countries may effectively shorten the duration of conflict. Second, given the preventive effect of aid, it seems reasonable to expect that the earlier donors increase the share of aid the lower will be the probability of the conflict escalating, thus shortening the duration and containing its negative effect on development.

The paper is structured as follows. In the next Section we provide a short review of the literature on foreign aid. In Section 3 we describe dependent variables, describing the approach that we follow in order to code our variables for the evolution of conflict. Section 4 presents the empirical results for the effect of levels of ODA on the evolution. In Section 5, we focus on the effect of the rate of change in the share of ODA/GDP and in Section 6 we show the economic impact of the evolution of conflict, using a simple growth model. The paper ends with short conclusions and policy implications.

2) Literature Review

The paper builds on two closely related areas of research. The first area is related to the effectiveness of foreign aid on economic growth and institutions, while the second research area focuses on foreign aid and conflict.

Regarding the effectiveness of aid on economic growth, this is a topic which has been largely discussed in economics often without conclusive evidence either way. Although early research seems to show that foreign aid has a positive effect on economic growth, this result does not seem to be robust to further sensitivity analysis. Even among *"aid-optimistics"* results are not completely consistent. Hansen and Trap (2001) find a non-conditional effect of foreign aid on economic growth, even though the effect has diminishing returns; while Burnside and Dollar (2000) and Collier and Dollar (2002) find that foreign aid has a positive effect on economic growth but this effect is confined to a set of countries with good institutions and policies.

Following these early findings the World Bank has tied foreign aid to a set of good policy indicators. However, later research has shown that this evidence is far from being robust. Easterly et al. (2004) and Easterly (2003) show that results in Burnside and Dollar (2000) are affected by sample-selection and definitions of aid and policies. Roodman (2004) tests the sensitivity of several pro-growth papers and finds that results in most of these papers are not robust to further controls. Prezworsky and Vreeland (2000) and Barro and Lee (2005) look at IMF credits and they also find no support for a pro-growth effect of these loans.

Evidence at support of the effect of foreign aid on institutions does not seem very encouraging either. Knack (2004) finds no effect of aid on democracy (the latter being measured by the Freedom House), Djankov et al. (2008) show a negative effect of foreign aid on institutional measures (i.e., checks and balances and democracy from the Polity IV) and Rajan and Subramanian (2007) argue in favour of a weakening effect of aid on governance.

With regard to aid and conflict, apart from De Ree and Nielsen (2010), Savun and Tirone (2011), Cadland et al. (2011), Collier and Hoeffler (2007) and Nunn and Qian (2011) who evaluate the effect of foreign aid on incidence, onset, or duration, the literature has mainly focused on foreign aid in post-conflict countries and fragile states. Chauvet and Collier (2006) evaluate the effect of aid in failing states and find that in these countries aid has a positive effect on per capita income depending on the timing and appropriateness of aid. Chen *et al.* (2008), Collier and Hoeffler (2004), Elbadawi *et al.* (2008) and David *et al.* (2011) all find some evidence of post-conflict recovery in growth, although these results are sometimes based on only a limited sample of conflict episodes. The role of aid and other policies after the end of conflict has also been extensively discussed (Collier and Hoeffler, 2004; Demekas *et al*., 2002; Elbadawi *et al*., 2008; Flores and Nooruddin, 2009).

3) Data Construction and Summary Statistics

To proxy the evolution/dynamics of conflict we decide to focus on the number of groups involved in the conflict and on the geographical extent of conflict. These two dimensions of the conflict seem to be extremely interesting from a strategic point of view given that the duration and intensity of conflicts are highly likely to depend on these features.

Although geographical extent and the number of groups are likely to be positively correlated, in our dataset the correlation is far from perfect. The correlation between the geographical extent and the number of groups in conflict is only 0.58 and the correlation between the evolution of these two different dimensions is only 0.28. Given the low correlation, it is a good idea to use both measures in order to check the robustness of results. This is also important for evaluating possible differences and the resulting policy implications which may refer to a different set of countries. For example, highly fractionalized countries may experience several conflicts at the same time (i.e., the Democratic Republic of Congo) even though the share of the country affected by the conflict is not large. On the other hand, countries which are not fractionalized may experience extensive conflict even though the number of groups is not large (i.e., Cambodia and Egypt).

