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**ABSTRACT**

We investigate how criminal organizations strategically use violence to influence elections in order to get captured politicians elected. The model offers novel testable implications about the use of pre-electoral violence under different types of electoral systems and different degrees of electoral competition. We test these implications by exploiting data on homicide rates in Italy since 1887, comparing the extent of ‘electoral-violence cycles’ between areas with a higher and lower presence of organized crime, under democratic and non-democratic regimes, proportional and majoritarian elections, and between contested and non-contested districts. We provide additional evidence on the influence of organized crime on politics using parliamentary speeches of politicians elected in Sicily during the period 1945-2013.

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# 1 Introduction

In many countries, even rich ones, criminal organizations play a political role. Incentivised by the profit opportunities available from the allocation of public works and procurement contracts, they instruct captured politicians to distort the allocation of public funds for their own benefit.<sup>1</sup> Politicians may also use their influence to weaken enforcement against criminal organizations.<sup>2</sup> In order to be able to do so, mafia-type criminal groups across the world use various tools, including terror and violence, to get their favoured politicians elected.<sup>3</sup>

In this paper we develop a model in which criminal organizations use pre-electoral violence in order to influence electoral results and help friendly ('captured') candidates to get elected. Violence can provide several mechanisms to achieve this goal. First, it can simply eliminate candidates from honest (i.e., not captured) parties. Those who step in may be less qualified, or intimidated, and therefore engage in less effective campaigns. Second, criminal organizations may disrupt the campaign operations of honest candidates, by damaging their headquarters or scaring campaign workers. Third, criminal organizations may intimidate voters, threatening violence if captured politicians are not elected. Fourth, such organizations may credibly threaten retribution against elected honest politicians.

We present a model in which violence occurs in equilibrium to influence electoral results. We test the implications of the model on Italian homicide data going back to 1887. Our results show that regions with a greater presence of criminal organizations are characterized by abnormal increases in homicides during the year before elections: an 'electoral-violence cycle'. In regions with a heavy presence of criminal organizations, there are (on average) two additional homicides per 100,000 inhabitants in the year before election – a 34% increase on the baseline homicide rate of 5.5 homicides per 100,000 inhabitants. By contrast, we observe no increase in homicides in other regions.<sup>4</sup>

To the extent that violence is a strategic policy tool used to favor certain candidates, the use of violence must depend upon the electoral rules. Thus, we investigate the effect of political competition on the equilibrium strategy of violence under two alternative electoral systems: a *proportional system* in which all candidates compete in a single, "at large" electoral district and the share of seats obtained by the two parties equal their respective vote-share; and a *majoritarian system* in which the candidates of the two parties

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<sup>1</sup>See Schelling (1971) for an early theoretical analysis and Barone and Narciso (2015) for evidence on the allocation of public investment subsidies in Sicily.

<sup>2</sup>Acemoglu et al. (2013) discuss the generalized amnesty enacted by Colombian President Uribe in favor of members of paramilitary groups.

<sup>3</sup>Lupo (2013) and Solis and Aravena (2009) provide extensive anecdotal evidence from Italy and Latin America, respectively.

<sup>4</sup>Although other forms of violence or intimidation may take place before elections, data on homicides are more precise and are available over a much longer period.

compete in several single-member, first-past-the-post districts. Under a proportional system, the use of pre-electoral violence depends, negatively, on the total electoral support enjoyed by the party favored by criminal organizations. Also, violence does not target particular areas within the (at large) district. In contrast, under a majoritarian system criminal organizations engage in electoral violence only in those (single-member) districts in which the electoral outcome is uncertain. This is because there is little incentive to engage in violence where the captured candidate is highly likely to win the election irrespective of the actions of the criminal group, or where violence is unlikely to sway the result in favor of their preferred party.<sup>5</sup>

To test our model predictions, we compare the extent of electoral violence before and after the electoral reform of 1993 that changed the Italian electoral system from proportional to majoritarian. Before the reform, electoral violence depends, negatively, on the gap between the national vote share of the two main parties – the Christian Democrats and the Italian Communist Party. After the reform, electoral violence is instead concentrated in contestable districts – i.e., districts characterized by a narrow expected margin of victory. Exploiting additional information on the identity of offenders and victims, we show the pattern of homicides is driven by the killing of politicians and politically active individuals by criminal organizations.

Finally, we demonstrate that electoral violence pays off. For historical reasons (discussed in the next Section) Italian criminal organizations traditionally opposed left wing groups – such as the Communist and Socialist parties and the labor unions – while favoring parties to the center-right of the political spectrum. Exploiting unique data available for Sicily, we show that municipalities with a higher number of Mafia homicides before elections experience a reduction in the electoral support for leftist parties.<sup>6</sup> In particular, each additional homicide brings a 3 percentage point decrease in the voting share of the Left. Crucially, this effect is driven by political homicides – i.e., murders of party or union members.

Finally, we show that electoral violence has a negative effect on the propensity of appointed politicians to openly talk about criminal organizations once they sit in parliament. To this end, we collected a unique data set on the speeches of members of the national parliament appointed in Sicily during the period 1945-2013, counting the number of times they uttered “Mafia” in a given legislature. Holding constant the total number of homicides committed during the electoral period, the homicides of party and union members decrease the likelihood that members of parliament appointed in Sicily talk about the Mafia during the following legislature. Under the realistic assumption that

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<sup>5</sup>These predictions are consistent with results in political economy on the effects of alternative electoral systems on political competition (see, e.g., Persson and Tabellini, 2000, for a review). This is not surprising since violence is part of the political game.

<sup>6</sup>From now on, “mafia” denotes generically all criminal associations described by Art. 416-bis, while *the* “Mafia” denotes the specific criminal association active in Sicily.

the word “Mafia” is mentioned to attract attention to the problem of organized crime (and not to praise it), this last result suggests that political homicides are effective in intimidating politicians. Interestingly, members of parliament appointed in Sicily, and those associated with the left more generally, have a higher propensity to talk about the Mafia but are also more intimidated by electoral violence – probably because they themselves are also potential targets. Overall, our results suggest that pre-electoral violence has important implications for electoral and political outcomes.

We are not the first to model violence as a political tool. In their pioneering work, Dal Bó and Di Tella (2003) show how interest groups may use violence to manipulate elected politicians.<sup>7</sup> Dal Bó et al. (2006, 2007) build on the same idea but allow for the use of both monetary incentives and self-enforceable punishments within a unified framework, and derive implications for the quality of public officials. This follows the tradition of economic models of lobbying, which focus primarily on the role of positive (monetary) incentives – see, e.g., Bernheim and Whinston (1986), Grossman and Helpman (1994), and Leaver (2009) among others.<sup>8</sup> Our paper, on the contrary, is not about lobbying, but about the strategic use of violence by criminal organizations to get captured politicians elected. To the best of our knowledge, ours is the first model that links electoral systems, political competition, violence and voting behavior. The two mechanisms – bribes or violence against elected politicians and violence to influence electoral results – can be complementary and may apply to different degrees in different settings.

Finally, while there are some empirical studies that focus on the political influence of criminal organizations – see, e.g., Acemoglu et al. (2013), De Feo and De Luca (2013), and Buonanno et al. (2014) – these papers are silent on the practices used to establish such influence – the primary objective of our empirical analysis.

The rest of the paper is structured as follows. Section 2 provides an historical overview that explains why Italian criminal organizations – and in particular the Sicilian Mafia – are of particular interest. Section 3 presents the model and develops its formal analysis. In Section 4 we describe the data, and provide the estimation results. Section 5 concludes. Proofs and additional results are in the Appendix.

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<sup>7</sup>See also Collier and Vicente (2012). More generally, the idea that special interest groups may try to exert political influence dates back to early work in public choice theory – see, e.g., the articles collected in Buchanan et al. (1980).

<sup>8</sup>Pinotti (2013) and Daniele (2015) test the implications of Dal Bó et al. (2006, 2007) for the quality of the political class using data on, respectively, national and local politicians in Italy. Consistent with the predictions of the model, they find that politicians in mafia-ridden areas are negatively selected on outside income opportunities.

## 2 Institutional and historical background

### 2.1 Criminal organizations in Italy

Article 416-bis, introduced into the Italian Penal Code in year 1982, defines a mafia-type criminal organization as a “stable association that exploits the power of intimidation granted by the membership in the organization, and the condition of subjugation and *omertà*<sup>9</sup> that descends from it, to commit crimes and acquire the control of economic activities, concessions, authorizations, and public contracts”. As of the end of 2013 – the last year in which these data are available – 5,470 people have been charged with this crime, 4,148 of whom were charged in Sicily, Campania, and Calabria.<sup>10</sup> These southern regions host three of the oldest and most powerful criminal organizations in the World: Mafia, Camorra, and 'Ndrangheta.<sup>11</sup>

The definition in Article 416-bis highlights three fundamental features of these criminal groups. First, they are *stable* organizations governed by a complex hierarchical structure. For example, the Sicilian Mafia, which is of primary interest for the present paper, has a distinctively pyramidal structure. At the base there is a multitude of criminal groups (*clans*) that control criminal businesses – extortion, racketeering, drug smuggling, loan sharking, prostitution, etc. – in a town or city neighborhood. Clans are organized into districts (*mandamenti*) of three or four geographically adjacent clans. Each district elects a representative to sit on its Provincial Commission, whose primary role is to resolve conflicts between the clans and to regulate the use of violence. Finally, the apex of the pyramid is the Regional Commission (*Cupola*), which takes decisions regarding alliances or wars with other criminal organizations, the commission of terrorist attacks, or the murder of prominent politicians and public officials.<sup>12</sup>

The second major feature of mafia groups highlighted by Article 416-bis is the power of intimidation. These organizations command thousands of heavily armed men, equipped with heavy machine guns, RPG launchers, high-powered explosives, and armored cars. This allows Mafia, Camorra, and 'Ndrangheta to control all criminal activity in their respective regions of influence.

Finally, and most importantly, Article 416-bis emphasizes the reach of these criminal groups into the official economy. Mafia-type organizations derive part of their profits from

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<sup>9</sup>The *omertà* is a code of conduct prohibiting the reporting of fellow members to authorities. Although it is sometimes disguised as a “rule of honor”, it rests in practice upon the threat of extreme violence against the relatives of informants.

