

VIOLENT GROUPS AND POLICE TACTICS:  
SHOULD TEAR GAS MAKE CRIME PREVENTERS  
CRY?

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# VIOLENT GROUPS AND POLICE TACTICS: SHOULD TEAR GAS MAKE CRIME PREVENTERS CRY?

## Abstract

Democratic societies are challenged by various violent and organized groups, be they terrorists, gangs or organized hooligans. In exchange for offering an identity, leaders in such groups typically require members to be violent. We introduce a simple model to capture these stylized facts, and then study the effects of policing. We find that an increase in the marginal cost of violence always reduces violence, while increasing the indiscriminate fixed cost may backfire and result in smaller and more violent groups.

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## 1 Introduction

Violent terrorist groups, youth gangs and organized hooligan groups pose a challenge to democratic societies. Terrorist groups generally aim to achieve a revolution, like the paramilitary organization of the German Nazi party before Adolf Hitler's rise to power, or RAF and the Red Brigades who aimed to overthrow the Capitalist society. Youth gangs combat competing youth gangs in pursuit of territory, potentially for drug-trading activities. For some supporter clubs associated primarily with football, the aim is to fight other supporter clubs. While these groups differ in their motivations and in who they target, they share three important features. First of all, they have leaders who want to achieve certain goals. Second, in all three types of organizations, leaders need violence from members to achieve their aims. Third, membership consists mostly of relatively young males, who may accept to be violent in order to establish a sense of identity by belonging to such groups.

To combat organized violent groups, it is important to understand how policing affects their internal structure. In this paper we study how different types of sanctions against those engaging in violence affect membership in violent groups, and aggregate violence. Policing can either be highly dependent on violence committed, or less targeted. Less targeted measures hit members of targeted groups at equal force independently of how violent they are. Good examples of this are the use of teargas or water canons, or jailing potentially violent individuals over night indiscriminately, or Israel closing borders for all Palestinians following a terrorist attack. We show that the latter type of policing may in fact increase, rather than reduce, violence. To the best of our knowledge, this topic has received little attention in the economics literature.<sup>1</sup>

Even though our analysis can be applied also to terrorist organizations and youth gangs, we present our model below focusing on supporter clubs of football hooligans because we have well-documented evidence in this field.<sup>2</sup> The supporter clubs we

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<sup>1</sup>Earlier work includes Levitt (2004) who argues that the magnitude of policing, rather than the type, affects violence, and Frey (2004) who argues that anti-terrorist deterrence policies may backfire.

<sup>2</sup>The fact that leaders view violence as a consumption good in supporter clubs and as an instrument for other means in terrorist groups and drug-selling gangs is consistent with our model. For example, in terrorist organizations we could view the privately more costly form of violence as willingness to engage in suicide bombing, and personally less costly level of violence as a willingness

study have at least four common features. First, many individuals join supporter clubs to benefit from identity and the social network offered in these clubs, rather than to fight, but they may have to be violent to join (see e.g. the work by the psychologists Marsh 1978, Marsh and Harré 1978 and sociologists Dunning et al. 2002).<sup>3</sup> Second, there are members and leaders in the clubs. Third, the leaders tend to be more violent than the members. Kerr (1994 p. 90) writes “In almost every book or extensive piece that has been written about soccer hooliganism, considerable attention is given to the ringleaders of soccer hooligan violence”.<sup>4</sup> Fourth, the clubs are well-organized and the leaders are good at planning and organizing hooligan episodes (Kerr 1994).<sup>5</sup>

To reflect the empirical evidence of the club structure and the importance of identity, respect, protection and network benefits we set up a model where the leaders require members to fight in order to stay in the club. Members differ in their valuation of various membership benefits, which is their private knowledge. From now on, we label these benefits for the sake of simplicity as identity. The fact that leaders are powerful is reflected in that they can require younger members to fight and exclude them if they do not. Exiting the club is costly because the identity will be lost. However, members who value identity more can always mimic those with lower valuation. As a consequence, leaders face a trade-off. They can go for a small group with a high level of violence per member, or a larger group with less violence per member.