The UCDP/PRIO Dyadic Dataset on Armed Conflicts and the Political Instability Task Force (PITF) represent the two sources that we use to construct our dependent variables. The UCDP/PRIO Dyadic Dataset is used in order to construct a count variable, which records the progressive number of groups involved in a conflict against the government for each country-year episode over the period 1960-2005. On the other hand the PITF provides figures for the geographical extent of the conflict[2]. The extent is coded using an ordinal variable between 0 and 4 with 0 denoting episodes with no conflict and 4 denoting cases in which the conflict affects more than half of the country's surface area[3].

[2] The PITF is a project hosted by the Center for Global Policy at George Mason University and the dataset was originally prepared in 1994 by a research team directed by Ted Robert Gurr and Barbara Harff under commission from the Central Intelligence Agency's Directorate of Intelligence. The dataset is regularly updated and the fact that reports on the data have been published in the *American Journal of Political Science* (e.g. Goldstone *et al.*, 2010) is testimony to its quality.

[3] The PITF coding rule is: 1 if the conflict affects less than 10% of the surface area; 2 if the conflict affects an area between 10 and 25 percentper cent of the surface area; 3 if the surface area affected by the conflict is between 25 and 50 percent; 4 if it is greater than 50 percent.

Table 1: Descriptive Statistics for the Extent and Number of Groups

Table 1 shows the distribution of the number of groups and geographical extent of conflict in our dataset. Over the 1960-05 period, the PITF records a total of 868 annual episodes of conflict providing an average probability of conflict equal to 10.6 percent. The majority of these conflicts have an extent equal to two, which means that in most of the episodes a share of the country between 10 and 25 percent of the surface area is affected by the conflict. On the other hand, the number of conflicts coded by the UCDP/PRIO is equal to 1010,[4] providing an average probability of conflict equal to 14.1 percent[5]. In almost 7.8 percent of these cases the conflict involves only one rebel group (and the government). However, there is a 2.8 percent of episodes in which at least two rebel groups challenge the government and a 1.7 percent of episodes in which three or more different rebel groups are involved in the conflict. This implies that in almost one third of the episodes with conflict there is more than one rebel group involved.

Using the distribution in Table 1 we construct new variables which proxy the evolution (escalation/de-escalation) of the conflict. The evolution is computed using first differences and it is summarized in Table 2. A negative change denotes cases in which the conflict deescalates either in terms of geographical extent or in the number of groups involved, while a positive change denotes an escalation of the conflict.

[4] The correlation between the incidence in the PITF and UCDP/PRIO is 0.72

[5] Differences in the number of conflicts between the two sources are due to the different coding rule applied. The UCDP/PRIO Dyadic Dataset on Armed Conflicts defines an armed conflict as: "*a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths in a year*". The PITF, for its part, defines a conflict as an episode of violent conflict between the government and a politically organized group where each party mobilizes 1000 or more people (armed agents, demonstrators, troops) and resulting in *"at least 1000 direct conflict-related deaths over the full course of the armed conflict and at least one year when the annual conflict-related death toll exceeds 100 fatalities".*

Table 2: Descriptive Statistics for the Evolution of Conflict (not Conditional on Conflict)

With regard to the geographical extent, there are almost 314 country-year episodes in which the geographical extent changes with respect to the previous year. Episodes of territorial escalation and de-escalation are almost equally distributed and in most cases the conflict escalates/deescalates by only one unit[6]. This means for example that over the course the share of the country affected by the conflict increases from 10-25 percent (extent = 2) to 25-50 percent of the surface area (extent = 3).

With regard to the evolution of groups involved in the conflict, we find almost 556 cases in which the number of groups changes over the course of the conflict. Even in this case, episodes in which there is a single group either entering or exiting at a later stage represent the majority. However there is almost a 16.4 percent of the cases with conflict in which more than one group either enter or exit from the conflict after its outbreak.

Because the number of observations in the tails of the distribution is relatively small (i.e., the number of groups entering at a later stage is greater than one) there is a risk that results for these episodes of conflict may be driven by only a few countries. To deal with such a problem, we summarize positive and negative changes using four different dummy dependent variables. The first dummy variable (*Δ+ Extent*) is equal to one if the extent has spread over the course of the conflict independently on the number of changes. The second dummy (*Δ- Extent*) is coded one if over the course of the conflict the extent has shrunk independently on the number of changes. The third variable (*Δ+ Groups*) is positive if any group steps into the conflict. Finally, the last dummy (*Δ- Groups*) is coded one if any of the rebel groups exits from the conflict.