<sup>10</sup>Obviously, these figures greatly understate the size of these organizations, as *omertà* limits whistleblowing and other sources of reporting of mafia crimes (Acconcia et al., 2014).

<sup>11</sup>Two other regions in the South-East, Puglia and Basilicata, have also witnessed the presence of criminal organizations since the mid-1970s (Pinotti, 2015). However, such organizations have been traditionally less powerful than Mafia, Camorra, and 'Ndrangheta, especially from a political perspective.

<sup>12</sup>The 'Ndrangheta adopts a similar pyramidal model, whereas the Camorra has a more horizontal structure (Catino, 2014).

“the control of economic activities, concessions, authorizations, and public contracts”. Schelling (1971) argued that public works and procurement contracts are attractive profit opportunities for mafia-type organizations, since they allow extorted firms to offload the predation costs on soft public budgets. According to the Italian judge Giovanni Falcone, who led the so-called *Maxi Trial* against the Sicilian Mafia in 1987 – and was later killed by the organization – “more than one fifth of Mafia profits come from public investment” (Falcone, 1991). More recently, Barone and Narciso (2015) show that the allocation of public investment funds is correlated with Mafia presence across Sicilian municipalities.

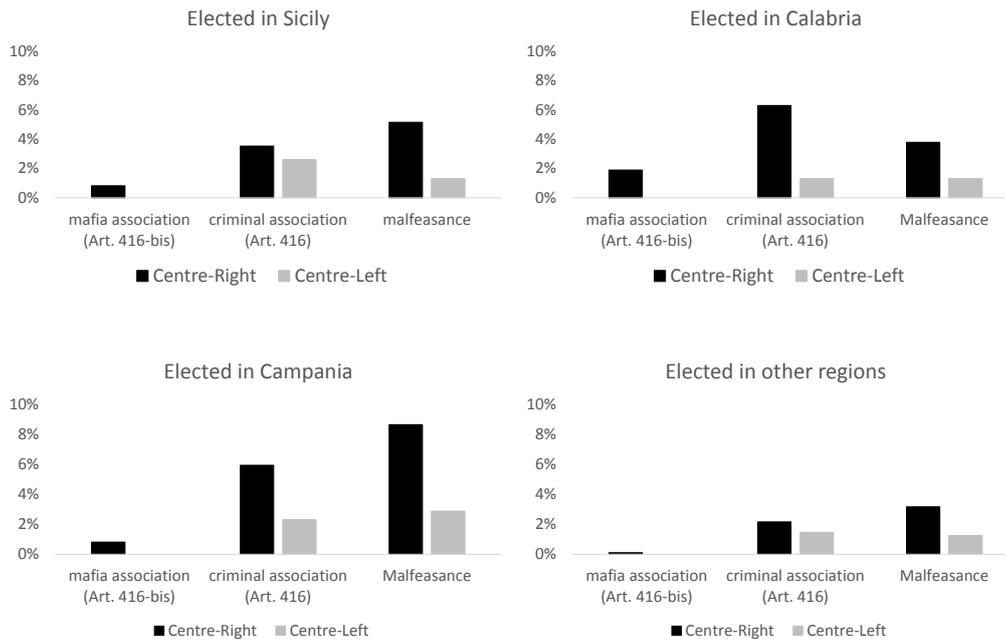
The embezzlement of public funds on a large-scale is only possible through the collusion of political parties with criminal organizations. The history of Mafia, Camorra, and 'Ndrangheta has been inextricably intertwined with political power since Italy's Unification in 1861. In fact, the very origin of the Sicilian Mafia has been traced back to the demand for protection from southern landlords and urban elites – generated by the power vacuum that followed the defeat of the Kingdom of Two Sicilies (Bandiera, 2003). In its role as protector, the Mafia also acted as a military force, fighting against workers' protests and revolts (Gambetta, 1996).

Over the subsequent decades, this tradition of collaboration between the Sicilian Mafia and the conservative bloc remained pervasive. During the so called First Italian Republic (1945-1993), the two protagonists in the Italian political arena were the Christian Democrats and the Italian Communist Party. Some of the most prominent Sicilian members of the Christian Democrats accepted the Mafia's support to reinforce their position against leftist opponents. In return, if elected, they would use their influence to subvert the police and judicial systems interference with Mafia activities, both at local and national level (Falcone, 1991; Paoli, 2003; Lodato and Buscetta, 2007).

The collusion between a section of the Christian Democrats and criminal organizations is apparent from judicial investigations into members of the Italian Parliament for mafia-related crimes. We explored the relationship by looking at prosecutors' requests to proceed against a member of Parliament (*“Richieste di autorizzazione a procedere”*) – a key step to lifting Parliamentary immunity, which protected national-level politicians from judicial investigations. We used the data originally collected by Golden (2007) – and used, among others, by Nannicini et al. (2013) – and added the types of crime described in each request. The institution of Parliamentary immunity was abolished in 1993, so our data cover only the period up to that year. Between 1945 and 1993, 11 members of Parliament were investigated for mafia association ex. Article 416-bis; all of them had been elected as representatives of the Christian Democrats or their government allies of the Centre-Right. In addition, many more politicians were investigated for “simple” criminal association (Article 416 of the Penal Code) or for political misconduct that typically signals some relationship with criminal organizations – at least in mafia-ridden regions. Figure 1 shows that the Christian Democrats and their allies were most likely to be in-

investigated for mafia-related crimes, even more so in Sicily, Campania, and Calabria.<sup>13</sup> This finding is confirmed by OLS regressions of the probability of being investigated on a dummy for partisan affiliation, a dummy for being appointed in mafia regions, and the interaction between the two.<sup>14</sup>

Figure 1: Members of the Italian Parliament investigated for mafia-type criminal association and related crimes, 1945-1993



*Note:* The graphs show the fraction of members of the Italian Parliament investigated for mafia-type criminal association (Article 416-bis of the penal code) and related crimes, by political alignment and region in which they were elected.

A similar relationship occurred after the transition to the Second Republic (1993), with several prominent members of the Centre-Right coalition openly dismissing the importance of the Sicilian Mafia – and sometimes even questioning its very existence. We next discuss how Italian organizations have historically supported such parties by using violence against their political opponents.

<sup>13</sup> Article 416 (“*associazione a delinquere*”) punishes *all* groups of three or more people involved in some type of criminal activity. As such, it does not recognize the specificity of mafia-types associations in terms of stability, military power, and infiltration of the official economy. Other misconduct included in Figure 1 regards different types of corruption.

<sup>14</sup>The results are presented in Table A1 of Appendix 3.

## 2.2 Terror strategy

In the first post-Fascism democratic elections for the Regional Government of Sicily, on April 20, 1947, a coalition of communist and socialist parties clinched an unexpected victory over the Christian Democrats. A few days later, on May 1, 1947, hundreds of Sicilian peasants were celebrating the victory during the traditional ‘Labour Day’ parade at Portella della Ginestra, when machine-gun fire broke out from the surrounding hills. Eleven people were killed immediately and thirty-three wounded, some of whom died in the following days. Although the bandit and separatist leader Salvatore Giuliano was blamed for orchestrating the shooting at Portella, it later emerged that the Sicilian Mafia ordered the massacre in reaction to the recent electoral success of the left (Lupo, 2013). Over the following months, the Mafia killed dozens of political activists, trade unionists, and peasants. When Sicilians voted again, at the national elections on April 18, 1948, Communists and Socialists obtained only 20.9% of the votes, down from 30.4% the previous year. The Christian Democrats, on the other hand, almost secured an absolute majority, winning 47.9% of the vote, up from 20.5% the year before. Other right wing factions such as the fascists and the monarchists also gained considerable ground.

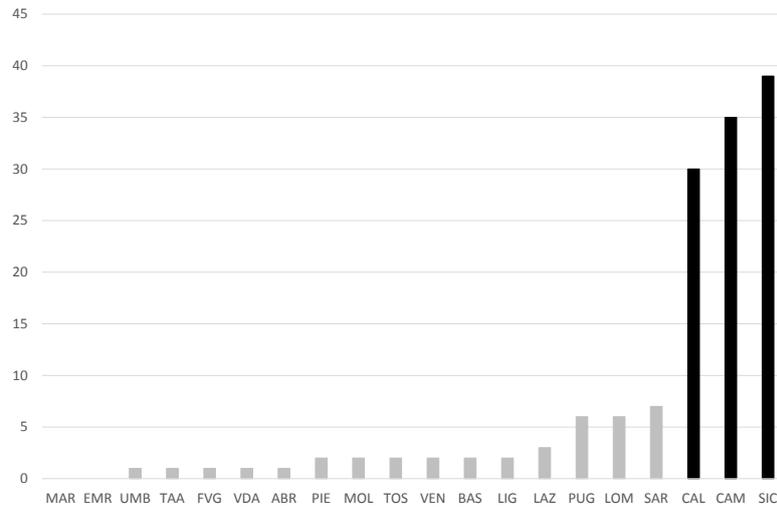
Although particularly infamous, the episode of Portella Della Ginestra was just part of a wider strategy of intimidation against left wing groups, their candidates and the electorate.<sup>15</sup> During subsequent decades, the Sicilian Mafia killed hundreds of political activists and local politicians, including the proponent of Article 416-bis, Pio La Torre, who was the head of the Italian Communist Party in Sicily. Similarly, starting from the mid 70’s, the Sicilian Mafia exerted heavy political pressure to prevent national laws aimed at harshening imprisonment conditions for convicted mafia members. In particular, between 1992 and 1995 the Sicilian Mafia undertook an aggressive intimidation campaign against national politicians in retaliation to the introduction of Article 41-bis of the Penal Code, which imposed extremely harsh prison conditions on members of criminal organizations.

Other criminal organizations in Italy have also engaged in violence and intimidation against local politicians and party members, so much so that in 2013 the Italian Parliament instituted an ad-hoc Commission to investigate this phenomenon. The final report produced by the Commission (Lo Moro et al., 2015) contains a list of political homicides in Italy during the period 1974-2013. In the total of 143 such homicides, 104 were committed in Sicily, Campania, and Calabria; see Figure 2.

