# Civil conflict participation game with a social network

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**Abstract**

We study how the structure of social ties shapes individual decisions to participate in a costly social conflict. By embedding players in a social network and defining within- and inter-group cohesion, we extend the current conflict literature and provide new findings on the role of cohesion, group size, and polarization. We characterize the unique Nash equilibrium of the contest game and show that denser ties across groups reduce the intensity of conflict, while denser within-group ties intensify it. The impact of group size is ambiguous; in particular, the size effect can reverse when network density itself depends on group size. We conduct a welfare analysis, decomposing the marginal effect of cohesion into three channels: an equilibrium-shift effect, a direct value effect, and a rent-dissipation cost. A uniform increase in inter-group cohesion across symmetric groups is strictly welfare-improving, formalizing the intuition that bridging ties pacify society.

**Keywords**

civil conflict, social networks, Nash equilibrium, games on networks

## Introduction

Literature regarding the origins and the resolution of civil conflict outlines numerous potential reasons for the outbreak of violence. However, it fails to address the question of coordination and contact between individuals in a society on the brink of civil unrest. In the following paper, we introduce social networks to show how ties between players in the society change the equilibrium outcomes in a game of civil conflict and how individuals

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change their expectations and, in effect, their decisions in a binary choice game of starting a conflict.

Historically, the most prevalent view was that the main cause of social conflict is class division. Intuitively, past research shows that inequality causes conflict (see e.g. Muller and Seligson, 1987 or Stewart, 1998). This approach however, fails to explain why the most common type of conflict is initiated along the ethnic division of society. In recent years, numerous papers were published explaining ethnic divisions, polarization, and how they influence the probability of conflict (Banda and Cluverius, 2018; Burgess et al., 2022; Esteban and Schneider, 2008). Reynal-Querol, 2002 shows that religious polarization is the most important social cleavage. Fearon and Laitin, 2011 notice migration as a common source of violence. The question that arises is why these social splits cause individuals to decide to fight. None of the current studies addresses this issue.

All of those publications mention the social aspect of decision-making. However, they all fall short of analyzing the ties between different groups and how they may impact individuals' expectations regarding the conflict. We address this by building a general model that allows us to parameterize the strength of connections between social groups. We show the mechanisms behind the impact of social divisions on conflict.

Another approach to looking at the subject of civil unrest is to model it as a fight between the ruling elite and the citizens. It can overlap with the conflict along the ethnic or class division. However, it puts greater stress on factors such as the potential prize of the conflict and the costs of starting a revolution. Notable papers examining these factors are by Ross, 2006, Bó and Bó, 2011, and Bazzi and Blattman, 2014. Others focus on the social structure, such as group size and fractionalization. Oliver and Marwell, 1988 explains under which circumstances a larger group is more or less willing to take action. Collier and Hoeffler, 1998 shows that the relation between fractionalization and conflict is non-linear.

Lately, more researchers have focused on combining several factors previously described in conflict papers. Usually, communities face numerous tensions both on the income and ethnicity lines. The open question is, what is the prevalent dimension causing conflicts? Besançon, 2005 examines various types of aggression and assigns them to the cleavages in society that cause them. Esteban and Ray, 2008 builds a model that outlines conditions for the choice of conflict on either ethnic or class lines and shows why ethnicity is the more observed cause of violence. We generalize that research. The original paper lacks a description of individual-level decision-making and only focuses on a representative agent. It also omits the topology of social structure and any information exchange that we introduce.

The conflict literature is lacking in its treatment of social interactions and revolutions. The decision to start a civil conflict is often presented as a coordination game (Ullmann-Margalit, 1977). Recently, more researchers started to look at it from the perspective of players' limited knowledge and model this decision as a global game (Angeletos et al., 2007; Angeletos and Werning, 2006). A step further in the research is combining incomplete knowledge with information exchange. There is growing literature on the subject of players learning from their networks (Fernández, 2013; Jackson and Zenou, 2015), but it is limited to the subject of social issues and does not extend to civil conflict.

In this research, we aim to fill that gap. We want to examine how social interactions and the structure of the society impact the decision to start a conflict and see if a theoretical model can indicate what factors lead to more intensive fighting.

We look at a model describing the formation and intensity of civil conflict proposed by Esteban, 2018. They build a framework where groups fight for public budgets expressed as utilities. They consider groups to be homogeneous in all ways aside from their size, and each member of the group to behave in the same way. We extend their work by adding a social network and showing how social structure can impact utilities obtained from the civil conflict.

The introduction of the social structure expressed as a network, as opposed to monolithic groups, allows us to draw more conclusions on the social sources of civil unrest and measure the impact of changes in inter-group social relations.

In the next section, we review related literature in more depth. Later, we move to the theoretical part, where we introduce the model and the network. We reach the equilibria and cutoff points between different game outcomes. We work on the comparative statics to understand the effects of changing game parameters, and explore endogenizing the social structure. Then, we move to welfare effects, where we analyze how shifts in social structure impact aggregate social welfare. Finally, we discuss the main findings and outline potential further research on the topic.

## Literature review

Previous papers published on the subject of civil conflict discovered many potential causes for its initiation as well as factors increasing (or decreasing) its probability. In this section, we will focus on the main points of selected research and describe how they may influence our model. We cover both theoretical and empirical papers. We start the analysis with a review of research on inequalities and class conflict. These focus on the poor fighting the rich, but also shifts in status or inequalities between social groups. Further, we move on to ethnic divisions and conflicts. We touch upon several papers that indicate how ethnic diversity influences the decisions to start revolutions or wars.

We finish with the group size, budgets at stake, and costs of conflict. We examine the findings of papers analyzing if bigger coalitions are more likely to revolt or not. Later, we look at the potential gain from conflict. With multiple examples of wars over mineral resources or valuable land, this may hypothetically be one of the major reasons to start a conflict. We end the section with costs, and whether conflict is determined by how much resources it takes to even take up a fight.

### *Income inequalities*

Starting with Karl Marx, it was widely accepted that the poor may revolt against the rich if inequalities in society are too high. Muller and Seligson, 1987 show empirically that this theory holds. In their paper, they analyze data on conflicts and insurgencies across countries and find that income inequalities impact the probability of conflict. The significance of this variable holds in numerous tests and with the causal model accounting for many other controls.

These findings were supported by a larger study by Wayne Nafziger and Auvinen, 2002. They verify a bigger and more up-to-date dataset and check various hypotheses regarding the sources of conflict. The results show that it is indeed the repressions by the government, and most of all, the inequality in income, that causes conflicts. They claim that even ethnic conflicts are started by the discrepancies between the wealth that people expect and what they get.