Variable costs of violence reduce in equal proportions the level of violence that leaders can extract from all members. As a result, they increase the price of violence to participate in nightly raids or become a sniper. Similarly, only some members of the drug-selling gang may be willing to kill, while others could still be useful for leaders by selling drugs or beating at command.

<sup>3</sup>Dunning et al (2002, p. 21) writes “In these gangs, ability and willingness to use violence and to fight tend to become criteria for membership of and prestige within the group - for the status of these males in their own and each others’ eyes as ‘men’.”

<sup>4</sup>Marsh (1978), for example, categorized hooligans into several different groups, including “aggro leaders” and “fighters”. Robins (1984, p. 58) gives a painting quote by a sixteen-year old member of a fighting crew discussing a leader. “He’s the top man of all the crews, I reckon. He’s the best fighter. He’s mad, goes around with a shooter or a cut-throat. Any time there’s a fight he has to steam in first. He used to have to fight with the top man of the other End.”

<sup>5</sup>To quote the head of the British National Football Intelligence Unit, “I think there is organization and ringleaders. Spontaneous hooliganism occurs a lot less than planned hooliganism” (Kerr 1994, p. 94).

in terms of membership. This relative price effect encourages leaders to reduce the level of violence they require in order to expand membership. Increasing the fixed costs of violence aggravates the mimicking effect, as it reduces relatively more the amount of violence that can be required from the type valuing identity less. Even if the leaders before the change in policy opted for a low level of violence to keep all members in the club, they may now turn focus to a high level of violence without the members willing to fight less. Therefore, a harsher governmental policy may finally increase violence.

Previous literature on law and economics, like seminal contributions by Becker (1968) and Becker and Landes (1974), has concluded that increasing the costs of crime tends to reduce crime. We find that this need not be the case with violent groups. The key explanation for this marked difference is that membership in violent groups is endogenous. Increasing fixed costs of violence causes a relatively larger drop in the amount of violence that leaders can require from members valuing membership less. It may then be optimal for leaders to forgo benefits from their membership, and move to a smaller and more violent group.

Our findings do not imply that using fixed cost of violence would always be suboptimal. As long as membership does not change, increasing either fixed cost or variable cost both push towards less violence. A utilitarian government may want to use fixed costs as part of the crime-fighting package, for example if these are cheaper to implement. However, our findings suggest a need to study supporter clubs carefully especially before implementing increases in fixed costs of violence, due to the potential backlash.

Our paper is related to several strands of economic literature. Violent supporter clubs remind of criminal gangs in that they are violent, that they serve as a platform for social interaction, and because society may aim to abolish them, or at least to reduce their activity. In contrast to criminal organizations in the economics literature on organized crime (see e.g. Shelling 1984, Konrad and Skaperdas 1997 and Levitt and Venkatesh 2000), we do not focus on illegal economic activity but rather on identity and violence.

Akerlof and Kranton (2000) introduce identity to economic modeling and study how it affects economic outcomes. We analyze how it affects violence and the society's possibilities to reduce violence. Glaeser (2005) examines a model of the supply of hate-creating stories by politicians, and the willingness of voters to believe in such stories.

The two approaches are complementary: redistribution that Glaeser highlights as a motive for group-level hatred is in most cases absent between the supporter clubs, or youth gangs, that we study. However, in civil wars the two mechanisms may interact. Glaeser (2005) suggests how group-level hatred arises, in Europe most recently in the civil wars of ex-Yugoslavia. Our model of prestige and identity helps to identify why individual citizens may become part of groups committing atrocities: even in absence of material gains, they view this as a means of gaining identity as promised by their ruthless leaders.

Even though violence associated with supporter clubs has not received any attention in the economics literature, there is a vast literature in other social sciences such as sociology, psychology and ethnography (see e.g. Dunning et al. 1984, Dunning et al. 2002, and Kerr 1994). Interestingly, sociologists and psychologists have for long been arguing also that more policing might lead to more violence in supporter clubs (see e.g. Cohen 1971, Taylor 1971, Buford 1991 and Kerr 1994). While they have focused on how police officers stimulate hooligans to fight more, we identify that the reason is due to group dynamics arising from optimizing leaders.