[6] A one unit change in Table 3 can also represent the onset/outset of conflict, given that the distribution is not conditional on conflict.

Table 3: Dummy Dependent Variables for the Evolution of Conflict (Conditional on Conflict)

Table 3 shows the conditional distribution of these four dummy dependent variables. In all 65 countries for which we have data on the geographical extent there has been at least one episode of escalation/de-escalation of conflict over the course (without considering the outbreak and outset). In average, out of the 863 episodes of conflict (incidence of conflict) from the PITF there are 157 cases in which the conflict escalates and a total of 63 episodes in which the conflict de-escalates. Therefore in average the extent changes almost after 3.8 years of conflict. With regard to the number of groups in conflict again we find that in all 94 countries which have experienced a conflict the number of groups changes over the course of the conflict. Out of a total of 1,002 episodes of conflict there are 294 cases in which new groups step into the conflict after the outbreak and 94 cases in which groups exit from the conflict. Roughly the number of groups in conflict changes every 2.5 years of conflict.

In Table 4 we show descriptive statistics for the evolution of conflict given the share of ODA in order to provide a general idea of the relationship. The geographical extent of the conflict tends to increase (Δ+ Extent) when the share of aid is lower, and to decrease (Δ- Extent) when the share of aid is larger, denoting a sort of preventive effect of ODA on the extent of conflict. On the other hand a larger share of ODA tends to increase the number of belligerent groups (Δ+ Groups) and to reduce the probability of groups exiting from the conflict (Δ-Groups), which seems consistent with a rent-seeking model (i.e., Grossman, 1991).

Table 4: Effect of ODA on the Evolution of Conflict

4) Empirical Issues

Given that the evolution is conditional on the probability of conflict, the model is best estimated using a Heckman-Probit Estimator (Heckman, 1979). This model can be estimated using either a 2-step estimator or a Maximum Likelihood Estimator (MLE). Generally the second estimator is to be preferred, because it is considered more efficient. However, the limited number of observations for the de-escalation of conflicts (63 out of 863 for the extent and 94 out of 1,002 for the number of groups involved) causes a serious risk of underestimating the probability. This downward bias occurs because the capacity of logit/probit models to determine a cut-off point is biased in the direction of favouring zeros at the expense of ones (King and Zeng, 2001a, 2001b). In order to deal with such a problem one can use a two-step estimator in which the second step is estimated using either a rare-event Logit/Probit or a Complementary Log Log function (*cloglog*). Using a rare event Logit/Probit or a *cloglog* link function in the second step would allow us to correct for the fact that the link function is not symmetrical (providing consistent estimates); but because this model is not estimated using a MLE efficiency is sacrificed.

Given the impossibility of finding a good trade-off between efficiency and consistency we decide to use a Maximum Likelihood Heckman-Probit Model in order to gain efficiency in the estimates. Of course this means that probability of underestimating effects increase[7]. For this reason the estimated effects in the following models are likely to be rather conservative.

[7] Given that the MLE Heckman is an efficient estimator then if any coefficients are under-estimated the likelihood of not rejecting the null increases.

The two equations to be estimated in order to evaluate the effect of ODA on the evolution of conflict can be written as follows:

$$Pr(Conflict_{i,t} = 1)^* = \Phi(\lambda_1 ODA/GDP_{i,t-1} + \lambda_2 Incidence_{i,t-1} + \lambda_3 Tropical\_Area_i + \lambda_4 W_{i,t-1}) \quad (1)$$

$$Pr(Evolution_{i,t} = 1 \mid Incidence=1) = \Phi(\beta_1 ODA/GDP_{i,t-1} + \beta_2 Level_{i,t-1} + \beta_3 X_{i,t-1}) \quad (2)$$