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<sup>15</sup>Note that this episode is consistent with the signaling model that will be developed in the next section and not with a story in which violence is just a retaliation device. The reason is that, if used as a threat, violence should have been directed toward center/right candidates that were responsible (*vis-à-vis* the mafia) for not winning the elections, rather than toward their opponents.

Figure 2: Homicides of local administrators across Italian regions, 1974-2013



*Note:* The graph shows the total number of local administrators killed in Italian regions during the period 1974-2013. Black bars denote regions with a higher presence of criminal organizations – namely Sicily, Calabria, and Campania.

### 2.3 Not only Italy

The links between criminal organizations and politics, together with the systematic use of violence against political opponents and activists, are not only features of Italian criminal organizations, but are also widespread in other countries.

Like the Sicilian Mafia, drug cartels in Mexico and Colombia have often turned to violence as a way of establishing control, not only over their members and their competitors, but also against ‘unwelcome’ political and popular leaders, local administrators, the police forces and public officers. Between the 1980s and 1990s, the Medellin cartel of Pablo Escobar waged a systematic campaign of violence and intimidation against national-level politicians to block the extradition of Colombian narcos to the United States. Ministry of Justice Rodrigo Lara and the presidential candidate Luis Carlos Galan – both strong supporters of extraditions – were killed during this period, together with hundreds of lower-level politicians and public officials.<sup>16</sup> Also similarly to the Sicilian Mafia, Colombian drug cartels allied with rich landowners to combat advocates of social reforms. As a consequence, thousands of left-wing activists – in particular, the members of the party *Union Patriótica* – were killed by the drug lords of both the Medellin and Cali cartels (Americas Watch Committee, 1989; Méndez, 1990).

Mexico has experienced a similar wave of political terrorism after President Filipe

<sup>16</sup>At the time of his assassination, Galan was conducting his electoral campaign for the 1990 elections and was comfortably ahead in the polls.

Calderon launched the “war on drugs” in 2006. The murder rate increased from 8.1 per 100,000 inhabitants in 2007 to 23.5 per 100,000 inhabitants in 2011. The number of deaths directly related to drug-cartel violence has been estimated at around 60-70,000, including hundreds of politicians and public officials (Shirk and Wallman, 2015; Molzahn et al., 2015). This surge in political violence attracted the attention of media all over the World. On June 29, 2010, the Wall Street Journal reported the murder of Rodolfo Torre, the candidate governor of the troubled Mexican state of Tamaulipas (“Killing Escalates Mexico Drug War”); on May 15, 2015, the Financial Times had an article titled “Third Mexican midterm election candidate murdered”; on June 9, 2015, The Economist dedicated a piece (“Death and the mayor”) to the numerous political victims of drug cartels; and so on.

Political violence by criminal groups is widespread also in other Latin American countries. Foglesong and Solis (2009) carried out a series of interviews with more than thirty experts in six countries: Mexico, Guatemala, Costa Rica, Panama, Dominican Republic, and the United States. When asked about the links between criminal organizations and the State, the majority of the interviewed agreed that there is a mutually beneficial and reciprocal relationship between drug trafficking and a section of the political elites in Mexico, Dominican Republic and Central America.<sup>17</sup>

In summary, the results that we obtain and discuss throughout the theoretical analysis should not be interpreted as specific to Italy. They apply, *mutadis mutandis*, to any democracy plagued by strong connections between organized crime and politics.

### 3 A model of electoral intimidation

This section develops a simple model of pre-electoral violence delivering several implications that will be tested in Section 4. As explained before, we do not model ‘bribes’ and ‘threats’ in return for favors (an alternative mechanism of influence). Instead, we study the mechanisms that allow criminal organizations to have their captured politicians elected under alternative electoral rules.<sup>18</sup>

#### 3.1 Proportional electoral system

Two political parties compete to attract a mass 1 of voters in a large election. One party is honest ( $h$ ), the other ( $c$ ) is captured by a criminal organization. For simplicity, and

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<sup>17</sup>Green (2015) provides a thorough historical account of political violence by criminal groups in Latin America. Similar patterns are also found in many African countries, that exhibit a higher risk of civil violence during election cycles relative to normal times – see, e.g., Goldsmith (2015).

<sup>18</sup>The mechanism through which politicians are captured by criminal organizations is not studied here. In some cases, the members of Italian criminal organizations become themselves politicians.

with no loss of generality, each vote is assumed to be equivalent to one seat.<sup>19</sup> When in office, the  $c$  party favors the criminal organization and its illegal activities, the  $h$  party does not. The criminal organization obtains a return,  $b$ , for each seat (vote) obtained by the captured party. Therefore, if the captured party wins a share  $x \in [0, 1]$ , the criminal organization gets a return  $bx$ . The voters' choice is influenced by the electoral effort ( $e$ ) exerted by the honest party during the electoral campaign. The vote-share of the honest party, when it exerts effort  $e$ , is

$$h(e, \alpha) \equiv \alpha + e,$$

where  $\alpha$  is the share of voters who always vote for  $h$  regardless of  $e$  – i.e., fully honest voters. Hence, the  $c$  party obtains a share equal to  $1 - h(e, \alpha)$ .<sup>20</sup> For simplicity, we assume that only honest candidates exert effort to win swing voters (we relax this assumption in Section 3.3).

The cost of exerting campaigning effort is  $\psi(e, \alpha, \theta)$  and is increasing and convex in  $e$ . It is decreasing in  $\alpha$  since parties with a larger share of fully honest voters have – other things being equal – a relatively lower cost of capturing swing voters because of positive externalities and/or herding behavior within social networks (see, e.g., Knoke, 1994, among others). In other words, if a large fraction of voters is honest it is easier to enforce honesty on potentially dishonest individuals: an hypothesis consistent with Tabellini (2008). Finally, the cost of effort is also increasing in the parameter  $\theta \in \{s, w\}$ , which measures the organization's military power and its willingness to use it:  $s$  stands for strong,  $w$  stands for weak, with  $\Delta \equiv s - w \geq 0$ .<sup>21</sup>

This relationship between effort cost and military strength of the organization is a convenient shortcut to capture, within a unified framework, several interpretations of the model. First, violence may imply that a candidate of the honest party is killed. In that case, another candidate may have to run. Yet, the latter may be less efficient at attracting votes (possibly because he is scared or, even more simply, because he is a second choice) which is equivalent to a higher cost of effort per vote obtained. Second, even if the honest candidate is not killed, violence may disrupt his campaign by damaging his headquarters and scaring his campaign 'workers'. Third, voters may be intimidated by violence, and may thus prefer to elect the corrupt party in order to avoid additional violence, which implies that the necessary effort to persuade them to vote for the honest party increases.

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<sup>19</sup>Further, we also assume there is only one honest party, but there could be more as was the case in Sicily. Assuming that there is only one criminal organization in each district is consistent with the pyramidal structure of the Sicilian Mafia, as we discussed above.

<sup>20</sup>Our approach borrows from Coate (2004). In his model there are three groups of voters: those who vote for sure for a certain candidate (leftists, and rightists in Coate's model) and swing voters that can be convinced by campaign effort. See also Prat (2002) and Roemer (2006) for similar models.

<sup>21</sup>We make the assumption of two possible types of criminal organization for simplicity. The qualitative insights of the model remain true in a more general environment with multiple types.

Our specification allows for all three interpretations or a combination of them.

In order to obtain closed form solutions we assume a specific functional form for the effort cost – i.e.,

$$\psi(e, \alpha, \theta) = \frac{\theta e^2}{2(1 + \alpha)}. \quad (1)$$

The honest party does not know the organization’s type when it chooses effort. Their prior belief is that the organization is strong with probability  $\beta \in [0, 1]$ . Hence, if feasible, the criminal organization would like to signal its military power in order to increase the effort costs of the  $h$  party. The signaling device is (pre-)electoral violence,  $\nu \geq 0$ , which may take the form of assassinations, violent riots, vandalism, etc., causing both psychological and physical impediments (including death) to the candidates of the honest party. Thus, from now on, signaling military power is meant in the sense of signaling the willingness to use a certain level of violence. Although criminal organizations always retain this option, the willingness to actually exert violence may vary considerably over time, depending (among other things) on the leaders in power in a given historical period. For instance, Totò Riina and Bernardo Provenzano – the two most important leaders of the Sicilian Mafia in recent decades – had a very different propensity to use violence. Strong leaders may want to reveal their willingness to use violence, however this is complicated by the fact that they operate in the underworld. Therefore, politicians and voters may have imperfect information about the attitude of the criminal leaders in power and they may, as a consequence, be unable to distinguish truly strong leaders from imitators. For this reason, strong leaders may need to undertake costly action for the threat of violence to be credible.<sup>22</sup>

The cost of electoral violence is  $k(\nu, \theta) = \frac{\nu}{\theta}$ , which is inversely related to the organization’s military power, and as discussed above, reflects the willingness to use it. The timing of the game is as follows:

1. Nature draws  $\theta$ .
2. The criminal organization chooses the intensity of electoral violence  $\nu$ .
3. Honest candidates observe  $\nu$ , update beliefs, and decide how much effort  $e$  to invest in the campaign.
4. The elections occurs.

The game is solved using a *perfect Bayesian equilibrium* (see, e.g., Fudenberg and Tirole, 1991). Therefore, a strategy for the criminal organization is a function that maps its military power (type) onto a level of violence, while the strategy for honest politicians specifies an effort choice contingent on the information revealed at stage 2. Off-path

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<sup>22</sup>Smith and Varese (2001) discuss a similar issue in the case of extortion.

beliefs will be specified as we go along. We mostly focus upon separating equilibria, which are of greatest interest, however in Appendix 1 we also examine pooling ones.

Let  $\nu_\theta^*$  denote the equilibrium intensity of violence when the type of the criminal organization is  $\theta$ . We rule out uninteresting equilibria in which, regardless of the organization type, honest politicians exert no effort as well as those in which honest politicians always win the election regardless of effort. This is guaranteed by the following:

- **Assumption A1.**  $w > \frac{1+\alpha}{1-\alpha}$ .