Stewart, 1998, 2000 and Cramer, 2003 provide a different look at the problem. They examine the types of inequalities that cause conflict. Research on both of them proves that different measures of income discrepancies have very different effects on complex humanitarian emergencies. They both claim that only horizontal inequality increases the probability of conflict. Only if the differences in income are visible among people of similar characteristics. They also claim that vertical inequality, like the one captured by the Gini coefficient, does not impact the probability of conflict.

Another finding was provided by Mitra and Ray, 2014. They show that the effect of changes in income in India depends on the social group and the status that is gained. Their results showed that only the increase in the wealth of Muslims, who are the minority, had a significant impact on the probability of violence. Their research did not extend to other countries, but it may suggest some not obvious transmission mechanisms between the economic dynamics and conflict.

In the model by Esteban and Ray, 2008, the authors find that the poor prefer class conflict to peace, while the rich prefer ethnic violence. However, the poor would accept the rich's coalition and start the ethnic conflict if the rich financed it. They claim to explain why ethnic conflict dominates the class one.

## *Ethnic divisions*

Despite strong arguments for the role of income inequalities in causing social unrest, the majority of conflicts observed in recent years have been initiated along ethnic lines. The discussion about this subject takes place on different levels. The first of them is the characteristic that causes people to fight. Geertz, 1973 and Dahl, 1971 talk about language groups that fight one another. They claim that the ability to communicate is an important factor in building societies.

Reynal-Querol, 2002 shows that the most important ethnic division is religion. She compares the effects of linguistic fragmentation with religious polarization and finds that the latter is more robust and unaffected by adding controls to the causal model. Fearon and Laitin, 2011 claim that a third of civil conflicts are started between the group that considers themselves "sons of the soil". They show that migrations are an important factor causing ethnic unrest.

Another debate in the field tries to resolve whether it is the diversity or the difference in views that leads to aggression. Former, as proposed by Easterly and Levine, 1997, is, through conflict, one of the main reasons for poverty in Africa. Lately, however, the latter view described as ethnic polarization, is more prevalent. Horowitz, 1985 notes that the most severe conflicts arise in societies where the ethnic majority is faced by a large minority. Montalvo and Reynal-Querol, 2005 examines both polarization and fragmentation and finds that the former is responsible for outbreaks of civil conflicts.

On the other hand, Esteban and Ray, 2011b show that "*the equilibrium level of conflict can be proxied by a linear function of the Gini coefficient, the Herfindahl-Hirschman fractionalization index, and a specific measure of polarization due to Esteban and Ray.*" Which would support both views. In another paper, Esteban et al., 2012 again, empirically show that all polarization, fractionalization, and the Gini-Greenberg index have a significant impact on conflict.

Another support for fractionalization is found by Collier and Hoeffler, 1998. They find a non-linear causality between the number of different ethnicities and conflict. Obviously, in a homogeneous society, there will not be ethnic violence. On the other side of the spectrum, if we observe large quantities of very small groups, each of them would not be powerful enough to start a conflict. Therefore we would only observe an outbreak of combat if ethnic groups were big enough to have chances of winning and small enough not to have a homogeneous society.

At the same time, some researchers reach different conclusions. Fearon and Laitin, 1996 and Bates, 1999 show that ethnic diversity is usually not a cause of violence. According to their models, inter-ethnic cooperation is more prevalent than conflict.

## *Group size, prize, and cost of conflict*

The size of a group that is supposed to get involved in a conflict is an intuitive factor to examine. The ideas about its effect. Oliver and Marwell, 1988 shows that it depends on the structure of a group. They notice that more heterogeneity within a coalition causes larger groups to be more active. At the same time, unsurprisingly, if a bigger group bears more costs, it will be less active.

Esteban and Ray, 2011a in their model of ethnic conflict reach the same conclusions. They show that within-group income heterogeneity promotes conflict. The logic behind this finding is that the rich would provide funding for the conflict, which has a lower value to them than to the poor. Those with the lower alternative value of time would give up work to participate in the conflict. It shows that minimizing the cost of conflict for the group may be an important factor in increasing the probability of conflict.

A similar observation was made by Fearon and Laitin, 2003, who shows that poverty causes civil conflicts. In their explanation, even ethnic or religious conflict would start only in favorable conditions. One of those is the small cost of recruiting fighters or activists. Among others is the large size of the population, which may also be interpreted as easiness of finding people to lead conflicts.

Approaching this topic from the payoff side, Mayoral and Ray, 2017 find that large groups are more likely to fight over public goods, while contests over private benefits attract smaller sides to a conflict. The intuition behind the results is clear. Public goods influence everyone in the same way. There are no losses from fighting as a bigger group. Private goods have to be shared, and increasing the number of people makes the price smaller.

Another approach to measuring the impact of the possible prize and the cost of initiating the conflict was proposed by Bó and Bó, 2011. They built a Hecksher-Ohlin style model showing that the increase in prices of labor-intensive goods would lead to less conflict because the poor would have higher alternative costs to fighting. At the same time, an increase in prices of capital-intensive goods benefits the rich and the ruling elite, therefore making a potential win in a revolution more profitable and increasing the probability of an outbreak of conflict.

Their theoretical model finds support in the data. Ross, 2006 has shown how countries with an abundance of natural resources, which usually benefit the ruling group, are significantly more likely to be involved in civil conflict. Similar results were obtained by Dube and Vargas, 2013. In their paper, they check the model by Dal Bo and Dal Bo on Colombian data. They see that drops in prices of agricultural (labor-intensive) goods led to more violence. The same effect was observed after rises in the prices of natural resources (capital-intensive goods). Their results went exactly in line with the theory.

Other results were obtained by Bazzi and Blattman, 2014. They construct a huge database of shocks in commodity prices and see their effect on conflicts in countries that export or import those. They see no statistical significance. Performing a number of regressions shows that the theory of Dal Bo and Dal Bo does not work.

Our work in the next chapters contributes to the literature on the group size and social structure. It also provides a framework to analyze the decisions of individuals rather than whole groups.

## The model

Consider a society consisting of a set of players $\mathcal{K} = \{1, 2, \ldots, n\}$. Each belongs to one of $m$ social groups, $\mathcal{I} = \{1, 2, \ldots, m\}$. These groups can represent divisions across any social spectrum. They can be social classes, ethnic groups, or societies organized around sets of values, such as political parties.

Each group $i$ has a population of $n_i$, which is a count of players belonging to this group. The total population is $n = \sum_{i=1}^{m} n_i$, as each player belongs to one of the groups. We do not make any assumptions about the relative sizes of those groups or their distribution.