Equation 1 represents the selection equation which drives the probability of conflict. The probability of conflict depends on the Incidence (t – 1), on the share of ODA (t – 1), and on a set of control variables $W_{i,t-1}$ which include GDP per capita (t – 1), population (t – 1), ethnic fractionalization, share of mountainous terrain, a dummy for oil producers, and government consumption (t – 1)[8]. The variable $Tropical\_Area_i$ denotes the share of the population within the tropical climate zones which is time invariant and therefore highly unlikely to explain a variable which strongly depends on the time-dimension like the evolution of conflict. The ratio for using the share of the population within the tropics as an exclusion restriction is related to the empirical evidence in the economic and conflict literature. We know that geography affects development (i.e. Sachs, 2003) and that development is one of the main causes of conflict (i.e. Collier and Hoeffler, 2002; Fearon and Laitin, 2003). Therefore the share of country within the tropics should explain the cross-section variation in the probability of conflict. However because the evolution of conflict depends on the time-dimension rather than on the cross-section dimension, we should expect that a time invariant variable has a small room to affect the dynamics of conflict which of course is more likely to depend on strategic reasons. The inclusion of real GDP per capita as a control variable also excludes hypothetical effects of the share of population within the tropics through levels of development.

[8] Government consumption is used to control for a possible diversion of aid to current expenditure and/or military expenditure.

Equation 2 represents the outcome equation where $Evolution_{i,t}$ is our proxy for the evolution of conflict, $Level_{i,t-1}$ is the level of conflict (t -1), $X_{i,t-1}$ is the same set of control variables as in the selection equation and $ODA/GDP_{i,t-1}$ is the share of ODA (t – 1).

Data for the level of ODA at current US dollars, GDP at current US dollars, and real GDP per capita are collected from the World Bank (WDI). The Penn World Table 7.1 is used to collect data on government consumption and population. Fearon and Laitin (2003) is the source for data on ethnic fractionalization and mountainous terrains. Data for variables related to democracy are collected from the Polity IV dataset, while Sachs (2003) is the source for the share of the population within the tropical climate zones.

5) Evolutions of Conflict and Levels of ODA

We start our analysis by looking at the effect of levels of ODA (the share of ODA/GDP) on the evolution of conflict. Table 5 reports estimates for the evolution of the geographical extent of conflict. In Model 1 we look at factors which may affect the territorial de-escalation of the conflict (***Δ- Extent***) and we find that ODA/GDP (t – 1), the extent of conflict (t – 1), and GDP per capita (t – 1) are the only variables which have a positive and significant effect on the probability that the conflict will de-escalate in terms of geographical extent. Therefore, the larger is the conflict (t - 1) and the richer is the country, the higher is the probability that the extent will decrease in the next period. At the same time, an increase in the share of ODA/GDP by one percentage increases the probability of de-escalation by almost 0.13 percent per year.

In Model 2 we show estimates for the escalation of the extent of conflict (***Δ+ Extent)***. The escalation also significantly depends on the share of ODA in terms of GDP which decreases the unconditional probability (Pr(***Δ+ Extent=1))*** by almost 1.1 percent per year per a one percentage change, and the conditional probability (Pr(***Δ+ Extent=1|Conflict=1)*** by almost 0.12 percent. The extent (t – 1), and GDP per capita (t – 1) have now an insignificant effect on the probability of conflict escalating (from a territorial point of view), while the probability increases with the number of groups in the country. The larger is the number of groups in the country the larger is the probability that the conflict will escalate, probably because of the probability of new groups entering.

Selection equations in Table 5 are quite standard. The probability of conflict increases with the share of the population within tropical climatic zones, with the population, and with possible conflicts in the previous period. GDP per capita and the share of ODA/GDP have both a negative and a significant effect on the probability of conflict.

Table 5: MLE Heckman Probit – Evolution and Incidence of Conflict

In Table 6 we look at the dynamics of groups in conflict. With regard to the dynamics of groups we find that ODA/GDP (t – 1) has a preventive effect in the sense that it decreases the probability of new groups entering in the conflict (Model 2). However its effect on the probability of groups exiting from the conflict is not significant (Model 1). As with the extent of conflict, the probability of new groups entering in the conflict increases with the fractionalization of the country, while the probability of groups exiting increases with the number of groups in conflict in the previous year

and decreases with population (i.e. in larger countries) and with dependence on oil (the oil export dummy).

Table 6: MLE Heckman Probit – Evolution and Incidence of Conflict

6) Evolution of Conflict and Change in the Share of ODA

In the previous section we showed a significant effect of levels of ODA on the evolution of conflict. However, given the large rate of growth of ODA for countries experiencing a conflict (0.2 vs 0.07 percent for countries at peace) it is legitimate to wonder if such a larger increase in the inflow of aid is functional to the dynamics of conflict. For this reason in this section we try to evaluate what happens to the dynamics of conflict when the share of ODA over the course of the conflict changes and whether the evolution of the conflict is responsive to the rate of change in the share of ODA.