Let  $\beta(\nu) \equiv \Pr[\theta = s|\nu]$  be the posterior of the honest party upon observing  $\nu \geq 0$ . In a separating equilibrium,  $\beta(\nu_s^*) \equiv 1$  and  $\beta(\nu_w^*) \equiv 0$ . The objective function of the honest party is equal to its share of votes net of the effort cost. Hence, upon observing  $\nu_\theta^*$ , at stage 3 the honest party chooses the effort level which solves the following problem

$$\max_{e \in [0, 1-\alpha]} \{h(e, \alpha) - \mathbb{E}[\psi(e, \alpha, \theta) | \nu_\theta^*]\},$$

where, under the quadratic specification (1), it follows that

$$\mathbb{E}[\psi(e, \alpha, \theta) | \nu_\theta^*] = \underbrace{[\beta(\nu_\theta^*)s + (1 - \beta(\nu_\theta^*))w]}_{\equiv \mathbb{E}[\theta | \nu_\theta^*]} \frac{e^2}{2(1 + \alpha)}.$$

The first-order condition, necessary and sufficient for an optimum implies

$$e_\theta^* = \frac{1 + \alpha}{\theta},$$

with  $e_s^* < e_w^* < 1 - \alpha$  by Assumption A1.

Hence, in equilibrium, effort is decreasing in the military power of the criminal organization and is increasing in the share  $\alpha$  of  $h$ 's ideological voters. The incremental vote-share that the corrupted party obtains when it is supported by a strong organization amounts to

$$h(e_w^*) - h(e_s^*) = (1 + \alpha) \frac{\Delta}{ws},$$

which is (*ceteris paribus*) increasing in  $\alpha$  and in  $\Delta$ . The outcome described above emerges in equilibrium when  $(\nu_s^*, \nu_w^*)$  satisfy the no-mimicking conditions of the organization, which make sure that types do not mimic each other – i.e., a strong (resp. weak) type must not profit from exerting a level of violence that is attributed to the weak type (resp. strong).

Note that, in a separating equilibrium, the level of violence exerted by the weak organization cannot be positive – i.e., it must be  $\nu_w^* = 0$ . Intuitively, this is because a weak organization would always have an incentive not to exert violence in a separating equilibrium. Hence, to find an equilibrium we simply need to determine  $\nu_s^*$ , which will be

pinned down by the incentive compatibility constraints. We thus establish the following result.

**Proposition 1.** *Suppose that Assumption A1 holds. There always exists the least-costly separating equilibrium in which  $\nu_w^* = 0$  and  $\nu_s^* = b(1 + \alpha) \frac{\Delta}{s}$ .*

The ‘least-costly’ separating equilibrium we have identified corresponds to the ‘*Riley outcome*’ (Fudenberg and Tirole, 1991). It implies that the level of pre-electoral violence can act as a signal to intimidate candidates of the honest party and yields testable comparative statics. Specifically, the level of violence exerted by the strong type in such an equilibrium is increasing in  $\alpha$ , the popularity of the honest party; it is also increasing in  $\Delta$ , which determines how uncertain honest politicians are about the characteristics of the criminal organization, and in  $b$  which is a measure of the profitability of influencing politics for the criminal organization. In Appendix 1 we discuss multiplicity of equilibria including pooled equilibria and we also show that the equilibrium just described is the only one that survives the Cho and Kreps (1987) intuitive criterion.

## 3.2 Majoritarian system

Consider now a majoritarian system. Specifically, suppose that the voting population is split in  $N$  identical districts, each populated by a mass  $\frac{1}{N}$  of voters and denoted by  $i \in \{1, \dots, N\}$ . In each district a candidate wins the election with a simple majority. Everybody votes. The (total) revenue of the criminal organization is  $\frac{bx}{N}$  where  $x$  is the total number of districts won by candidates of party  $c$ . The honest politician running in district  $i$  exerts effort  $e_i$  which determines the share  $h(e_i) = \alpha_i + e_i$  of the honest party in that district. As before,  $\alpha_i$  measures the mass of a district  $i$ 's electors that always vote for  $h$ . The criminal organization can still be either strong or weak, and this characteristic is common to all districts. For the moment we posit that there are no informational externalities between districts. That is, the information about  $\theta$  revealed through the use of violence within district  $i$  does not affect the behavior of politicians in the other districts. We discuss this in more detail below and in Appendix 1.

We restrict attention to separating equilibria in which only the strong organization engages in pre-electoral violence; the analysis of pooling equilibria is discussed in Appendix 1. We also assume that the cost of exerting violence for the organization is additively separable across districts. That is, letting  $\nu = \sum_{i=1}^N \nu_i$ , we assume:

- **Assumption A2.** The total cost of violence  $k(\nu, \theta)$  is additive – i.e.,

$$k(\nu, \theta) = \sum_{i=1}^N k(\nu_i, \theta).$$

Clearly, this is a restrictive assumption. Committing crimes and violence in district  $i$  may affect the cost of doing the same in district  $j$  in a variety of ways. Party  $h$  may adopt more precautions in district  $j$  having observed violence in district  $i$ , in turn raising the cost of violence in support of party  $c$ . Law enforcers – possibly under pressure from public opinion – may increase security as violence escalates in several districts. On the other hand, public opinion (and law enforcers) may be accustomed to a certain level of intimidation and violence (or scared by it), numbing the effect of further violence and releasing pressure for greater enforcement efforts. Both these effects seem plausible and, in principle, they may be at play simultaneously. Hence, by imposing separability we isolate the model results from the relative strength of these two forces.

Formally, Assumption A2 implies that the organization’s maximization problem is separable across districts. Therefore, in order to characterize the equilibrium of the game we can focus on a generic district (say  $i$ ). The timing of the game is as before. When the captured party obtains a majority of votes in a district it wins the seat.<sup>23</sup> That is, for given effort  $e_i$  it needs to obtain a share of votes

$$1 - h_i(e_i, \alpha_i) > \frac{1}{2},$$

which requires the honest candidates to exert a sufficiently low campaigning effort – i.e.,

$$e_i < \frac{1}{2} - \alpha_i.$$

Obviously, engaging in pre-electoral violence in district  $i$  is useless if  $\alpha_i \geq 1/2$  since the honest party wins the election even if  $e_i = 0$ .<sup>24</sup> Hence, hereafter, we focus on the most interesting case  $\alpha_i < 1/2$ .

In a separating equilibrium, the honest party wins the elections if, and only if, the utility of being appointed exceeds the corresponding effort cost. That is,

$$1 \geq \psi\left(\frac{1}{2} - \alpha_i, \alpha_i, \theta\right).$$

Let us first focus on districts in which honest candidates win the election *only* when they face a weak organization, namely districts in which the following condition holds

$$\psi\left(\frac{1}{2} - \alpha_i, \alpha_i, w\right) \leq 1 < \psi\left(\frac{1}{2} - \alpha_i, \alpha_i, s\right). \quad (2)$$

Note that, under a majoritarian system a weak criminal organization has an even stronger incentive not to exert violence in a separating equilibrium. This is because it makes

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<sup>23</sup>For simplicity, we assume that in the case of a tie the honest party wins the subsequent round of elections.

<sup>24</sup>We are excluding here a situation in which the candidate of party  $h$  is killed and the party cannot supply another candidate for which  $\alpha \geq 1/2$ .

no profit when  $\alpha_i$  satisfies (2). Hence, a separating equilibrium must again be such that  $\nu_{i,w}^* = 0 < \nu_{i,s}^*$ , with the latter inequality satisfying the organization's incentive compatibility constraints.

To rule out the uninteresting case in which the weak organization always loses the elections regardless of  $\alpha_i$ , we assume that

- **Assumption A3.**  $w$  is large enough to imply  $\psi(\frac{1}{2} - \alpha_i, \alpha_i, w) > 1$  for some  $\alpha_i \in (0, \frac{1}{2})$ .

Essentially, when this assumption is violated the problem becomes trivial since the weak organization is never willing to exert violence to win the election even when  $\alpha_i$  is equal to zero.

We can thus establish the following result.

**Proposition 2.** *Suppose that A2 and A3 hold. Under a majoritarian system, in the least-costly separating equilibrium  $\nu_{i,w}^* = 0$  and*

$$\nu_{i,s}^* = \frac{wb}{N},$$

*only if  $s$  is not too small, and if  $\alpha_i$  is neither too large nor too low. Otherwise, in district  $i$ , there is only a pooling outcome in which the organization does not exert violence.*

This proposition provides our second main empirical prediction. Under a majoritarian system, an equilibrium in which only the strong organization engages in electoral violence only arises in districts where there is *head-to-head* competition between parties. By contrast, it is never optimal for the criminal organization to rely on costly violence in order to signal its military strength if one of the two parties wins the election no matter what  $e_i$  is. In this region of parameters, only a pooling equilibrium exists, which can be easily constructed by choosing appropriate off-equilibrium beliefs.<sup>25</sup>

### 3.3 Remarks

#### 3.3.1 Uninformed corrupt candidate

We have so far assumed that captured politicians always know the organization type and that they always favour it once they are elected. Although both these assumptions seem quite realistic, at least in the case of the Sicilian Mafia, the insights of the model do not change – qualitatively – when they are weakened. Suppose, for example, that corrupted politicians do not know the type of the organization they are facing and that they may decide, once in office, not to support the organization. In this case, the organization

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<sup>25</sup>Of course, among the class of pooling equilibria, the one that maximizes the organization's expected profit features no violence.

members have an extra reason for signaling their military strength. In fact, by exerting violence against the candidates of the honest party, they are able to intimidate not only these candidates – i.e., through the reduction of their electoral effort – but also to signal to corrupt politicians not honoring their promises will result in retaliation. Anticipating this, corrupt politicians will continue to favor the criminal organization once they are in office. Obviously, this argument strengthens if we assume that corrupt politicians also exert a campaigning effort which tends to mitigate the effect of the campaigning effort exerted by the honest candidates on the swing voters.