Players are connected to each other via a social network. The connections are described by a graph $\mathbb{G}$, where $\mathbb{G}_{i,j}$ is an undirected edge ($\mathbb{G}_{i,j} = \mathbb{G}_{j,i}$) between individuals $i$ and $j$. The graph is symmetrical, and the values in the matrix $\mathbb{G}$ only take values of 0 or 1. For the ease of notation, we set $\mathbb{G}_{i,i} = 1$. Therefore, each player in the society has at least one connection — the one with themselves.

We do not make any assumptions about the distribution of edges in the graph $\mathbb{G}$. However, to measure the impact of social factors like polarization, we introduce a measure of within- and inter-group cohesion. The measures of cohesion we use are the densities of the network (Wasserman and Faust, 1994). We look at how many connections are established out of all that could be. Therefore our within-group cohesion of group

$i$ is given by $\gamma_i = \frac{\sum_{k\in i}\sum_{l\in i}\mathbb{G}_{kl}}{n_i^2}$. Whereas for between groups $i$ and $j$ it is given by $\gamma_{ij} = \frac{\sum_{k\in i}\sum_{l\in j}\mathbb{G}_{kl}}{n_i n_j}$.

Each player makes a decision on the resources they commit to the conflict. Our model does not imply the conflict has to be armed or violent. It can be understood as a political process, in which members of parties participate by committing their time or work, but equally well, it can be financing or participating in violent unrest. The resources committed by player $k$ to their group are $r_k$. These bear a cost to the player given by a strictly convex function $c$. $c(r_k)$ is strictly increasing, and its derivative is also increasing. The convexity of the function $c$ is implied by diminishing returns from private consumption, which is sacrificed by resources committed to the conflict.

Total resources of each group $R_i = \sum_{k\in i} r_k$ define the group's chances of winning in the conflict. As each group can obtain resources from its members, $R = \sum_{i=1}^{m} R_i$ is the total of resources committed to the conflict. The probability that a group $i$ wins the conflict is given by $p_i = \frac{R_i}{R}$. The game is an example of a Tullock conflict (Tullock, 1975).

Upon winning the conflict a group manages a direct budget and a distribution of public goods. The first one of those, $\mu$, is distributed over the network, i.e. the more connections an individual has with the winning group, the more of the benefits they obtain. The second public good is group-specific, and each member of each group obtains the same utility from a distribution proposed by a given group. Therefore, for each group $i$ and $j$, if group $i$ wins the conflict, members of group $j$ obtain utility $u_{ij}$ from the second public good.

Together, both the budgets and the cost of resources committed to the conflict give the ex post utility a player $k$ belonging to group $i$ receives, if group $j$ wins the conflict:

$$v_k = u_{ji} + \mu \sum_{l\in j} \mathbb{G}_{kl} - c(r_k). \tag{1}$$

Ex ante, when players make their decisions about the resource commitment to the conflict they optimize their expectations, given by:

$$E(v_k) = \sum_{j=1}^{m} p_j \left( u_{ji} + \mu \sum_{l\in j} \mathbb{G}_{kl} \right) - c(r_k). \tag{2}$$

Upon making a decision about participation in the conflict, as in equation 2, each player decides the resources committed to the conflict.

## *Equilibrium*

Players' choice is a response to the choices of all the others in society. Their collective actions are aggregated to totals of resources of each group and of the whole society, and enter directly into probabilities of winning by each of the groups $p_j$. The Nash equilibrium of the game will be given by each player's best response to resources committed by all the other players.

In the model, players face no uncertainty regarding the state of the world. Only the outcome of the conflict is subject to a "random draw" according to the probabilities of winning $p_j$. The Nash equilibrium of the game will be a vector of allocations $r_k$ — resources committed by each player in the game. Each player's resources are the best response to all the others' resources $r_k = BR_k(r_{-k})$.

**Proposition 1.** *The equilibrium commitment $r_k$ for player $k$ belonging to group $i$ is a solution to the equation:*

$$c'(r_k) = \frac{u_{ii} + \mu \sum_{l \in i} \mathbb{G}_{kl} - \sum_{j=1}^{m} p_j \left( u_{ji} + \mu \sum_{l \in j} \mathbb{G}_{kl} \right)}{R}. \tag{3}$$

**Proof.** First, let's introduce a difference in utility for a player belonging to group $i$ between his group and other group $j$ winning in the conflict from equation 1:

$$\Delta_{ij} = u_{ii} + \mu \sum_{l \in i} \mathbb{G}_{kl} - u_{ji} - \mu \sum_{q \in j} \mathbb{G}_{kq} = u_{ii} - u_{ji} + \mu \left( \sum_{l \in i} \mathbb{G}_{kl} - \sum_{q \in j} \mathbb{G}_{kq} \right). \tag{4}$$

We can rearrange the formula for the expected utility from equation 2 to obtain:

$$E(v_k) = u_{ii} + \mu \sum_{l \in i} \mathbb{G}_{kl} - \sum_{j=1}^{m} p_j \Delta_{ij} - c(r_k). \tag{5}$$

To choose the optimal level of contribution to the conflict, players maximize their expected utility, as described in equation 5. To obtain that we take the first order condition:

$$\frac{\partial E(v_k)}{\partial r_k} = \sum_{j=1}^{m} \frac{R_j}{R^2} \Delta_{ij} - c'(r_k) = 0. \tag{6}$$

Therefore, the optimal value will be given by the solution to the equation:

$$\begin{aligned} c'(r_k^*) &= \sum_{j=1}^{m} \frac{R_j^*}{R^2} \Delta_{ij} = \frac{\sum_{j=1}^{m} p_j \Delta_{ij}}{R} \\ &= \frac{u_{ii} + \mu \sum_{l \in i} \mathbb{G}_{kl} - \sum_{j=1}^{m} p_j \left( u_{ji} + \mu \sum_{q \in j} \mathbb{G}_{kq} \right)}{R}. \end{aligned}$$

The important point to notice is that the equilibrium always exists in the game. With strictly convex $c$ and a Tullock-style contest success function, the game yields a Kakutani fixed point. Existence and uniqueness of the Nash equilibrium follow from (Szidarovszky and Okuguchi, 1997) and (Cornes and Hartley, 2005). There is, however, a corner solution. If $c'(r_k^*) < 0$ we assume player $k$ would simply not participate in the conflict. This holds even in the case when $\Delta_{ij}$ is negative, which breaks (Szidarovszky and Okuguchi, 1997) assumptions — then players have a negative payoff from participation in the conflict and they commit 0 resources.

The result of Proposition 1 does not give us a closed-form solution for the size of individual commitment by player $k$. It allows us, however, to study the equilibrium and draw conclusions on the impact of each of the model's parameters on the changes in individuals' contributions and the intensity of the conflict.