In Table 7 we focus on the probability of escalation/de-escalation of the extent of conflicts conditional on the rate of growth of the share of ODA/GDP. We find that the rate of growth of the share of ODA has a decreasing effect on the extent given that the probability that the conflict will shrink increases by almost 0.27 percent per a one percentage change in the rate of growth of ODA/GDP (Model 1). However, the rate of growth of ODA/GDP does not have any significant preventive effect on the probability that the extent of the conflict will spread (Model 2).

Table 7: MLE Heckman – Evolution and Incidence of Conflict

In Table 8 we switch to the dynamics of the number of groups. While the effect of changing the share of ODA/GDP over the course of the conflict does not affect the probability of groups exiting from the conflict (Model 1), the rate of growth of ODA does have a significant and negative effect on the probability of groups entering in the conflict (Model 2). In average the probability that new groups will enter in the conflict decreases by almost 0.32 percent for a one percentage change in the rate of growth of ODA.

Table 8: MLE Heckman – Evolution and Incidence of Conflict

From a policy point of view these results seem to suggest that whether and when to increase the share of ODA may depend on the kind of conflict. In cases of conflicts in ethnic fractionalized countries in which there is a risk of new groups entering in the conflict it may be worth to increase the share of ODA/GDP soon after the outbreak of the conflict given that it decreases the probability that new groups enter in the conflict. Increasing the share of foreign aid also seems recommendable in cases of civil war (which normally have a larger extent) given that foreign aid may provide support to weak governments which then may affect the probability that the extent of conflict decreases and probably the duration of the conflict. On the other hand, increasing the share of ODA does not seem particularly effective when the conflict has already spread to neighbouring groups (given the insignificant effect on the probability of exiting) and in cases of conflicts which affect a small portion of the country given that whether the conflict will spread or not is not affected by the rate of growth of ODA.

7) The Economic Impact of the Evolution of Conflict

Of course economists are interested in the economic impact of policies. For this reason in this section we evaluate the economic impact of the evolution of conflict, in order to understand whether there may be an indirect effect of aid on the path of development of countries experiencing a civil war. The idea is quite simple. Given that aid has a significant effect on the evolution of conflict then it may be the case that aid has an indirect effect on development if the evolution (rather than the incidence) is what matters the most for development.

In order to analyse the economic impact of the evolution of conflict we construct five-year episodes of growth. Five-year episodes of growth are quite common in the literature on conflict (Chen *et al.,* 2008; Collier and Hoeffler, 2004; and Elbadawi *et al.,* 2008) even though it may be argued that economic growth needs to be evaluated over a long-term horizon. The reason why we decide to look at a shorter period is because it would be difficult to proxy the evolution of conflict over a longer time-horizon. Looking at a longer time-horizon might cause the loss of useful information related to the annual variation in the evolution. Using five-year episodes, however, represents a fair compromise between the need to give the necessary variation to the evolution of conflict and the need to evaluate a sort of intermediate effect in terms of economic growth.

Data on real GDP per capita growth, real GDP per capita, and ODA/GDP are collected from the WDI. We use the Penn World Table 7.1 to collect data on government consumption, trade/GDP, investment/GDP, and population growth. Data about the evolution of conflict are the same as those used in previous sections. More specifically, we use four dummy variables to proxy whether in the

five years there has been an escalation or a de-escalation of the conflict, either in terms of geographical extent or in terms of the number of groups involved.

Table 9 shows growth-estimates using a 2-step GMM estimator in order to deal with a possible endogeneity of the incidence and evolution of conflict. In Model 1 we look at a possible effect of changing the number of groups in the conflict on the rate of growth of real GDP per capita. In order to do this, we enter in the model dummies for whether new groups have entered or exited from the conflict, together with a dummy for the incidence of conflict. While the incidence of conflict is not significant, the change in the number of groups in conflict does have a marked effect on economic growth. The rate of growth of GDP decreases by almost 3.7 percentage if any new group enters the conflict over the five-year period and this effect is significant at a 1 percent level. At the same time, the rate of growth increases by almost 2.8 percentage if any of the rebel groups exit (Model 1).