### 3.3.2 Information externalities across districts

In our analysis of the majoritarian system we have assumed that candidates in one district do not learn from the criminal organization’s behavior in other districts. Suppose instead that exerting violence in one district signals the criminal organization’s type in other districts as well. Our results do not change qualitatively in this case. Here is the intuition for why. Let us consider the simplest possible case where there are only two districts ( $N = 2$ ) which differ not only by the share of people that always vote for the honest candidates but also with respect to the attention they receive from the media. District 1 is ‘central’ while district 2 is ‘peripheral’. Formally, this means that if the organization signals its type to the honest candidates in district 1, with probability  $\lambda_1 \in [0, 1]$  this information reaches district 2, while the information disclosed in district 2 reaches district 1 with probability  $\lambda_2 < \lambda_1$ . Intuitively, if it is profitable for a strong type to only exert violence in district 1 in order to win elections in both districts, then a weak type will want to do the same. Actually, the more attractive this option is to the strong type – e.g., the larger is  $\lambda_1$  – the more attractive it is for the weak type too. Hence, the potential cost savings from only exerting violence in central districts is offset by the possibility of mimicking. This makes it hard for strong types to exploit information externalities between central districts and peripheral ones (see also Appendix 1).

## 4 Empirical evidence

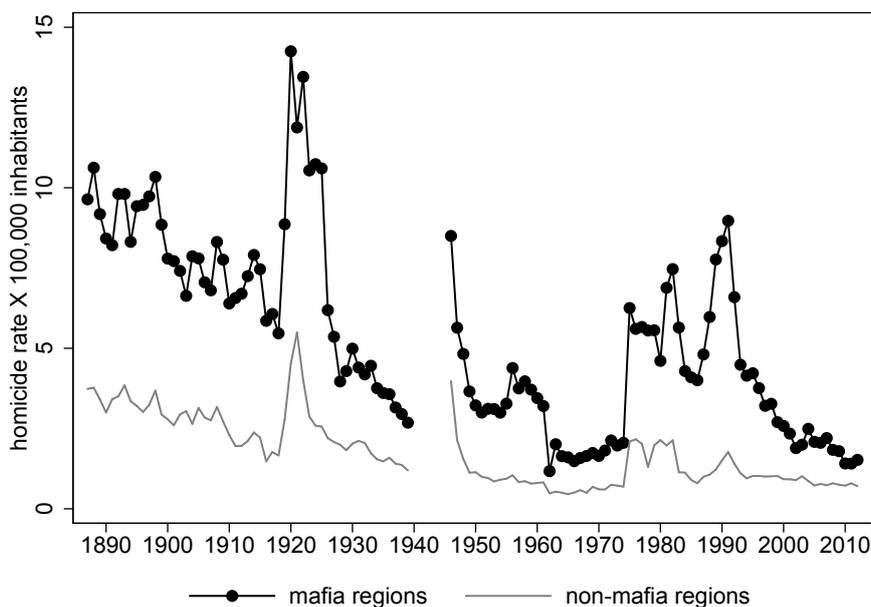
First, we test the model predictions using data on homicide rates across Italian regions and provinces over a long time span (1887-2012). In particular, we compare the extent of electoral cycles in homicides between mafia and non-mafia regions, under democratic and non-democratic regimes, proportional and majoritarian elections, and between contested and non-contested districts. Second, we exploit unique data available for Sicily over the period 1945-2013 to investigate the effects of electoral violence on electoral results and the subsequent parliamentary activities of appointed politicians.

## 4.1 Electoral violence in Italy, 1887-2012

The Italian administrative framework comprises 20 regions corresponding to level 2 of Eurostat’s Nomenclature of Territorial Units for Statistics (NUTS2); 110 provinces (NUTS3), up from 95 in 1993; and about 8,100 municipalities (NUTS4). Using official paper publications by the Italian National Statistical Institute (ISTAT) we constructed yearly series of homicide rates at the regional-level starting from 1887. For the first decades of this period, the region of Valle D’Aosta was aggregated with Piedmont, and the regions of Veneto, Friuli Venezia Giulia and Trentino were aggregated into a unique region. We maintain the same classification (16 regions in total) also for the following years. Provincial-level data are available for the last part of the sample period (1983-2012).

Figure 3 plots the homicide rate distinguishing between regions with an historical presence of mafia-type criminal organizations – i.e., Sicily, Campania, and Calabria – and other Italian regions. The homicide rate in mafia regions is always much higher than in non-mafia regions.<sup>26</sup>

Figure 3: Homicide rates in mafia and non-mafia regions, 1887-2012



*Note:* The graph shows the time series of homicides per 100,000 inhabitants in regions with an historical presence of mafia-type criminal organizations (Sicily, Campania, and Calabria) and in other regions. The series does not include the years during World War II (1940-45).

<sup>26</sup>We exclude homicides for the World War II years because, during this period, the victims of the civil war between Fascists and partisans were recorded as homicides. Since the civil war was fought mainly in the northern part of Italy, the homicide rate in non-mafia regions is abnormally high – greater than in mafia regions – towards the end of the conflict (1944-45). However, this is clearly a distinct phenomenon from criminal homicides perpetrated outside the war period. For completeness, in Figure A1 of Appendix 3 we also show the graph including the war period.

In order to quantify the extent of electoral cycles in violence, we first estimate a series of simple univariate regressions for each Italian region:

$$homicides_{rt} = \alpha_r + \beta_r * electoral_t + \varepsilon_{rt}, \quad (3)$$

where  $homicides_{rt}$  is the homicide rate per 100,000 inhabitants in region  $r$  and year  $t$ ,  $electoral_t$  is a measure of the electoral cycle, and  $\varepsilon_{rt}$  is an error term summarizing the effect of other determinants of the homicide rate. We assume that the electoral period starts one year before the election date. Therefore, if elections are held in month  $m$  of year  $t$  ( $m = 1, 2, \dots, 12$ ),  $electoral_t = m/12$  and  $electoral_{t-1} = (12 - m)/12$ . For instance, when national elections are held in April (as is normally the case in Italy)  $electoral_t = 1/3$  and  $electoral_{t-1} = 2/3$ .<sup>27</sup>

Figure 4 shows the region-specific estimated coefficients and confidence intervals. Sicily, Calabria, and Campania exhibit abnormal spikes in the homicide rate during the electoral period – i.e., between 1.5 and 2.5 additional homicides on average per 100,000 inhabitants. This is a large effect, as the average homicide rate during the same period was 5.5 in mafia regions and 2.5 in non-mafia regions. The coefficient is positive and significantly different from zero also for Puglia, and it is close to statistically significant for Basilicata. These two regions also experienced the presence of criminal organizations, although only since the 1970s and on a smaller scale than in Sicily, Calabria, and Campania (Pinotti, 2015). The coefficient is not significantly different from zero for any other Italian region.

In Table 1 we pool all regions together and estimate a series of difference-in-differences models interacting the measure of electoral cycles,  $electoral_t$ , with indicator variables for regions with an historical presence of criminal organizations. The estimated equation in column (1) is

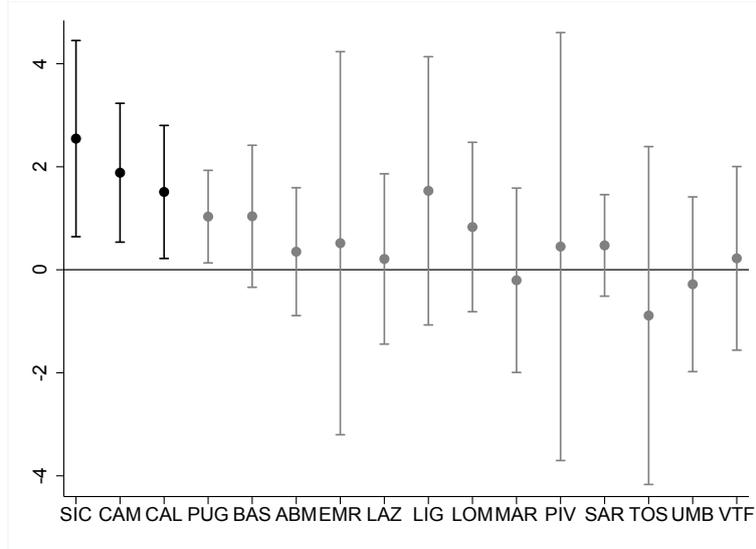
$$homicides_{rt} = \alpha * electoral_t + \beta * mafia_r * electoral_t + \gamma' x_{rt} + \delta_r + \varepsilon_{rt}, \quad (4)$$

where  $mafia_r$  is a dummy equal to 1 for Sicily, Calabria, and Campania, and it is equal to 0 for other regions;  $x_{rt}$  is a vector of additional observed determinants of the homicide rate that vary across regions and years;  $\delta_r$  is a region-specific fixed effect; and  $\varepsilon_{rt}$  is a residual term summarizing the effect of other omitted factors. The estimated coefficient  $\alpha$  captures the average increase in homicide rate for regions without an historical presence of mafia organizations ( $mafia_r = 0$ ) and  $\beta$  estimates the additional increase in Sicily, Calabria, and Campania. We always report heteroskedasticity-robust standard errors clustered by region and year using the two-way clustering method of Cameron et al. (2012).

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<sup>27</sup>All results are robust to defining the electoral period as the two years before the election and/or over-weighting the months closer to the election through a triangular weighting scheme.

Figure 4: Electoral violence in Italian regions, 1887-2012



*Note:* This figure shows the differential effect of electoral cycles on homicides in Italian regions, based on separate regression by region of the homicide rate per 100,000 inhabitants on a measure of the electoral cycle. Black symbols denote regions with an historical presence of mafia-type organizations. The regressions are estimated on yearly observations for the homicide rate over the period 1887-2012, the measure of the electoral cycle is the fraction of months in each calendar year within 12 months from the following national election. The plots show the point estimate and confidence intervals of the coefficient of this variable. Robust standard errors are used for constructing the confidence interval.