## **2 Empirical Evidence on Supporter Clubs**

From chariot races in the Roman Empire to contemporary football, team sports have been plagued by violent supporter clubs. Already in 532, in Constantinople, team support at the “Hippodrome” escalated from insults to mob riots, which finally lay the town in ruins. Much later, in 1314, football was banned in London for the fear of tumult and disorder surrounding the games (Armstrong 1998). Another, more recent example, is from 1909 when 54 police constables were injured when 6000 spectators were involved in a riot in Glasgow (Carnibella et al. 1996).

Throughout the last century supporter violence was a large problem, yet it escalated during the 1980s. Most notoriously, the violence initiated by English football hooligans in Heysel stadium in Belgium in 1985 resulted in chaos and death of 39 persons. Even though there was a downward trend during the 1990s, many societies are still plagued by organized supporter violence (Carnibella et al. 1996). For example, Argentina is currently experiencing extreme levels of supporter violence where stabbings and shootings are prevalent (Dunning et al. 2002).

There is plenty of evidence showing that search for identity is an important motivation to join supporter clubs. Marsh spent three years with English football sup-

porters in the end of the 1970s and found that being a football hooligan enabled young males to achieve a sense of identity through recognition of their peers. The supporter clubs filled the function of providing an alternative career for these individuals with little prospects of success in school or work (see Marsh 1978 and Marsh and Harré 1978). Members are also willing to invest a lot in building their identity. The following quote is from a recent book written by a leading individual in one of Sweden's most notorious supporter clubs, earlier called Black Army. "*Black Army was surrounded by myth and being part of it implied a necessity for others to pay attention and watch out for you. That was how we considered ourselves, that was how media framed it, and that was how the public saw it. It was the perfect ground for a little bastard who longed for respect and considered violence to be a condition to get it*" (Höglund, 2005, p. 35; own translation). Furthermore, supporter clubs have established their own dress code, relying on expensive high-end brands like "Burberry" and "Stone Island".<sup>6</sup>

To reduce hooligan violence, governments have traditionally used intense policing. In the 1970s and 1980s harsh, often indiscriminate, policing was common. Large police forces were typically surrounding the supporter groups outside the stadiums. While in Italy the police still tends to use harsh and indiscriminate policing, sometimes being armed with for example water canons and automatic weapons, the English police has changed strategy in favor of more discriminative policing (Carnibella et al. 1996). This includes both the use of technical devices such as surveillance cameras, and of special trained intelligence personnel, for example the so called spotters who have the responsibility of identifying and monitoring hooligans (see e.g. Carnibella et al. 1996, [www.Footballnetwork.org](http://www.Footballnetwork.org), Preventing Football Hooliganism).

Other countries have followed England towards more discriminative policing. In Denmark, the police changed strategy in the mid-1990s in favor of less armed police

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<sup>6</sup>We note that there is evidence that also members of gangs have a strong preference for a social identity. Levitt and Venkatesh (2000) show that low-level gang members who sell drugs often get an extremely low income from it. This, they argue, shows that members have other incentives to belong. "Certainly, economics considerations play an important role in the decisions of members and the activities of the gang. However, we find that social/nonpecuniary factors are likely to play an important role as well" (Levitt and Venkatesh, 2000, p. 758). In addition, Padilla (1992) studies in detail a Chicago gang in which members must endure three types of violence. They first get a beating when entering, then when breaking internal rules, and finally when exiting the gang. Padilla suggests that the reason for accepting this harsh treatment and being a gang member, apart from the potential economics benefits, which were often small, was to get a social identity and respect.

using special police cars to come close to the violent hooligans in order to be able to specifically target them. The Swedish police is currently adopting a similar system (Dagens Nyheter, April 12, 2005). Such policy change finds support from several psychologists and sociologists who have concluded that indiscriminate policing can increase violence. Psychologists Stott and Adang advised the Dutch police in their preparations for the European Soccer Championship in 2004. Stott states “Indiscriminate, heavy-handed policing can create rather than reduce conflict”. According to Adang “Police interventions must occur before events get out of hand but must be targeted only at those fans who are actually misbehaving” (Adang and Stott, 2004).