In Model 2 we look at the potential growth effect of the escalation/de-escalation of conflict in terms of geographical extent. As with Model 1, the incidence of conflict is not significant but the proxy for the escalation of conflict has a significant and negative effect on economic growth. If the conflict escalates in terms of geographical extent, then the rate of growth of output is reduced by an average 4.7 percent over the five-year period.

Table 9: Economic Impact of the Evolution

Therefore in terms of development it is not important whether there is a conflict or not. What matters is how the conflict changes over its course. In addition, given that ODA is one of the few variables that affect the evolution of conflict, what is implied is that there is a sort of indirect effect of ODA on economic growth in conflict economies.

8) Conclusions

Whether aid has a positive or negative effect on the probability of conflict and the economic impact of aid in conflict economies are two of the most important issues faced by international donors when they come to decide whether to allocate aid to countries experiencing conflict. Using proxies for the evolution of conflict, we show that aid has a significant effect on the probability that the conflict will either escalate or deescalate and that by affecting the evolution of conflict aid also affects the incidence of conflict. In addition, we find that for economic growth the evolution of conflict is what matters. Therefore, by affecting the evolution of conflict aid also has a significant and indirect effect on economic growth.

We find, too, that policy variables under the control of the government are hardly significant in explaining the evolution of conflict, which is likely to be the result of the lack of room for national policy makers to manoeuvre. For this reason the support of the international community is essential in countries experiencing a conflict, given that international donors are the only ones who can provide enough variation in national budgets.

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Table 1: Descriptive Statistics for the Extent and Number of Groups

PITF			*UCDP/PRIO*		
Extent	***Freq.***	***Percent***	***Groups***	***Freq.***	***Percent***
0	7,322	89.40	0	7,022	87.69
Extent < 10%	249	3.04	1	632	7.89
10%< Extent < 25%	288	3.52	2	222	2.77
25%< Extent < 50%	164	2.00	3	80	1.00
Extent > 50%	167	2.04	4	17	0.21
			5	11	0.14
			6	7	0.09
			7	11	0.14
			8	6	0.07
Total	8,190	100.00	Total	8,008	100.00

Table 2: Descriptive Statistics for the Evolution of Conflict (not Conditional on Conflict)

PITF			*UCDP/PRIO*		
Territorial Evolution	***Freq.***	***Percent***	***Groups Evolution***	***Freq.***	***Percent***
-4	16	0.20	-4	2	0.02
-3	26	0.32	-3	11	0.14
-2	45	0.56	-2	31	0.39
-1	70	0.87	-1	218	2.72
0	7,694	96.08	0	7,452	93.06
1	73	0.91	1	247	3.08
2	49	0.61	2	37	0.46
3	20	0.25	3	9	0.11
4	15	0.19	5	1	0.01
Total	8,008	100.00	Total	6,075	100

Table 3: Dummy Dependent Variables for the Evolution of Conflict (Conditional on Conflict)

Territorial Escalation				*Groups Entering*			
Δ+ Extent	*Freq.*	*Percent*	*Cum.*	*Δ+ Groups*	*Freq.*	*Percent*	*Cum.*
0	706	81.81	81.81	0	708	70.66	70.66
1	157	18.19	100.00	1	294	29.34	100.00
Total	863	100.00		Total	1,002	100.00	
Territorial De-escalation				*Groups Exiting*			
Δ- Extent	*Freq.*	*Percent*	*Cum.*	*Δ+ Groups*	*Freq.*	*Percent*	*Cum.*
0	800	92.70	92.70	0	908	90.62	90.62
1	63	7.30	100.00	1	94	9.38	100.00
Total	863	100.00		Total	1,002	100.00	

Table 4: Effect of ODA on the Evolution of Conflict

Territorial Escalation				*Groups Entering*			
Δ+ Extent	ODA/GDP	Std. Dev.	Freq.	*Δ+ Groups*	ODA/GDP	Std. Dev.	Freq.
0	0.056	0.090	680	0	0.053	0.092	671
1	0.053	0.088	139	1	0.065	0.101	278
Total	0.055	0.089	819	Total	0.056	0.0949	949
Territorial De-escalation				*Groups Exiting*			
Δ- Extent	ODA/GDP	Std. Dev.	Freq.	*Δ- Groups*	ODA/GDP	Std. Dev.	Freq.
0	0.054	0.084	761	0	0.057	0.097	859
1	0.072	0.143	58	1	0.050	0.066	90
Total	0.055	0.089	819	Total	0.056	0.094	949