Proposition 1 indicates that personal investment into conflict will be driven by the utility obtained from the policy introduced by each group, and the direct budget, which is always affected by the network through which it is distributed. The equation has the total resources committed as its divisor. It indicates that others' resources will attenuate the effect of each source of utility for a player.

By definition, the function $c$, which maps personal resources to the utility obtained by a player, is strictly convex. It implies that its first derivative with respect to committed resources $r_k$ is increasing. It allows us to analyze the impact of each variable on the $r_k$. As the right-hand side of equation 3 increases, so will the resources $r_k$. Even as we cannot infer the exact value of the personal investment, we can tell how changes to each of the factors would impact the decision of each player.

The results also indicate that there is an optimal total investment into conflict, which is a sum of all personal investments. $R^* = \sum_{k=1}^{n} r_k^*$ indicates the total intensity of conflict. As personal commitments would become higher, the aggregate conflict would be more intense.

**Observation 1.** *Players will only participate in conflict by committing any resources to it if the utility they are to obtain from their group winning is higher than the weighted average of utilities they would obtain if other groups won, weighted by their probability of winning the conflict.*

As players' commitment to conflict cannot be negative, we know that if equation 3 is negative, so will be the commitment. As $R$ is strictly positive, the equation can only be less than zero if the sum of utilities from other groups is higher than from the player's own group.

## Comparative statics

In the following section, we analyze the impact of each model parameter on players' optimal decisions. Our goal is to understand how the network changes and its topology impact the intensity of conflict. We start by analyzing the best response of a player $k$ to changes in the commitment to conflict by members of their group $i$ and other groups $j$.

The corner solutions of the model, e.g. $c'(r_k^*) < 0$, imply non-participation in a conflict. In the following section, we focus on the analysis of the interior equilibrium. However, finding that the personal commitment would increase or decrease as a result of changing some parameter, means that $c'(r_k^*)$ increases or decreases, respectively. Although, in most cases we do not analyze when the switch from non-participation to participation happens, the factors that cause players to increase their personal commitment would also lead to a higher likelihood that a player who otherwise would not participate in the conflict joins.

**Proposition 2.** *As the commitment of players in group $i$ increases, player $k$ belonging to this group decreases their commitment.*

**Proof.** The commitments of players belonging to group $i$ aggregate to $R_i$. We can take the derivative of $c'(r_k^*)$ with respect to it. The sign of the derivative would indicate the impact of investments into conflict from player $k$'s group on their own decision about $r_k$.

$$\frac{\partial c'(r_k^*)}{\partial R_i} = \frac{2\sum_{j=1}^{m} R_j \left(u_{ji} + \mu \sum_{q\in j} \mathbb{G}_{kq}\right) - 2R\left(u_{ii} + \mu \sum_{l\in i} \mathbb{G}_{kl}\right)}{R^3} \tag{7}$$

The equation above is higher than 0, indicating a positive impact of increasing the commitments of members of $k$'s group, if:

$$\begin{aligned} 2\sum_{j=1}^{m} R_j \left(u_{ji} + \mu \sum_{q\in j} \mathbb{G}_{kq}\right) &> 2R\left(u_{ii} + \mu \sum_{l\in i} \mathbb{G}_{kl}\right) \\ \implies \sum_{j=1}^{m} p_j \left(u_{ji} + \mu \sum_{q\in j} \mathbb{G}_{kq}\right) &> u_{ii} + \mu \sum_{l\in i} \mathbb{G}_{kl} \end{aligned}$$

This means that players would increase their commitment to the conflict together with the rest of their group if the weighted average of utilities from other groups' wins is higher than the utility the player would obtain if their group won the conflict. However, in Observation 1, we notice that in such a case, a player would not participate in the conflict at all.

Therefore, if a player $k$ participates in a conflict, and their group increases their commitment, $k$ would free ride and decrease the amount of resources committed to the conflict.

With Observation 1 and Proposition 2, we know that a player's strategy in relation to the commitment of their group can be one of two:

$$\begin{aligned} &\sum_{j=1}^{m} p_j \left(u_{ji} + \mu \sum_{q\in j} \mathbb{G}_{kq}\right) > u_{ii} + \mu \sum_{l\in i} \mathbb{G}_{kl} \to \text{no participation,} \\ &\sum_{j=1}^{m} p_j \left(u_{ji} + \mu \sum_{q\in j} \mathbb{G}_{kq}\right) < u_{ii} + \mu \sum_{l\in i} \mathbb{G}_{kl} \to \text{free riding.} \end{aligned}$$

This means that if an increase in group resources does not change the network topology, it would not affect the intensity of the conflict. This shows that for each group $i$ there is some level of $R_i$ above which players will not be willing to invest more. The next propositions show how the network structure mediates the relationship between group size and conflict intensity that is observed in the data.

The other response we analyze is the one to the members of other group $j$.

**Proposition 3.** *As the commitment of players in group $j$ increases, player $k$ belonging to group $i$ would increase their commitment if the weighted average of utilities they would obtain if other groups won, weighted by their probability of winning the conflict, is higher than the average utility they are to obtain from their group or group $j$ winning.*

**Proof.** We proceed as in the proof of 2, only taking the derivative of $c'(r_k^*)$ with respect to $R_j$, the aggregate commitment of members of group $j$.

$$\frac{\partial c'(r_k^*)}{\partial R_j}$$
$$= \frac{2\sum_{l=1,l\neq j}^{m} R_l \left(u_{li} + \mu \sum_{q\in l} \mathbb{G}_{kq}\right) + (2R_j - R)\left(u_{ji} + \mu \sum_{q\in j} \mathbb{G}_{kq}\right) - R\left(u_{ii} + \mu \sum_{l\in i} \mathbb{G}_{kl}\right)}{R^3}.$$

Again, we check under what conditions the equation above is positive. It is given by:

$$2\sum_{l=1,l\neq j}^{m} R_l \left(u_{li} + \mu \sum_{q\in l} \mathbb{G}_{kq}\right) + (2R_j - R)\left(u_{ji} + \mu \sum_{q\in j} \mathbb{G}_{kq}\right) > R\left(u_{ii} + \mu \sum_{l\in i} \mathbb{G}_{kl}\right)$$
$$\implies \sum_{l=1}^{m} p_l \left(u_{li} + \mu \sum_{q\in l} \mathbb{G}_{kq}\right) > \frac{u_{ii} + \mu \sum_{l\in i} \mathbb{G}_{kl} + u_{ji} + \mu \sum_{q\in j} \mathbb{G}_{kq}}{2}.$$

Therefore, players will increase their investment in conflict as a response to growing investment from members of some group $j$ if the expected payoff across all possible winners of the conflict is higher than the average utility obtained from their group or group $j$ winning it.