Table 1: Electoral violence in mafia and non-mafia regions, 1887-2012

	(1)	(2)	(3)	(4)	(5)	(6)
	complete sample: 1887-2012			1887-1921	1922-45	1946-2012
<i>electoral period</i>	0.407					
	(0.863)					
<i>mafia X electoral period</i>	1.574**	1.504*				
	(0.731)	(0.816)				
<i>Sicily X electoral</i>			1.992***	1.971***	1.280	1.132**
			(0.548)	(0.399)	(1.794)	(0.516)
<i>Calabria X electoral</i>			1.338**	1.524***	-1.228	0.761
			(0.547)	(0.254)	(0.823)	(0.601)
<i>Campania X electoral</i>			1.182**	0.909***	-2.168	0.972**
			(0.484)	(0.047)	(1.528)	(0.388)
<i>log GDP per capita</i>		3.709**	3.708**	2.197	22.411	-1.269*
		(1.480)	(1.482)	(1.910)	(15.396)	(0.646)
<i>log population</i>		1.325	1.323	5.606**	-34.082	2.007
		(1.734)	(1.734)	(2.176)	(27.333)	(1.433)
Observations	2,016	1,936	1,936	496	400	1,040
Year FE	NO	YES	YES	YES	YES	YES
R <sup>2</sup>	0.004	0.022	0.022	0.115	0.052	0.053

*Note:* This table shows the differential effect of electoral cycles on homicides in mafia and non-mafia regions. The dependent variable is the homicide rate per 100,000 inhabitants in each region and year, the explanatory variable *electoral period* is the fraction of months in each calendar year within 12 months of the following national election, and *mafia* is an indicator variable equal to 1 for regions with an historical presence of mafia-type criminal organizations – Sicily, Calabria, and Campania. Columns (4), (5), (6) include in the sample only the years between Unification and Fascism, Fascism and the World-War II period, and the Republican period, respectively (the exact period is indicated at top of each column). Region fixed effects are included in all regressions and year fixed effects are included in columns (2) to (6). Robust standard errors are reported in parentheses and they are clustered by region and year using the two-way method described in Cameron et al. (2012). \*, \*\*, and \*\*\* denote statistical significance at the 90%, 95%, and 99% confidence levels, respectively.

During electoral periods, the homicide rate in mafia regions increases by 1.6 additional homicides per 100,000 inhabitants – statistically significant at the 5% confidence level – relative to non-mafia regions. This result is unaffected when including a full set of year fixed effects in the regression – thus dropping  $electoral_t$  – the log of regional GDP per capita and the log of population (column 2).<sup>28</sup> In column (3) we estimate three separate interaction terms for each of the mafia-affected regions. All three coefficients are statistically significant and of the same order of magnitude (between 1 and 2 additional homicides per 100,000 inhabitants).

In columns (4) to (6) of Table 1 we look at the effect of interest over three different historical periods: between Unification and the advent of Fascism (1887-1921); during Fascism and World War II (1922-1945); and during the Republican period (1946-2012). Interestingly, homicides increase around electoral periods in mafia regions (relative to other regions) in all periods apart from during the Fascist period. In this period, elections were not free – they were plebiscites for the Fascist party, the only party admitted to run in the 1929 and 1934 elections. This period can thus be considered a placebo test, as criminal organizations had little or no chances of influencing electoral and political equilibria. Reassuringly, this is the only period in which the regression is not significantly different from zero.<sup>29</sup>

The Republican period (column 6) was characterized by considerable variation in electoral institutions. We next exploit such variation in order to test our model predictions regarding the extent of electoral violence under different electoral systems and different levels of electoral competition.

#### 4.1.1 Proportional electoral system

At the end of World War II, a national unity government formed by all anti-fascist parties (Communists, Socialists, Christian Democrats, and Liberals) guided the transition to the Italian Republic. The committee in charge of the electoral reform adopted a proportional system with both party lists and preference votes for individual candidates. The system remained in place, with only minor changes, until 1993. Throughout this period, the political landscape was marked by competition between the Christian Democrats and the Communist Party. Although the Christian Democrats always obtained a relative majority – forming a series of coalition governments with the help of small center parties – starting from the late 1970s, their vote share was progressively eroded by the advance

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<sup>28</sup>Data on regional GDP per capita and population are available from Malanima and Daniele (2007) and ISTAT, respectively. These are the only control variables available at the regional level over the period 1887-2012. In line with extensive previous evidence (e.g., Raphael and Winter-Ebmer, 2001) homicide rates are pro-cyclical with the level of economic activity, whereas they are unrelated to changes in population.

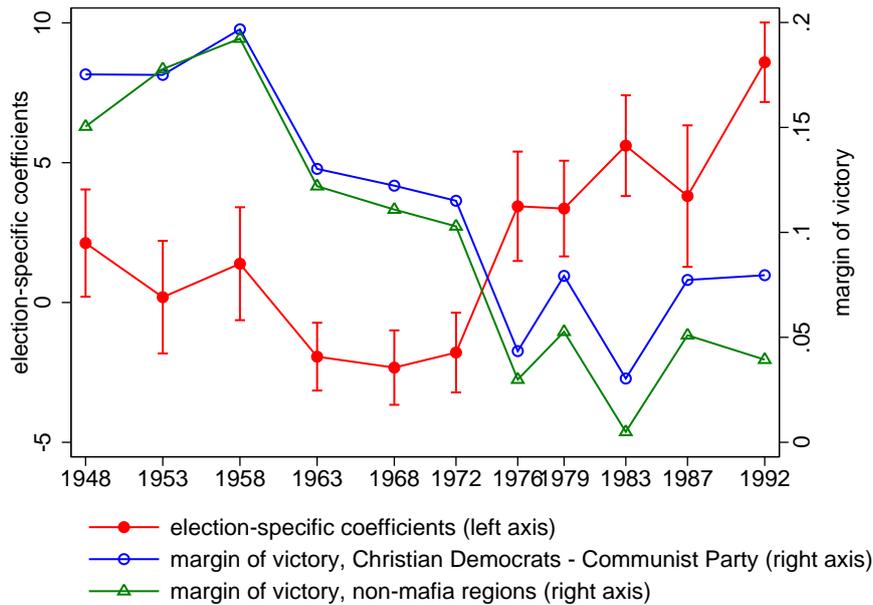
<sup>29</sup>We also find no effect on other types of (predatory) crimes. These results are reported in Table A2 of Appendix 3.

of the Italian Communist Party.

Our model predicts that the improvement in the electoral prospects of the “honest” party (i.e., non captured by the mafia) should result in more violence (Proposition 1 in Section 3.1). In order to test this hypothesis, we compute the variable *electoral* separately for each election, and we interact this full set of electoral cycle indicators with *mafia*. We then plot the election-specific effects against the evolution of the difference in votes between the Christian Democrats and the Communists.<sup>30</sup>

The results, presented in Figure 5, confirm that the differential in electoral violence between mafia and non-mafia regions increases as the gap between the two parties gets narrower. In particular, the 1976 elections marked an historical turning point, the difference between the voting share of the two major parties declining to 4.3 percent (down from 11.5 in 1972) and oscillating around 5 percent thereafter. In the same years we observe an increase in electoral violence in mafia regions relative to non-mafia regions, as estimated by the election-specific interaction coefficients reported in Figure 5.

Figure 5: Electoral violence, by election



*Note:* This figure shows the differential effect of the electoral cycle on homicides in mafia regions relative to non-mafia regions and the differential between the voting share of the Christian Democrats and the Italian Communist Party in each national election between 1948 and 1992.

Since the relative performance of the two parties in mafia regions would partly depend on electoral violence carried out by criminal organizations – this is indeed the main premise of our analysis – in Figure 5 we also plot the vote gap within the sub-sample of non-mafia regions. In such regions, the relationship between such a trend and the

<sup>30</sup>Official data on electoral results are available from the dedicated website of the Italian Ministry of Interior ([www.elezionistorico.interno.it](http://www.elezionistorico.interno.it)).

Table 2: Electoral violence under different types of electoral system

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	regional data, 1946-2012			provincial data, 1993-2004		type of homicide		
	1948-1992	1887-1909	1993-2004	majoritarian elections		mafia	non-mafia	
<i>mafia X electoral period</i>	4.303*** (1.098)	1.463*** (0.332)	1.610** (0.585)	1.512** (0.578)	1.254** (0.416)			
<i>mafia X electoral period X gap</i>	-0.372*** (0.075)	-0.028 (0.029)	-0.007 (0.041)					
<i>mafia X electoral X contested district</i>					5.686** (1.911)	5.459** (2.408)	4.350*** (1.049)	1.109 (1.457)
<i>electoral X contested district</i>					0.465** (0.171)	0.418** (0.181)	0.019 (0.016)	0.398* (0.193)
Observations	752	496	192	1,140	1,140	1,140	1,140	1,140
mafia region X year FE	NO	NO	NO	NO	NO	YES	YES	YES
R-squared	0.143	0.127	0.277	0.082	0.108	0.030	0.071	0.009

*Note:* This table shows the differential effect of electoral cycles on homicides in mafia and non-mafia regions under different electoral regimes. The units of observation are region-years in columns (1) to (3), and province-years in columns (4) to (8), as reported at the bottom of each column – the sample period is also indicated. The dependent variable in columns (1) to (6) is the homicide rate per 100,000 inhabitants. Separate figures for mafia related and other crimes are available in columns (7) and (8) for the sub-period 1993-2004. The principle explanatory variables of interest are interactions between *electoral period*, *mafia*, and *gap*. *electoral period* is the fraction of months in each calendar year within 12 months from the following national election. *mafia* is an indicator variable equal to 1 for regions with an historical presence of mafia-type criminal organizations – Sicily, Calabria, and Campania. Finally, *gap* is the difference in the voting share of the two main parties (or coalition of parties) of the Left and Right in non-mafia regions. Region and year fixed effects are included in all regressions and region X year fixed effects are included in columns (6) to (8). Robust standard errors are reported in parentheses and they are clustered by region and year using the two-way method described in Cameron et al. (2012). \*, \*\*, and \*\*\* denote statistical significance at the 90%, 95%, and 99% confidence levels, respectively.

differential in electoral violence between mafia and non-mafia regions is even steeper. Therefore, more electoral violence by criminal organizations is associated with a larger gap between Christian Democrats and Communists in mafia regions relative to non-mafia regions. This is consistent with our model: better electoral prospects for the honest party trigger violence by criminal organizations, which in turn reduces support for the honest party in mafia regions relative to other regions.