Table 5: MLE Heckman Probit – Evolution and Incidence of Conflict

	The Evolution of the Extent of Conflict			
	Outcome Equation		*Selection Equation*	
	Model 1	*Model 2*	*Model 1*	*Model 2*
Dependent Variables	***Δ- Extent***	***Δ+ Extent***	***Incidence***	***Incidence***
Log Population (t -1)	0.0828	-0.0973	0.0819**	0.0828**
	(1.16)	(-1.52)	(2.35)	(2.39)
Log real GDP per cap. (t - 1)	0.157***	-0.0890	-0.178***	-0.177***
	(2.67)	(-1.04)	(-4.33)	(-4.23)
Oil producers Dummy	-0.0160	-0.275	0.143	0.158
	(-0.10)	(-1.40)	(1.36)	(1.52)
Ethnic Fractionalization	0.142	0.372	-0.133	-0.161
	(0.55)	(1.09)	(-0.72)	(-0.87)
ODA/GDP (t - 1)	1.391**	-4.849**	-1.410***	-1.410***
	(2.00)	(-2.35)	(-2.74)	(-2.68)
Government Consumption (t - 1)	0.0512	-0.136	0.0538	0.0457
	(0.50)	(-1.11)	(0.72)	(0.62)
Extent of Conflict (t - 1)	0.375***	-0.215**		
	(3.22)	(-2.49)		
Incidence (t - 1)			3.214***	3.215***
			(36.95)	(37.00)
Tropical Area			0.228**	0.232**
			(2.15)	(2.02)
Constant	-4.542***	1.652	-2.449***	-2.331***
	(-2.74)	(1.08)	(-3.14)	(-3.17)
LR test of indep. eqns. (rho = 0)	0.192	0.000***		
Observations	644	644	4,575	4,575

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: MLE Heckman Probit – Evolution and Incidence of Conflict

The Dynamics of Groups				
	Outcome Equation		***Selection Equation***	
	Model 1	***Model 2***	***Model 1***	***Model 2***
Dependent Variables	***Δ- Groups***	***Δ+ Groups***	***Incidence***	***Incidence***
Log Population (t -1)	-0.176***	0.0559	0.147***	0.129***
	(-3.89)	(1.01)	(5.55)	(4.78)
Log real GDP per cap. (t - 1)	0.0408	-0.0964	-0.106***	-0.105***
	(0.80)	(-1.58)	(-3.51)	(-3.44)
Oil producers Dummy	-0.286**	0.0508	0.220***	0.216***
	(-2.46)	(0.29)	(2.72)	(2.69)
Ethnic Fractionalization	-0.198	0.528**	0.278*	0.233
	(-0.91)	(2.00)	(1.84)	(1.61)
ODA/GDP (t - 1)	-0.289	-1.379***	-0.547	-0.654
	(-0.37)	(-2.69)	(-1.24)	(-1.53)
Government Consumption (t - 1)	-0.0294	0.0944	0.0995*	0.117**
	(-0.40)	(0.86)	(1.72)	(2.00)
Nr. Groups in Conflict (t - 1)	0.415***	0.0347		
	(8.29)	(0.67)		
Incidence (t - 1)			2.509***	2.547***
			(37.38)	(38.14)
Tropical Area			0.112	0.169**
			(1.41)	(1.98)
Constant	1.680	-2.161*	-3.934***	-3.698***
	(1.62)	(-1.81)	(-6.69)	(-6.11)
LR test of indep. eqns. (rho = 0)	0.000***	0.000***		
Observations	766	766	4,575	4,575

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: MLE Heckman – Evolution and Incidence of Conflict