The condition in Proposition 3, as opposed to the one in 2, can be met. The weighted average of utilities obtained from all the groups can be higher than the average of the utilities from a win of groups $i$ and $j$, while still having $k$ participate in the conflict.

This gives us three options of players' behavior in response to the increase in commitment from players of group $j$. Let's denote the utility for player $k$ belonging to group $i$ from group $i$ winning the conflict as $U_i = u_{ii} + \mu \sum_{n\in i} \mathbb{G}_{kn}$.

$$\sum_{l=1}^{m} p_l \left(u_{li} + \mu \sum_{q\in l} \mathbb{G}_{kq}\right) > U_i \rightarrow \text{no participation},$$
$$\frac{U_i + u_{ji} + \mu \sum_{q\in j} \mathbb{G}_{kq}}{2} < \sum_{l=1}^{m} p_l \left(u_{li} + \mu \sum_{q\in l} \mathbb{G}_{kq}\right) < U_i \rightarrow \text{increasing},$$
$$\sum_{l=1}^{m} p_l \left(u_{li} + \mu \sum_{q\in l} \mathbb{G}_{kq}\right) < \min\left(U_i, \frac{U_i + u_{ji} + \mu \sum_{q\in j} \mathbb{G}_{kq}}{2}\right) \rightarrow \text{decreasing}.$$

In the situation where $\sum_{l=1}^{m} p_l \left(u_{li} + \mu \sum_{q \in l} \mathbb{G}_{kq}\right) = \frac{U_i + u_{ji} + \mu \sum_{q \in j} \mathbb{G}_{kq}}{2}$, members of group $i$ would not change their investment as an answer to their opponents.

**Proposition 4.** *Player $k$'s, belonging to a group $i$, commitment to the conflict increases with their utility from the policies introduced by group $i$ upon winning, $u_{ii}$.*

**Proof.** It is enough to show that the derivative of $c'(r_k^*)$ with respect to $u_{ii}$ is positive.

$$\frac{\partial c'(r_k^*)}{\partial u_{ii}} = \frac{1 - p_i}{R}. \tag{8}$$

It is always greater than 0, as both $(1 - p_i)$ and $R$ cannot be negative.

As players stand to earn more from the conflict, they will invest more into it. Utility from the player's own group's policies enters their utility directly, and the effect on their commitment to the conflict will be relative to the total resources, but also their chances of winning. The numerator of the derivative in the proof above shows that if the chances increase, players will increase their investments less after the increase of $u_{ii}$. As they become surer of their win, $(1 - p_i) \to 0$, they would not react to the change at all.

**Proposition 5.** *Player $k$'s, belonging to a group $i$, commitment to the conflict decreases with their utility from the policies introduced by group $j$ upon winning, $u_{ji}$.*

**Proof.** It is enough to show that the derivative of $c'(r_k^*)$ with respect to $u_{ji}$ is negative.

$$\frac{\partial c'(r_k^*)}{\partial u_{ji}} = -p_j/R. \tag{9}$$

It is always less than 0, as both $p_j$ and $R$ are always positive.

The utility obtained by a member of group $i$ from group $j$ after their conflict is won impacts the player's commitment negatively. The higher the utility from losing, the less relative return the player gets from their investment into the conflict. Therefore, they will limit their commitment $r_k$.

Between Propositions 4 and 5 we see that the more equal utilities from policies introduced by different groups players would observe, the less intense the investment into conflict would be. In the literature, we see evidence that ethnic groups generally feel that they get less public goods from others than they should and expect some levels of mistreatment (Koch, 2018). It is often caused by a lack of representation and a lack of information about the availability of public funds (Flöthe, 2020). It can also be caused by differing needs between social and ethnic groups that are not adequately addressed by public budgets (Schuldt et al., 2022).

Increasing ethnic diversity also tends to shift individuals' opinions on what is a proper public budget division, often causing so-called welfare chauvinism (van der Meer and Reeskens, 2020). A body of research showed that ethnic diversity causes a decrease and misallocation of public spending or "diversity debit" (Alesina et al., 1999; Gerring et al., 2015). This can be very problematic in societies, and as policy advice, newer research often argues that the opposite is true and there exists a “diversity dividend”, which makes societies with more ethnic groups get higher public goods provisions (Gisselquist et al., 2016) or have ambiguous effects depending on the metric used (Ajide, 2020).

**Proposition 6.** *Player $k$ belonging to group $i$ will increase their investment in conflict with an increase in direct budget $\mu$ if their own-group connections, scaled by the probability that another group wins, exceed the probability-weighted sum of their connections with members of other groups.*

**Proof.** The direct budget, or the network effect of winning, enters the expected utility and the formula 3 for the optimal commitment twice.

$$\frac{\partial c'(r_k^*)}{\partial \mu} = \frac{\sum_{l \in i} \mathbb{G}_{kl} - \sum_{j=1}^{m} p_j \sum_{l \in j} \mathbb{G}_{kl}}{R}. \tag{10}$$

The effect of increasing $\mu$ will be positive on player $i$'s investment into conflict if:

$$\frac{\partial c'(r_k^*)}{\partial \mu} > 0 \iff \sum_{l \in i} \mathbb{G}_{kl} - \sum_{j=1}^{m} p_j \sum_{l \in j} \mathbb{G}_{kl} > 0, \tag{11}$$

which only occurs if:

$$(1 - p_i) \sum_{l \in i} \mathbb{G}_{kl} > \sum_{j=1, j \neq i}^{m} p_j \sum_{l \in j} \mathbb{G}_{kl}. \tag{12}$$

The above proposition proves a notion that if players gain utility over the network, they will be willing to invest more into the conflict if the network related to the investment is bigger. The findings here are equivalent to those in Propositions 4 and 5.

**Proposition 7.** *If a new connection is made within group $i$ between player $k$ and some other member of the group, player $k$ will increase their commitment to the conflict.*

**Proof.** New connections enter the formula 3 through the direct budget $\mu$. As the player would get more of this budget thanks to the new connection, their potential utility from winning the conflict by their group is higher. Therefore, they will be more willing to invest in it.

$$\frac{\partial c'(r_k^*)}{\partial \mathbb{G}_{kl, l \in i}} = \frac{\mu(1 - p_i)}{R}. \tag{13}$$

As both $\mu$ and $R$ are positive, the impact of adding new within-group connections will be more intense conflict.

The effects on the other side — the interconnections between groups will have an opposite effect — similar to the opposing effects between Propositions 4 and 5.