To quantify the visual evidence in Figure 5, we interact in equation (4),  $mafia_r * electoral_t$ , with the gap between the percentage vote-shares of the Christian Democrats and the Italian Communist Party (computed only across non-mafia regions, for reasons explained above). The results are presented in column (1) of Table 2. If the two parties had equal chances of winning the elections (i.e.,  $gap_t = 0$ ), the homicide rate in the year before elections would increase by 4.3 additional homicides in mafia regions relative to non-mafia regions. An electoral advantage of 5 percentage points for the captured party – i.e., about the difference between the vote shares of Christian Democrats and Communists after 1976 – reduces the differential in homicides to 2.5 per 100,000 inhabitants.<sup>31</sup>

<sup>31</sup>To minimize the risk of omitted variable bias in the estimated coefficient of  $mafia_r * electoral_t * gap_t$ , one must also include, on the right-hand side of the equation, all interactions between any two variables in the triple interaction term. However,  $gap_t$  is defined only for the electoral period – analogously to  $electoral_t$  – so  $mafia_r * gap_t$  is ultimately identical to  $mafia_r * electoral_t * gap_t$ , while  $electoral_t * gap_t$  is absorbed by the year fixed effects.

### 4.1.2 Majoritarian electoral system

In the wake of massive corruption scandals, the First Republic came to an abrupt end in 1992-1993. The Christian Democrats and their allies in government were severely damaged by the judicial investigations initiated by the scandals, disappearing from political view. The subsequent transition to the Second Republic involved a change from a pure proportional electoral system to a mixed system with a strong majoritarian component. Under the new system, 75% of seats were attributed by plurality rule in 475 single-member districts – the remaining 25% were filled with proportional representation. A majoritarian rule had already been adopted in Italy in the period before Fascism (1861-1909) although, at that time, suffrage was restricted to a minor share of the population – namely males above a certain income level.

According to our model, under a majoritarian system, electoral violence should not depend on the level of electoral competition at the national level. To test this prediction, we compute the gap between the two main coalitions during the periods in which the majoritarian system was in place. For the period 1887-1909, the Left coalition comprised the Socialists and other radical parties, whereas the Right comprised liberal and conservative parties – including the so called “Historical left”, a moderate liberal party very similar to the “Historical right”. For the period 1994-2004, the Left comprised the Democratic Party – the heir of the Italian Communist Party – and its allies, whereas the Right comprised *Forza Italia* – the party of Silvio Berlusconi – and its allies.<sup>32</sup> In columns (2) and (3) of Table 2, we then interact the gap between the two main coalitions in the election held under the majoritarian system with our main explanatory variable of interest,  $mafia_r * electoral_t$  (analogously to what we did in column 1 for proportional elections). In line with our model, the extent of electoral violence is unrelated to the intensity of electoral competition at the national-level.

The model predicts, instead, that violence should be concentrated in those “swing” districts where the outcome is more uncertain. In order to test this prediction, one would ideally compare the extent of electoral violence between contested and non-contested districts. Unfortunately, homicide rates are not available at the district level. The finest level of geographical detail is provincial – available for years since 1983. Each province includes multiple districts but no electoral district crosses provincial borders.<sup>33</sup> We thus compute the fraction of voters in each province residing in contested districts, defined as those in which the gap between the winning and losing coalition at the first elections held with the majoritarian system (1994) was below 5 percent. Then, we interact this variable with  $mafia_r * electoral_t$  in equation (4). We also interact the fraction of voters in

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<sup>32</sup>The electoral data for the periods 1887-1909 and 1994-2004 are available, respectively, from Corbetta and Piretti (2009) and from the website of the Italian Ministry of Interior.

<sup>33</sup>In 1993 there were 95 provinces and 475 districts, with a median size of 2,247 and 527 square kilometers, respectively.

contested districts with  $electoral_t$ , while the interaction with  $mafia_r$  is absorbed by the province fixed effects (always included in the regression). The regression also controls for the log of province population, the only variable available at the provincial level during the sample period.

The results are presented in columns (4) to (6) of Table 2. A standard deviation increase in the fraction of voters residing in contested districts (0.32) increases the differential in homicides between mafia and non-mafia regions during electoral periods from 1.2 to 3 (column 5). Exploiting variation across provinces, it is possible to extract any differential trend in homicide rates between mafia and non-mafia regions by interacting  $mafia_r$  with the set of year fixed effects; when doing so, the triple interaction coefficient remains identical (column 6).

The province-level criminal statistics available since 1983 also allow us to distinguish between mafia-related homicides and other homicides. Such a distinction was introduced with Article 416-bis of the Penal Code, which classifies as mafia-related the homicides committed by mafia members for the purposes of the organization. The last two columns of Table 2 show that the effect of interest is entirely due to mafia-related homicides.

## 4.2 The effects of electoral violence in Sicily, 1945-2013

We take advantage of detailed information about the homicides committed by the Mafia in Sicily to deepen our investigation into the relationship between organized crime, electoral violence, and politics.

### 4.2.1 Mafia victims

Several anti-mafia associations in Italy compile lists of victims of criminal organizations – excluding individuals that were themselves members of criminal organizations. Such lists are available on the Web and report the date and location of each murder as well as a few individual characteristics of the victim.<sup>34</sup> The information is most accurate and complete for victims of the Sicilian Mafia, which until a few years ago attracted most attention from the media, whereas there is only sparse information on the victims of other criminal organizations. For instance, the NGO *Progetto Legalità* lists 352 victims of the Sicilian Mafia, but only 34 victims of the Camorra and 31 victims of the 'Ndrangheta. This large difference is at odds with the number of homicides in each region classified by judicial authorities as mafia-related (*ex. Article 416-bis*): 1695 in Sicily, 2892 in Campania, and 1307 in Calabria.<sup>35</sup>

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<sup>34</sup>These sources are reported in Appendix 2 of the paper.

<sup>35</sup>The total number of mafia-related homicides is much higher than the number of mafia victims because the former – but not the latter – include all murders of individuals that were themselves members of criminal organizations.

Table 3: Victims of the Sicilian Mafia, 1945-2013

Total number of victims	462
Police forces and judges	142
Entrepreneurs	79
Politicians, party and union members	50
Others	192

*Note:* This table shows the number of mafia victims, for different categories of individuals, during the period 1945-2013.

Cross-checking information available from different associations and NGO's, we obtain a list of 463 victims between 1945 and 2013. These data have two main advantages for us. First, they contain the exact date and location of each murder, so we do not need to aggregate such information at the yearly and regional (or provincial) level. Second, individual-level information on victims allows us to distinguish between victims that were somehow linked with politics – specifically, members of political parties and labor unions – and other victims. Table 3 shows that police officers, judges, and entrepreneurs paid the highest toll to Mafia violence, followed by politicians and members of political parties and worker unions. However, taking into account that the latter account for a very minor fraction of the population, they face a particularly high risk compared to those not involved in politics.

Most importantly, political murders are clearly influenced by electoral cycles. In Table 4 we regress the number of victims in each month on a dummy equal to one in the 12 months before an election, and equal to zero otherwise.<sup>36</sup> Based on the OLS results in the first row of the table, the months before elections witness on average 0.2 additional victims per month – on a baseline of 0.57. When distinguishing between different categories of victims (columns 2-5), the effect is precisely estimated only for those involved in politics – politicians, party and union members. For this group, the average number of victims per month more than doubles relative to the baseline. The coefficient remains identical when including a full set of month fixed effects (second row of the table) in order to account for possible seasonality in violence cycles. The results are also very similar when employing a Poisson regression model (last two rows of the table) in order to account for the discrete nature of the dependent variable. The exponentiated coefficient reported in square brackets (i.e., the incidence-rate ratio) suggests that during the electoral period the death rate among politicians, party and union members is 2.5 times that experienced in normal times.

<sup>36</sup>All regressions control for the (log) number of residents in Sicily. Results are unaffected when excluding such variable from the regression.

Table 4: Electoral cycles and Mafia victims in Sicily, 1947-2013

category of victims →	(1)	(2)	(3)	(4)	(5)
estimation method ↓	total	politicians	police	entrep.	others
OLS regression	0.214* (0.127)	0.073*** (0.028)	0.072 (0.076)	-0.008 (0.027)	0.076 (0.085)
OLS with month FE	0.214* (0.127)	0.073*** (0.028)	0.072 (0.077)	-0.007 (0.027)	0.076 (0.084)
Poisson regression	0.350* (0.187) [1.419]	0.945*** (0.306) [2.573]	0.375 (0.359) [1.456]	0.013 (0.292) [1.014]	0.304 (0.301) [1.355]
Poisson with month FE	0.350** (0.160) [1.419]	0.958*** (0.334) [2.606]	0.374 (0.381) [1.453]	0.015 (0.293) [1.016]	0.303 (0.295) [1.354]
mean dependent variable	0.567	0.061	0.174	0.097	0.235
Observations	816	816	816	816	816

*Note:* This table shows the relationship between the timing of national elections and homicides committed by the Mafia in Sicily in each month between January 1945 and December 2013, by category of victim. The entries of the table are the estimated coefficients of a regression of the number of victims in a given category (indicated on top of each column) on a dummy equal to 1 during the 12 months before an election. Each row reports the estimate obtained using a different method, reported in the left column. For Poisson regressions, the exponentiated coefficients (i.e., incidence-rate ratios) are also reported in square brackets. Robust standard errors are reported in parentheses. \*, \*\*, and \*\*\* denote statistical significance at the 90%, 95%, and 99% confidence levels, respectively.

#### 4.2.2 Electoral results

As discussed in Section 2, the Sicilian Mafia always opposed leftist parties, so we can easily classify electoral outcomes that were more or less favored by the Mafia, and look at their relationship with the number of homicides committed in the period before elections.

In the first two columns of Table 5, we focus on the massacre of Portella della Ginestra as an interesting case-study. The dependent variable is the vote share obtained in each municipality by the Left at the regional elections of 1947 and at the national elections of 1948 – a panel of  $2 \times N$  observations,  $N$  being the number of municipalities in Sicily. On the right-hand side of the equation, we include the distance of each municipality from the location of the massacre, a dummy for the 1948 election, and the interaction between these two variables.<sup>37</sup> The idea is that, in the language of our model, the closer honest politicians were to Portella, the more scared they were by the massacre and therefore the less campaign effort they supplied in the following election.