	The Evolution of the Extent of Conflict			
	Outcome Equation		***Selection Equation***	
	Model 1	***Model 2***	***Model 1***	***Model 2***
Dependent Variables	***Δ- Extent***	***Δ+ Extent***	***Incidence***	***Incidence***
Log Population (t -1)	0.0735	-0.0408	0.0980***	0.0991***
	(1.00)	(-0.66)	(2.86)	(2.92)
Log real GDP per cap. (t - 1)	0.137**	0.0331	-0.149***	-0.146***
	(2.38)	(0.43)	(-3.85)	(-3.77)
Oil producers Dummy	-0.0680	-0.206	0.208**	0.223**
	(-0.40)	(-1.05)	(1.96)	(2.14)
Ethnic Fractionalization	0.175	0.316	-0.187	-0.218
	(0.65)	(0.93)	(-0.99)	(-1.16)
Δ.ODA/GDP (t - 1)	3.024**	-0.915	-2.261***	-2.201***
	(2.44)	(-0.45)	(-3.33)	(-3.25)
Government Consumption (t - 1)	0.0748	-0.171	0.0278	0.0192
	(0.72)	(-1.38)	(0.37)	(0.26)
Extent of Conflict (t - 1)	0.383***	-0.238***		
	(3.12)	(-2.73)		
Incidence (t - 1)			3.209***	3.209***
			(36.63)	(36.70)
Tropical Area			0.262**	0.272**
			(2.32)	(2.35)
Constant	-4.261**	-0.132	-2.948***	-2.962***
	(-2.53)	(-0.09)	(-3.94)	(-3.98)
LR test of indep. eqns. (rho = 0)	0.239	0.000***		
Observations	644	644	4,575	4,575

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: MLE Heckman – Evolution and Incidence of Conflict

The Dynamics of Groups				
	Outcome Equation		*Selection Equation*	
	Model 1	*Model 2*	*Model 1*	*Model 2*
Dependent Variables	***Δ- Groups***	***Δ+ Groups***	***Incidence***	***Incidence***
Log Population (t -1)	-0.153***	0.0684	0.148***	0.130***
	(-3.97)	(1.23)	(5.70)	(4.87)
Log real GDP per cap. (t - 1)	0.0583	-0.0709	-0.0975***	-0.0943***
	(1.36)	(-1.14)	(-3.46)	(-3.28)
Oil producers Dummy	-0.291**	0.126	0.245***	0.242***
	(-2.50)	(0.68)	(3.04)	(2.96)
Ethnic Fractionalization	-0.169	0.522	0.236	0.206
	(-0.87)	(1.62)	(1.58)	(1.34)
Δ.ODA/GDP (t - 1)	1.294	-2.627***	-1.816***	-1.931***
	(0.99)	(-3.63)	(-2.74)	(-3.05)
Government Consumption (t - 1)	-0.0112	0.0671	0.0838	0.102*
	(-0.15)	(0.61)	(1.45)	(1.73)
Nr. Groups in Conflict (t - 1)	0.408***	0.0404		
	(8.55)	(0.72)		
Incidence (t - 1)			2.515***	2.555***
			(36.99)	(37.24)
Tropical Area			0.143*	0.187**
			(1.85)	(2.09)
Constant	1.102	-2.596**	-4.030***	-3.815***
	(1.29)	(-2.15)	(-7.10)	(-6.50)
LR test of indep. eqns. (rho = 0)	0.000***	0.000***		
Observations	766	766	4,575	4,575

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Economic Impact of the Evolution

Dependent Variable: 5-year Average real per capita GDP growth		
Estimation Method: 2-step GMM	Model 1	Model 2
Log Real GDP per Capita, Lagged	-1.545**	-1.368**
	(-2.56)	(-2.07)
Log (1 + Investment/GDP)	2.823***	2.657***
	(2.94)	(2.59)
Incidence	-0.438	1.106
	(-0.54)	(1.36)
Δ+ Number of Groups	-3.674***	
	(-2.92)	
Δ- Number of Groups	2.831***	
	(2.99)	
Δ+ Extent		-4.734***
		(-3.27)
Δ- Extent		-0.317
		(-0.42)
Constant	16.53*	12.10
	(1.92)	(1.41)
AR (1) Test (p-values)	0.012	0.009
AR (2) Test (p-values)	0.791	0.691
Hansen J-Statistics (p-values)	0.868	0.742
Observations	882	882
Number of Countries	142	142

*Robust z-statistics in parentheses (Windmeijer; 2005): *** p<0.01, ** p<0.05, * p<0.1*
GMM Instruments: Lag (1/2) Xt or Lag (2/3) Xt depending whether variables are endogenous or pre-determined.
IV Instruments: Time dummies
Other Controls (not reported) include: Population Growth, Government Consumption (in GDP), Trade (in GDP), ODA (in GDP), Ethnic Fractionalization and Dummies for Asia, Africa and Aid Recipient.