**Proposition 8.** *If a new connection is made between groups, between player $k$ from group $i$ and some member of group $j$, player $k$ will decrease their commitment to the conflict.*

**Proof.** We proceed with the proof as in Proposition 7.

$$\frac{\partial c'(r_k^*)}{\partial \mathbb{G}_{kl,l\in j}} = -p_j\mu/R. \tag{14}$$

As in the previous proposition, $p_j$, $\mu$, and $R$ are all positive, and the impact of a new connection between groups will always be negative.

*Example* Consider a society with two symmetrical groups 1 and 2 of 50 players each. Each player has a cost function related to the personal investment into conflict given by $c(r) = r^2/2$. Both the groups have an Erdős-Rényi graph for their connections (Erdős and Rényi, 1959). They are randomly connected within their group at a rate 0.2, and 0.1 with the members of the other group. Each group provides a utility of 1 to its members after winning and 0.5 to the other group's members. The network good $\mu$ is worth 0.1.

In this situation, the expected value for a player $k$ belonging to group 1 would be:

$$E(v_k) = \frac{R_1}{R_1+R_2}(1+0.1\cdot 0.2\cdot 50) + \frac{R_2}{R_1+R_2}(0.5+0.1\cdot 0.1\cdot 50) - r^2/2. \tag{15}$$

It is worth noting that $c'(r) = r$ and the personal investment will be given by:

$$\begin{aligned} r &= \frac{R_2\cdot\left(u_{11}-u_{21}+\mu\left(\sum_{l\in i}\mathbb{G}_{kl}-\sum_{q\in j}\mathbb{G}_{kq}\right)\right)}{R^2} \\ &= \frac{R_2\cdot(1-0.5+0.1(0.2-0.1)50)}{(R_1+R_2)^2} = \frac{R_2}{(R_1+R_2)^2} \end{aligned}$$

for members of group 1, while for group 2, the numerator would include $R_1$ instead of $R_2$. In such a symmetric case, the investment from members of both groups would be equal. Therefore $p_1 = p_2 = 0.5$. We know that $1 + 0.1\cdot 0.2\cdot 50 > 1/2\cdot(1+0.1\cdot 0.2\cdot 50) + 1/2\cdot(0.5+0.1\cdot 0.1\cdot 50)$, therefore players would participate in the conflict.

If players from group 2 would increase their investment, as in Proposition 3, players of group 1 would not change their investment. One can notice, that by symmetry, in this case $\sum_{l=1}^m p_l\left(u_{li}+\mu\sum_{q\in l}\mathbb{G}_{kq}\right)$ exactly equals $\frac{U_i+u_{ji}+\mu\sum_{q\in j}\mathbb{G}_{kq}}{2}$, so this case sits on the knife-edge between the two regimes of the response to the increase of investment from the other group.

In the case when policy towards group 1 from itself becomes better after winning increases, e.g. $u_{11} = 1.2$, members of group 1 would invest more.

$$\begin{aligned} r_{k\in 1} &= \frac{1.2R_2}{(R_1+R_2)^2} \\ r_{l\in 2} &= \frac{R_1}{(R_1+R_2)^2}. \end{aligned}$$

## *Network*

With the understanding of the effect of changes to the network topology on the individual decisions, we can move to global findings and analyze the total intensity of a conflict, subject to changes in the network structure. We can rewrite the formula 3 so that it matches an average player within the group $i$.

$$c'(\bar{r_i}) = \frac{u_{ii} + \mu\gamma_i n_i - \sum_{j=1}^{m} p_j(u_{ji} + \mu\gamma_{ji}n_j)}{R}. \tag{16}$$

The notation in equation 16 above highlights the two factors of a group structure influencing the intensity of a conflict. Both the connections within and between groups and their sizes impact the aggregate outcomes of individual decisions. Our approach provides a framework that, by taking into account the additional variable of the network structure, reconciles various views from the literature.

**Proposition 9.** *Holding the average number of within-group connections per player constant, increasing the group size leads to a higher intensity of conflict from its members. Conversely, an increase in the size of group $j$ would decrease the intensity of conflict from members of group $i$.*

**Proof.** Proofs based on equation 16 follow the same logic as the previous ones, as the convexity of the function $c$ still holds. For the proof, we need to show that the derivative of equation 16 with respect to the size of group $i$, $n_i$, is positive and with respect to $n_j$, negative.

$$\frac{\partial c'(\bar{r_i})}{\partial n_i} = \frac{\mu\gamma_i(1 - p_i)}{R} \tag{17}$$

$$\frac{\partial c'(\bar{r_i})}{\partial n_j} = -\frac{p_j\mu\gamma_{ji}}{R} \tag{18}$$

$\mu$, $\gamma_i$, $R$, and $p_j$ are all positive, therefore increasing group $i$'s size increases conflict investments from members of that group, while the increase in other groups' size decreases it.

This finding agrees with Brückner, 2010 and Fearon and Laitin, 2003. Bigger groups will fight more often. However, it is based on the assumption that new members of the group maintain the same level of connectedness to a group and between groups.

**Proposition 10.** *Increasing within-group cohesion increases the investment in conflict of members of the group. Conversely, increasing inter-group cohesion decreases investment in the conflict.*

**Proof.** Following the same steps as in the previous propositions, we get:

$$\frac{\partial c'(\bar{r_i})}{\partial \gamma_i} = \frac{\mu n_i(1 - p_i)}{R}, \tag{19}$$

and
$$\frac{\partial c'(\bar{r}_i)}{\partial \gamma_{ji}} = -\frac{p_j \mu n_j}{R}. \tag{20}$$

Proposition 10 shows that increasing the inter-group cohesion strictly decreases the investment in conflict. As in Proposition 9 an increase in any group's size led to an increase in the group's investment in conflict and a decrease for others, its overall effect on the scale of the conflict depended on the other parameters. For cohesion, the global effects are definite. Increasing within-group cohesion would always lead to more intense conflict, while increasing inter-group cohesion would decrease this scale. This finding is in line with Esteban, 2018 and Esteban and Ray, 2011b.

What happens if the number of connections changes with the growth of the group? If we decide the intensity of connections $\gamma$ to be a function of the group size, $\gamma_i = g(n_i)$ and $\gamma_{ji} = h(n_j, n_i)$, we can analyze under what conditions the size of the group increases the intensity of the conflict.