### 3 Supporter Clubs

#### 3.1 Game Structure

A supporter club consists of leaders and members. Leaders derive utility from fighting by members and the total number of members. Members derive utility from belonging to a supporter club, while they dislike fighting. The latter assumption is without loss of generality: our results could be generalized to a case in which some members like fighting, as long as there are also at least two types of members who do not. Members differ in the utility they derive from membership. There are two types of members, 1 and 2. We denote variables referring to type  $j$ ,  $j \in \{1, 2\}$  by subscript  $j$ .<sup>7</sup> The number of potential members of type  $j$  is  $n_j$ , and the number of members of type  $j$  who stay and are not expelled is  $m_j$ , giving as total membership  $m = m_1 + m_2$ . The number of leaders is normalized to unity. Leaders differ in their valuation of violence.

At the first stage, leaders declare a minimum level of violence  $\hat{v}$  required from members. At the second stage, members decide how much to fight. After observing the level of fighting by individual members, leaders decide whether to keep them or expel them.

Leaders cannot distinguish an individual member’s private valuation of identity. This is a reasonable assumption, as members who value identity highly have an incentive to lie about their type. Leaders therefore must ask for one level of violence only.

Violence of amount  $v$  generates cost  $\lambda v + \gamma$  for those committing it.  $\lambda$  is a marginal cost parameter capturing injuries caused by hooligans or the police, being jailed overnight or added into a criminal register, carefully meted out judicial punishments

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<sup>7</sup>Our results would generalize into more than 2 discrete groups.



and psychological costs from violence.  $\gamma$  is an additional fixed cost arising from police activity and criminal sanctions for those who belong to supporter clubs and commit violence. It reflects the possibility that any supporter engaging in violence, independently of the level of violence committed, has a probability of incurring the costs mentioned above. For example, using tear gas to disperse a violent crowd hurts those targeted, independently of how much violence they have committed. Formally, cost  $\gamma$  is levied on those whose  $v > 0$ . We therefore introduce an indicator variable  $D$ , so that  $D = 0$  if  $v = 0$  and  $D = 1$  if  $v > 0$ . All our results would remain the same in case  $\lambda$  and  $\gamma$  would be expected costs from committing violence, and members would be risk-neutral.

Members of type  $j$  receive benefits  $\alpha_j$  from identity, so that  $\alpha_2 > \alpha_1$ . Total utility for a member of type  $j$  who chooses a level of violence  $v_j$  and is not expelled is

$$u_j = \alpha_j - \lambda v_j - \gamma D, \quad (1)$$

while the utility of the expelled members is zero.

Aggregate level of violence is

$$V = m_1 v_1 + m_2 v_2. \quad (2)$$

Leaders differ in their relative valuation of violence. Leaders of type  $i$  receive utility

$$u_l = \pi m + \beta_i V. \quad (3)$$

By  $\pi > 0, \beta_i > 0$ , leaders receive a positive utility from the aggregate level of violence by their club, and from the number of members who stay. One reason why leaders have a reason to care about the number of members, even if members do not, is that leaders are evaluated according to how many followers they have. We call the utility that leaders derive from the number of followers prestige. For the same reason, leaders care also about the aggregate level of violence. The assumption that leaders differ only in their valuation of violence is without loss of generality, and suffices to account for different levels of violence and membership in different supporter clubs.

Leaders may expel those who fight less than they require, in which case the expelled lose identity and receive payoff of zero. Leaders announce a minimum level of violence required,  $\hat{v}$ , and then expel the members who do not fulfill it. Expulsion following defection is necessary to maintain credibility. Violence is supplied and identity is received as a flow. For both types of members, the participation constraint

is that the expected utility from membership must be non-negative, implying that requirement

$$\hat{v} \leq \frac{\alpha_j - \gamma}{\lambda}$$

needs to be satisfied for type  $j$  to stay.