**Observation 2.** *If the size of group $i$ influences both $\gamma_i$ and $\gamma_{ji}$, the derivative of equation 3 giving us the optimal personal investment looks as follows:*

$$\frac{\partial c'(\bar{r}_i)}{\partial n_i} = \mu \frac{(1-p_i)(g(n_i) + n_i g'(n_i)) - \sum_{j=1}^{m} p_j h'(n_j, n_i) n_j}{R}. \tag{21}$$

*The effect of the increase would be positive if*

$$(1-p_i)(g(n_i) + n_i g'(n_i)) - \sum_{j=1}^{m} p_j h'(n_j, n_i) n_j > 0. \tag{22}$$

Depending on the impact of the group size on $\gamma$, the results may differ from Proposition 9. If we have a negative $g'(n_i)$, meaning that as the size of a group rises, the density of a network or the group cohesion decreases at a rate higher than $g(n_i)/n_i$, and $h'(n_j, n_i)$ is negligible, we would observe a decrease in investments as a result of increasing the group size.

On the contrary, if $g'(n_i)$ is positive or if the changes in the group size do not impact its cohesion, but within-group connections crowd out inter-group ones — $h'(n_j, n_i) < 0$ — we would observe an increase in personal commitments to conflict from members of group $i$ as new players would join.

Finally, let's allow for changes in size not caused by exogenous shocks, but by players deciding to switch group allegiance.

**Observation 3.** *A player $k$ belonging to a group $i$ would only switch sides if their expected utility from being a member of group $j$ would be higher than $i$. From equation 5 we know that it would only occur if:*

$$u_{jj} + \mu \sum_{l \in j} \mathbb{G}_{kl} - \sum_{q=1}^{m} p_q \Delta_{jq} - c(r_{k_j}) > u_{ii} + \mu \sum_{l \in i} \mathbb{G}_{kl} - \sum_{q=1}^{m} p_q \Delta_{iq} - c(r_{k_i}). \tag{23}$$

The effect of Observation 3 above does not translate directly into the intensity of the conflict. If new players switch sides to a group, they would always increase their utility, but there is no implication about bringing more resources to the conflict. Even if they did invest more, by Observation 2, they may crowd out the investments from the initial members of the group.

*Example* Coming back to the example from the previous section, if we have two symmetrical groups and group 1's size increases to 60 players, while keeping the chance of connection within the group at 0.2 and 0.1 inter-group (with $g(n_i) = 0.2$ and $h(n_i, n_j) = 0.1$), players of that group would invest more in conflict, while members of the other group would invest less.

$$\begin{aligned} r_{k\in 1} &= \frac{R_2 \cdot (1 - 0.5 + 0.1(0.2 \cdot 60 - 0.1 \cdot 50))}{(R_1 + R_2)^2} = \frac{1.2R_2}{(R_1 + R_2)^2} \\ r_{l\in 2} &= \frac{R_1 \cdot (1 - 0.5 + 0.1(0.2 \cdot 50 - 0.1 \cdot 60))}{(R_1 + R_2)^2} = \frac{0.9R_1}{(R_1 + R_2)^2}. \end{aligned}$$

If we make the density of a network dependent on size, so that $g(n_i) = 10/n_i$ and $h(n_i, n_j) = (n_i + n_j)/1000$, the same change in the group size would have a different result. Now, members of both groups would decrease their investments.

$$\begin{aligned} r_{k\in 1} &= \frac{R_2 \cdot (1 - 0.5 + 0.1(10 - 0.11 \cdot 50))}{(R_1 + R_2)^2} = \frac{0.95R_2}{(R_1 + R_2)^2} \\ r_{l\in 2} &= \frac{R_1 \cdot (1 - 0.5 + 0.1(0.2 \cdot 50 - 0.11 \cdot 60))}{(R_1 + R_2)^2} = \frac{0.84R_1}{(R_1 + R_2)^2}. \end{aligned}$$

The new equilibrium aggregates $R_1$ and $R_2$ solve the system

$$\begin{aligned} R_1 R^2 &= 57R_2, \\ R_2 R^2 &= 42R_1, \end{aligned}$$

where $R = R_1 + R_2$. Dividing yields $R_1/R_2 = \sqrt{57/42} \approx 1.165$ and $R \approx 6.995$, compared to $R \approx 7.071$ in the original symmetric case. The total intensity of conflict is therefore about $1\%$ lower (as expressed by the total commitment to it).

## Welfare and policy implications

Knowing the equilibrium and the individual decisions of players, we want to analyze the aggregate welfare effects of the conflict. We take the utilitarian approach and focus on aggregate ex-ante expected utility across all players. Let's define:

$$W = \sum_{k=1}^{n} E(v_k) = \sum_{k=1}^{n} \left( \sum_{j=1}^{m} p_j \left( u_{ji} + \mu \sum_{l\in j} \mathbb{G}_{kl} \right) - c(r_k) \right). \tag{24}$$

Adopting the convention $\gamma_{jj} \equiv \gamma_j$ for the within-group case, this aggregates to:

$$W = \sum_{j=1}^{m} p_j \left( \sum_{i=1}^{m} n_i u_{ji} + \mu \sum_{i=1}^{m} n_i n_j \gamma_{ij} \right) - \sum_{k} c(r_k).$$

The social value when group $j$ wins is given by:

$$V_j \coloneqq \sum_{i=1}^{m} n_i u_{ji} + \mu \left( n_j^2 \gamma_j + n_j \sum_{i \neq j} n_i \gamma_{ij} \right). \tag{25}$$

Equation 25 gives us two clear elements of welfare. The first one is the public good from group $j$'s win — $\sum_{i=1}^{m} n_i u_{ji}$. The second is the activation of the group's network — $\mu \left( n_j^2 \gamma_j + n_j \sum_{i \neq j} n_i \gamma_{ij} \right)$.

This also gives us a cleaner equation for the total welfare:

$$W = \sum_{j=1}^{m} p_j V_j - \sum_{k=1}^{n} c(r_k^*). \tag{26}$$

From the social planner's standpoint, equation 26 gives us two areas to optimize. First, a probability-weighted average of social values across possible winners. And second, the total conflict cost. A utilitarian planner will try to maximize the first element, while ideally keeping the deadweight cost $\sum_{k=1}^{n} c(r_k^*)$ at 0.

The changes in the social cohesion will have three effects on the aggregate welfare.

$$\frac{\partial W}{\partial \gamma_i} = \sum_{j=1}^{m} \frac{\partial p_j}{\partial \gamma_i} V_j + \sum_{j=1}^{m} p_j \frac{\partial V_j}{\partial \gamma_i} - \sum_{k=1}^{n} \frac{\partial c(r_k^*)}{\partial \gamma_i}. \tag{27}$$

First, there will be an equilibrium-shift effect given by $\sum_{j=1}^{m} \frac{\partial p_j}{\partial \gamma_i} V_j$. Then a direct value effect of $\sum_{j=1}^{m} p_j \frac{\partial V_j}{\partial \gamma_i}$. And finally the cost effect — $\sum_{k=1}^{n} \frac{\partial c(r_k^*)}{\partial \gamma_i}$.