### 3.2 Equilibria

Leaders face two alternative strategies. One is to choose such level of violence that both types 1 and 2 stay, and another to choose such a level that only type 2 stays. In the first case, leaders choose  $\hat{v} = (\alpha_1 - \gamma)/\lambda \equiv \underline{v}$ , and in the latter,  $\hat{v} = (\alpha_2 - \gamma)/\lambda \equiv \bar{v}$ . It is never optimal to choose any other level of  $\hat{v}$ . To see this, note that if  $\hat{v} < (\alpha_1 - \gamma)/\lambda$ , or  $(\alpha_1 - \gamma)/\lambda < \hat{v} < (\alpha_2 - \gamma)/\lambda$ , then leaders can increase the required violence without causing members to leave. If  $\hat{v} > (\alpha_2 - \gamma)/\lambda$ , then all members would leave, resulting in zero utility for leader. With  $\hat{v} = \underline{v}$ , the utility of leaders of type  $i$  is

$$u_i = \pi(n_1 + n_2) + \beta_i(n_1 + n_2)\underline{v}. \quad (4)$$

With  $\hat{v} = \bar{v}$ , the utility of leaders of type  $i$  is

$$u_i = \pi n_2 + \beta_i n_2 \bar{v}. \quad (5)$$

The optimal strategies by the leaders are given by

**Proposition 1** *Leaders of type  $i$  prefer to choose the required level of violence  $\hat{v} = \bar{v}$  if and only if*

$$n_1 \pi < \frac{\beta_i}{\lambda} [n_2 (\alpha_2 - \alpha_1) - n_1 (\alpha_1 - \gamma)]. \quad (6)$$

*Otherwise, leaders choose the minimum level of violence  $\hat{v} = \underline{v}$ .*

**Proof.** Follows by inserting  $\underline{v} = \frac{(\alpha_1 - \gamma)}{\lambda}$  into (4) and  $\bar{v} = \frac{(\alpha_2 - \gamma)}{\lambda}$  into (5) and then simplifying the condition that  $u_i$  given by (4) is higher. ■

According to Proposition 1, leaders choose the level of violence that just keeps members of type 2 and leads to an exit by members of type 1 if this increases aggregate violence, and if the leaders value this increase more than the utility they would derive from type 1 members if they would stay. If  $n_2 (\alpha_2 - \alpha_1) - n_1 (\alpha_1 - \gamma) < 0$ , then leaders always choose  $\hat{v} = \underline{v}$ , independently of their valuation of violence. In other words, choosing  $\hat{v} = \bar{v}$  would be a dominated strategy if the difference  $\alpha_2 - \alpha_1$  is sufficiently small, or if  $n_2$  is very small. This is intuitive: Type 2 members must be willing to

engage in a considerably higher level of violence than type 1 members for leaders to be willing to forgo prestige and violence they can extract from type 1 members, in exchange to force type 2 members to move from  $\hat{v} = \underline{v}$  to  $\hat{v} = \bar{v}$ .

The leaders' choice between a smaller and more violent group with  $\bar{v} = \frac{(\alpha_2 - \gamma)}{\lambda}$  and a wider and less violent group with  $\underline{v} = \frac{(\alpha_1 - \gamma)}{\lambda}$  depends on their relative valuation between the number of members and violence committed by them. (6) allows to solve a condition for a group with leaders of type  $i$  to remain more inclusive and less violent. If and only if  $\frac{n_2}{n_1} (\alpha_2 - \alpha_1) - (\alpha_1 - \gamma) > 0$  and

$$\beta_i \geq \tilde{\beta}_i = \frac{\pi \lambda}{\frac{n_2}{n_1} (\alpha_2 - \alpha_1) - (\alpha_1 - \gamma)}, \quad (7)$$

then leaders select a smaller and more violent group.

We can now prove the following proposition.

**Proposition 2** *The threshold valuation of violence  $\tilde{\beta}$  above which leaders choose smaller and more violent groups is increasing in  $n_1$ ,  $\alpha_1$ ,  $\pi$  and  $\lambda$  and decreasing in  $n_2$ ,  $\alpha_2$ , and  $\gamma$ .*

**Proof.** Follows by differentiating (7). ■

Proposition 2 reports a surprising finding: Increasing the fixed cost of violence may encourage leaders to switch to smaller and more violent groups, while increasing the variable cost of violence has an opposite effect.

In other words, as type 2 members can mimic type 1 members, increasing the fixed cost of violence renders keeping type 1 members relatively more expensive, in terms of forgone violence. Increasing the variable cost of violence, on the other hand, reduces violence that leaders can command from the two types by the same proportion. It increases the price of violence relative to membership, thus encouraging some leaders to shift to less violent and larger groups.<sup>8</sup>

## 4 Policy Implications

We will now study policy implications that follow from this analysis. We first study how policing affects violence and then how it affects welfare.

### 4.1 Policing and Violence

Law and order, in the form of police activity to capture perpetrators of violence and justice system to punish them, increase the cost of violence for all members,

<sup>8</sup>This is true whenever the leaders do not always select  $\underline{v}$ .

independently of their valuation of identity. If the membership base stays unchanged, then this lowers violence. This result is in line with Becker (1968) and Becker and Landes (1974). In an equilibrium with both type 1 and type 2 members staying, the participation constraint of type 1 members is binding. Correspondingly, the participation constraint of type 2 members is binding in case only they stay. When membership base does not change, violence declines smoothly in both fixed and variable costs of violence.

However, these straightforward comparative statics are only part of the potential effects. A change in policing might encourage leaders to change from one equilibrium membership base to another, as the fixed cost of violence enters the conditions in Proposition 1. When accounting for the endogenous membership, the effects of punishment on the level of violence may become non-monotonic, and a marginal increase in the fixed cost of violence may result in a discrete *upward* jump in the aggregate violence.

In particular, to study which equilibrium is more violent, we note that total violence is given by

$$V^{n_1+n_2} = (n_1 + n_2) \frac{(\alpha_1 - \gamma)}{\lambda} \quad (8)$$

if a large group is selected and

$$V^{n_2} = n_2 \frac{(\alpha_2 - \gamma)}{\lambda} \quad (9)$$

if a small group is selected.

Hence, if

$$\frac{n_1}{n_2} > \frac{(\alpha_2 - \alpha_1)}{(\alpha_1 - \gamma)},$$

then the larger group is more violent.

We summarize our findings as three propositions:

**Proposition 3** *An increase in the variable cost of violence  $\lambda$  or in the fixed cost of violence  $\gamma$  results in a decrease in the aggregate violence, provided that membership does not change.*

**Proof.** Follows by differentiating (8) and (9) with respect to  $\lambda$  and  $\gamma$ . ■

**Proposition 4** *A marginal increase in the variable cost of violence  $\lambda$  may result in a downward jump in aggregate violence, associated with an increase in membership.*

**Proof.** Proposition 1 gives us a condition for the leaders to choose a smaller and more violent group. Note that a necessary condition for small groups not being a dominated strategy is  $\frac{n_2}{n_1}(\alpha_2 - \alpha_1) - (\alpha_1 - \gamma) > 0$ . Assume next that this is the case, as otherwise there cannot be any jump. By (6),  $\partial\tilde{\beta}_i/\partial\lambda > 0$ . This implies that an increase in  $\lambda$  causes leaders with some values of  $\beta$  to switch to larger and less violent groups. ■

**Proposition 5** *A marginal increase in the fixed cost of violence  $\gamma$  may result in an upward jump in aggregate violence, associated with a decrease in membership.*

**Proof.** As in Proposition 4, a necessary condition for small groups not being a dominated strategy is  $\frac{n_2}{n_1}(\alpha_2 - \alpha_1) - (\alpha_1 - \gamma) > 0$ . Assume next that this is the case, as otherwise there cannot be any jump. By (6),  $\partial\tilde{\beta}_i/\partial\gamma < 0$ . This implies that an increase in  $\gamma$  causes leaders with some values of  $\beta$  to switch to smaller and more violent groups. ■

Propositions 3 to 5 have empirically testable implications. Proposition 3 implies that if increased policing is not associated with change in the size of supporter clubs, then total violence should decrease. Proposition 4 implies that if a small increase in the variable cost of violence, either in the form of policing or tougher sentences, would lead into a large drop in aggregate violence, then this should be accompanied by an increased size of violent supporter clubs. Conversely, proposition 5 suggests that should a small increase in the fixed cost of violence lead into an increase in aggregate violence, then this should be accompanied by a decreased size of violent supporter clubs.