**Proposition 11.** *While increasing within-group cohesion of group $i$, $\gamma_i$, the cost effect contributes negatively to welfare. The direct value effect on welfare is positive. The equilibrium shift effect is ambiguous.*

**Proof.** From Proposition 10 we know that members of group $i$ would increase their $r_k$ as an effect of increasing $\gamma_i$. That causes the total cost of conflict to grow. At the same time $V_i$ grows.

$$\frac{\partial V_i}{\partial \gamma_i} = \mu n_i^2. \tag{28}$$

It is always positive. On top of that, as personal investments of members of that group increase, their $p_i$ increases.

In the situation described in Proposition 11, the total value of a probability-weighted average of social values across possible winners increases if $V_i > \sum_{j=1}^{m} p_j V_j$. The aggregate welfare effect is still ambiguous as costs also increase.

**Proposition 12.** *Increasing the between-group cohesion of groups $i$ and $j$, $\gamma_{ij}$, has a positive welfare cost effect and positive direct value effect. The equilibrium shift effect is ambiguous.*

**Proof.** From Proposition 10 we know that members of groups $i$ and $j$ would decrease their $r_k$ as an effect of increasing $\gamma_{ij}$. The value of a win of any of those groups increases as:

$$\frac{\partial V_i}{\partial \gamma_{ij}} = \frac{\partial V_j}{\partial \gamma_{ij}} = \mu n_i n_j. \tag{29}$$

However, as the investments of members of both groups decrease, the total intensity of the conflict $R$ decreases. The relative win probabilities depend on the symmetry of the change.

Again, the effect of increasing cohesion between two groups out of many is ambiguous. However, if all inter-group cohesion parameters $\gamma_{ij}$ rise by the same amount, both $\sum_{j=1}^{m} p_j V_j$ rises and total conflict costs fall, so aggregate welfare strictly increases.

## Conclusions and further research

In this paper, we build a model of individual decisions to participate in civil conflict and embed it in an explicit social network. Starting from the framework of Esteban, 2018, where homogeneous groups fight for public budgets, we generalize their setup to allow for any number of players and groups, and we replace monolithic groups with a graph of social ties. This allows us to define within- and inter-group cohesion as densities of the underlying network and to study how each player's individual choice depends on the structure of their connections, not only on the size of their group.

Our equilibrium analysis shows that, under strict convexity of the cost function, the game has a unique Nash equilibrium given by a closed expression on $c'(r_k^*)$. Even without a closed form for $r_k^*$ itself, this representation lets us read off how each parameter shifts individual investment into the conflict. We find that within their own group, players free-ride: as their group commits more resources, each member reduces their own contribution. The response to other groups is more nuanced. Depending on whether the expected payoff across all possible winners is above or below the average of own-group and group $j$ utilities, players either escalate or de-escalate in response to group $j$'s commitment, and there is also a region where the player does not participate at all. We also find that the marginal effect of own-group parameters on personal commitment is attenuated by a factor of $(1 - p_i)$. The more dominant a group is in the contest, the less responsive its members are to changes in their own utility from winning, and as $p_i$ approaches one, the response vanishes. This gives a contest-theoretic foundation for the apparent passivity of secure majorities.

Once we move from individual to network-level comparative statics, the role of cohesion becomes definite. Increasing within-group cohesion always raises members' commitments to conflict, while increasing inter-group cohesion always lowers them. This is in line with Esteban, 2018 and Esteban and Ray, 2011b. The effect of group size, on the other hand, is mediated by the network. Keeping the cohesion fixed, a larger group fights more, in agreement with Brückner, 2010 and Fearon and Laitin, 2003. However, when cohesion itself is allowed to depend on group size, the sign of the size effect can flip. If density falls fast enough as a group grows, or if new members predominantly form ties outside the group, larger groups can fight less, not more. Our framework therefore reconciles two strands of the empirical literature by making the network mechanism through which group size affects conflict explicit. We also note that when players are allowed to switch group allegiance, switching is driven by differences in expected utility rather than by the marginal incentive to fight, so a wave of defections to a stronger group does not, by itself, imply more intense conflict from that group.

The welfare analysis shows that the network plays a dual role in shaping aggregate outcomes. Beyond determining how hard each player fights, the network also determines the social value of each potential winner: a denser group, or a group more tightly connected to outsiders, generates a larger network payoff when it wins. We decompose the marginal welfare effect of any cohesion parameter into three channels: an equilibrium-shift effect that reallocates probability mass across possible winners, a direct value effect that changes the social value of each outcome, and a cost effect that captures rent dissipation in the contest. Within-group cohesion has a negative cost channel and a positive direct-value channel; the equilibrium shift is positive exactly when the favored group is socially above-average, $V_i > \sum_j p_j V_j$. Inter-group cohesion has a positive cost channel and a positive direct-value channel, with an ambiguous shift. A clean policy result emerges from the symmetric case: when inter-group cohesion rises uniformly across groups of equal size, all three channels move in the same direction and aggregate welfare strictly increases. This formalizes, within our framework, the longstanding intuition that bridging ties pacify society.

The contribution of this paper is twofold. On the conflict side, we extend the existing class- and ethnic-conflict literature by moving from representative-agent groups to individual-level decisions taken on a network, by deriving comparative statics that recover known empirical regularities while pointing to the network as the mediating channel, and by characterizing the welfare effects of cohesion through three distinct channels. On the network-games side, we provide a new application of contests on graphs, with explicit measures of within- and between-group cohesion that map onto sociological notions of bonding and bridging social capital. The main policy implication is that more diverse societies, where ties between groups are dense, tend to be less politically unstable, in line with (Putnam, 2007). Investments that build bridging ties between groups should therefore have a stronger pacifying effect than those that strengthen a single group's internal cohesion — not only because they reduce conflict effort, but also because they raise the social value of every potential outcome.

The framework we propose admits several extensions. The most immediate is to allow several axes of social cleavage — for example, ethnicity and class — to operate simultaneously, so that an individual's network position interacts across multiple group memberships. The second is to let the network itself be endogenous through dynamic link formation, in which case the coexistence of an equilibrium social structure and an equilibrium conflict intensity becomes a genuine question. A third would be to study the constrained-efficient policy problem explicitly: if a planner can subsidize the formation of bridging ties at some cost, what is the optimal targeting rule across pairs of groups? Finally, the comparative statics we derive are sharp enough to suggest a structural empirical agenda: with data on the network of social ties in conflict-prone societies, the predictions on cohesion, group size, switching, and welfare are testable, and the parameters of the model could in principle be estimated from observed patterns of unrest.

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