## 4.2 Optimal Policing

Importantly, Propositions 4 and 5 imply that the welfare effects of policing and sentencing can be non-monotonic. To evaluate socially optimal policing, assume that the social welfare function is utilitarian. Assume that the marginal external cost of violence is  $\kappa$ ,  $\kappa > 0$ , and assume that the cost of implementing the fixed cost  $\gamma$  of violence is  $C(\gamma)$ , so that  $C(0) = 0$ , and  $C(\gamma + \delta) > C(\gamma) \forall \gamma \geq 0, \delta > 0$ . Assume also that the cost of implementing the variable cost  $\lambda$  of violence is  $D(\lambda)$ , so that  $D(0) = 0$ , and  $D(\lambda + \delta) > D(\lambda) \forall \lambda \geq 0, \delta > 0$ . These assumptions imply that the marginal cost of increasing either fixed or variable punishment for violence is strictly positive. The cost functions need not be continuous, allowing some threshold levels, for example it could be that implementing any punishment for violence results already

in some fixed implementation cost. Social welfare function can now be written as

$$SWF = n_1u_1 + n_2u_2 + u_l - \kappa V - C(\gamma) - D(\lambda). \quad (10)$$

The first term gives the utility of type 1 potential members. The second term is the utility of type 2 members, and the third term is the utility of leaders. The fourth term is the external social cost of violence, while the fifth and the sixth terms are the costs of punishing for violence. The socially optimal punishment strategy is such a pair of  $\gamma$  and  $\lambda$  which maximizes (10). While it is not possible to give explicit solutions for this without specifying functional forms of the costs, our analysis allows identifying a possibility for Pareto improvements, even without establishing any additional assumptions:

**Proposition 6** *A marginal decrease in the fixed cost of violence results in a Pareto-improvement, provided that it results in larger supporter clubs.*

**Proof.** By Proposition 5, reducing  $\gamma$  reduces  $V$  if it results in larger supporter clubs. Note that  $u_1 = 0$  with both large and small supporter clubs, and thus the utility of type 1 potential members does not change. With large supporter clubs,  $u_2 > 0$  while with small clubs,  $u_2 = 0$ . Therefore, a marginal decrease in  $\gamma$  would improve the welfare of type 2 members, provided that it results in larger supporter clubs. Also  $u_l$  is increased, which follows from revealed preferences: After the reduction in the fixed cost of violence, leaders could still have kept the same group size, and increased the required level of violence. If they, instead, preferred to switch to a larger and less violent club, then this must have further increased their utility. When aggregate violence is reduced, so are the external costs. Finally, reducing the fixed cost of violence also reduces the cost of law and order to implement it. ■

An increase in the fixed or variable cost of violence can never generate a Pareto-improvement. This is because it unambiguously reduces the utility of leaders. However, punishments for violence can still be justified from utilitarian perspective, provided that the costs of punishment are not prohibitively high, and that the external social cost of violence, measured by  $\kappa$ , is sufficiently high.

Our welfare results suggest the paramount importance of understanding the group dynamics of violent supporter clubs, before deciding on policy interventions. A well-meaning intervention may, at worst, be counterproductive. This is especially the case when increasing the fixed cost of violence as this may backfire.

## 5 Conclusion

In this paper, we study how different sanctions against violence can be expected to affect membership in violent groups, as well as total violence committed. We compare targeted measures that increase variable costs of violence, and cruder measures which levy a fixed cost on violence, like teargas or punishing any participation in a fight. We analyze the effects of the costs of violence when violent groups are highly hierarchical, with leaders deciding how much violence they require from members in order to allow them to stay. We take as our starting point that members differ in their valuation of membership.

First of all, we find that increasing either fixed or variable cost of violence reduces total violence committed, as long as it does not change total membership in supporter clubs. We find an intriguing asymmetry in how aggregate violence reacts to sanctions when membership changes. A small increase in the variable cost of violence may encourage violent leaders to move away from small and highly violent group to a larger and less violent one. Leaders would then reduce the level of violence required sufficiently to attract also those potential members who previously stayed outside due to the high cost of fighting. A small increase in the fixed cost of violence, on the other hand, may trigger a counterproductive response, encouraging leaders to move from a larger and less violent group towards a smaller and more violent one. Then aggregate violence would increase.

Our results have policy implications in combating terrorist groups, extremist groups not yet engaging in terrorism, violent street gangs, and hooligan groups plaguing especially football. When addressing the challenge posed by such groups, societies should carefully analyze the dynamics in order to avoid well-meaning but counterproductive policy responses.

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