The estimated coefficients, reported in column (1) of Table 5, convey several interesting results. First, the share of votes obtained by the Left at the 1947 regional elections (before the massacre) does not vary significantly with distance from Portella della Ginestra. Second, at the following national elections in 1948 (after the massacre) the electoral share of the Left decreases considerably – 7 percentage points in the neighborhood of the

<sup>37</sup>The location of Portella Della Ginestra is shown in Figure A2 of Appendix 3. Observations are weighted by the share of valid votes expressed in each municipality and election, so the results are representative at the regional level. Heteroscedasticity-robust standard errors are clustered by municipality.

Table 5: Electoral violence and electoral outcomes in Sicily, 1947-2013

	(1)	(2)	(3)	(4)	(5)	(6)
	period 1947-48		all national elections, 1948-2013			
<i>distance from Portella della Ginestra</i> ( $\times 100$ km)	0.001 (0.026)					
<i>elections 1948</i>	-0.070*** (0.011)	-0.065*** (0.015)				
<i>distance from Portella X elections 1948</i>	0.030** (0.012)	0.029* (0.016)				
<i>total homicides before elections</i>			-0.004*** (0.001)	-0.003*** (0.001)		
<i>political homicides before elections</i>				-0.029*** (0.006)		
<i>any homicide before elections</i>					-0.022*** (0.004)	-0.014*** (0.004)
<i>any political homicide before elections</i>						-0.027*** (0.008)
Constant	0.288*** (0.034)	0.286*** (0.005)	0.378*** (0.004)	0.378*** (0.004)	0.379*** (0.003)	0.379*** (0.004)
Observations	709	709	6,171	6,171	6,171	6,171
Municipality FE	NO	YES	YES	YES	YES	YES
Year FE	NO	NO	YES	YES	YES	YES
R <sup>2</sup>	0.024	0.927	0.802	0.803	0.802	0.803

*Note:* This table shows the effect of electoral violence by the Mafia on electoral results in Sicily. The dependent variable is the vote-share obtained by the Left – the Italian Communist Party in the First Republic and the Centre-Left coalition in the Second Republic – in each municipality and election after World War II. Columns (1) and (2) include in the sample only the regional elections of 1947 and the national elections of 1948, columns (3) to (6) include in the sample all national elections between 1948 and 2013. *distance from Portella della Ginestra* is the geodesic distance of each municipality from the location of the massacre and *elections 1948* is a dummy for the 1948 elections. *total homicides before elections* is the number of people killed by the Mafia in each municipality in the year before elections, and *political homicides before elections* is the number of victims that had some linkage with political parties and/or trade unions (e.g., party members or local administrators); *Any (political) homicide before elections* equals 1 if there was at least one (political) victim before elections and 0 otherwise. All specifications include municipality and election fixed effects. Observations are weighted by the size of the electorate. Robust standard clustered by municipality are reported in parentheses. \*, \*\*, and \*\*\* denote statistical significance at the 90%, 95%, and 99% confidence levels, respectively.

massacre. Third, the loss in votes is attenuated in municipalities that are farther away from the massacre. According to the interaction coefficient, the decrease in the vote share of the Left is cut by half in municipalities that are 100 kilometers from Portella. These results are unaffected when including municipality fixed effects, thus dropping distance from Portella from the regression (column 2).

In the remaining columns of Table 5 we extend the analysis to all national elections held during the post-War period. In column (3) we regress the share of votes obtained by the Left in each municipality and election on the number of people killed by the mafia in the 12 months preceding the elections, and in column (4) we add the number of victims during the same period that were members of political parties or labor unions. The coefficients of both variables are negative and statistically significant, however political homicides have a much larger effect on voting. This is confirmed when examining the effect of observing at least one (political) homicide in the 12 months before an election (columns 5 and 6).

The results in columns (3)-(6) of Table 5 are in line with the evidence for the specific case of Portella della Ginestra, confirming that Mafia violence during electoral periods lowers electoral support for parties of the Left.

### 4.2.3 Anti-mafia activities of elected politicians

Finally, we explore the implications of mafia homicides for the behavior of politicians over the following legislature.<sup>38</sup> In particular, we investigate whether electoral violence lowers the propensity of appointed politicians to engage in anti-mafia activities in the national parliament. In order to study these activities we measure how often politicians openly talk about the mafia once they sit in national parliament. In principle one could talk about the mafia to praise it or do discount its existence, but in reality the mafia is overwhelmingly mentioned with a negative connotation. Members of the mafia want to be ignored by the national government to be able to continue to control their territory without external interference; as Totò Riina once said, they “want to live in peace”.

We collected the transcripts of all parliamentary debates featuring at least one intervention by a member of the national parliament (MP henceforth) elected in Sicily from the main parties of the Left and Right during the period 1948-2013. We processed this very large amount of information – about 300,000 pages of transcripts – using an ad-hoc automatized routine that identified the intervention of each MP within the same debate.<sup>39</sup> We then counted the total number of times the word “Mafia” was mentioned by each politician in a given legislature. In Table 6 we regress such variable on the total

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<sup>38</sup>This test goes above and beyond our model since the latter does not investigate the behavior of politicians when in office.

<sup>39</sup>This was possible thanks to the fact that the name of each speaker, and the beginning and end of each intervention, are clearly marked in the transcripts. In general the work was made difficult and extremely time consuming because of the poor physical state of parts of this documentation.

Table 6: Electoral violence and parliamentary debates about the mafia, 1948-2013

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	all MPs elected in Sicily			MPs elected in other regions			all MPs	
<i>total number of words</i> ( $\times 1,000$ )	0.606*** (0.168)	0.607*** (0.165)	0.596*** (0.161)	0.106*** (0.032)	0.107*** (0.032)	0.106*** (0.032)	0.193** (0.079)	0.191** (0.078)
<i>total homicides before elections</i>	0.108 (0.113)	0.291* (0.148)	0.209 (0.129)	0.021 (0.016)	0.046*** (0.011)	0.034*** (0.009)	0.050*** (0.014)	0.043*** (0.013)
<i>political homicides before elections</i>		-0.978** (0.447)	-0.660 (0.400)		-0.131*** (0.035)	-0.107*** (0.025)	-0.140*** (0.043)	-0.121*** (0.033)
<i>Left</i>			1.868* (1.026)			-0.044 (0.076)		-0.131 (0.128)
<i>Left X total homicides</i>			0.350** (0.157)			0.032** (0.013)		0.020 (0.018)
<i>Left X political homicides</i>			-1.336*** (0.386)			-0.062 (0.045)		-0.050 (0.048)
<i>Sicily</i>							1.595* (0.774)	0.552 (0.373)
<i>Sicily X total homicides</i>							0.219 (0.149)	0.130 (0.107)
<i>Sicily X political homicides</i>							-0.812* (0.455)	-0.420 (0.318)
<i>Left X Sicily</i>								3.317* (1.743)
<i>Left X Sicily X total homicides</i>								0.410 (0.239)
<i>Left X Sicily X political homicides</i>								-1.689*
Observations	653	653	653	7,064	7,064	7,064	7,717	7,717
R <sup>2</sup>	0.405	0.418	0.430	0.097	0.101	0.102	0.170	0.184

*Note:* This table shows the effect of electoral violence by the Mafia on parliamentary debates since 1948, as reported in the official transcripts of the Italian Parliament. The sample in columns (1) to (3) includes all parliamentary speeches by MPs elected in Sicily from either the Christian Democratic Party or the Italian Communist Party; the sample in columns (4) to (6) includes all MPs elected in other regions that intervened in a parliamentary debate in which at least one MP elected in Sicily also intervened; and the sample in columns (7) and (8) includes all MPs in the previous columns. The dependent variable is the number of times the word “Mafia” is mentioned by each MP in a given legislature. *total homicides before elections* is the number of people killed by the Mafia in each municipality in the year before elections, and *political homicides before elections* is the number of victims that had some linkage with political parties and/or trade unions (e.g., party members or local administrators). *Left* and *Sicily* are dummy variables for MPs of the Left (the Italian Communist Party in the First Republic and the Centre-Left coalition in the Second Republic) and MPs appointed in Sicily, respectively. Finally, *total number of words* ( $\times 1,000$ ) is the total number of words pronounced by each MP in a given legislature. Robust standard errors are reported in parentheses and are clustered by MP and legislature using the two-way method described in Cameron et al. (2012). \*, \*\*, and \*\*\* denote statistical significance at the 90%, 95%, and 99% confidence levels, respectively.

number of homicides and the number of political homicides, respectively, committed by the Mafia in the 12 months before the elections (analogously to what we did in Table 5 for electoral results). We always control for the total number of words spoken by each MP in a given legislature.

Columns (1) to (3) include only MPs elected in Sicily. As should be expected, a higher number of homicides during the electoral period increases the salience of Mafia-related issues in the political debate during the legislature that follows – though the coefficient of total homicides is not statistically significant in column (1). At the same time, keeping constant the total number of homicides, political murders *decrease* the propensity to talk about the Mafia, this effect being large and statistically significant (column 2). These results confirm the hypothesis that (only) political homicides have an intimidating effect on MPs appointed in the elections. In column (3) we add to the equation a dummy for politicians appointed from the Left and its interaction with total and political homicides committed during the electoral period. Interestingly, MPs appointed from the Left are

on average more willing to bring up the Mafia in parliamentary debates, especially after periods of greater electoral violence (see the positive interaction coefficient on *Left X total homicides*). At the same time, they are also more intimidated by political murders. This is consistent with the idea that political violence effectively signals the strength of the Mafia to “honest” politicians.

In columns (4) to (6) we replicate the analysis for MPs appointed in other regions that intervened in the same debates with (at least) one MP appointed in Sicily. Interestingly, the sign of the coefficients of total homicides, political homicides, and their interactions with *Left* is the same as for MPs appointed in Sicily, but the magnitudes are considerably lower. Intuitively, the Mafia may have less intimidatory power against MPs, party organizations, and voters from other regions.

In the last two columns of Table 6 we pool together MPs appointed in all regions, we include a dummy for MPs appointed in Sicily and interact it with all other variables of interest. On the one hand, MPs appointed in Sicily talk more about the Mafia, on the other they also seem more vulnerable to intimidation (column 7). In line with the results in the previous columns, such effects are driven by MPs appointed from the Left (column 8).

## 5 Conclusions

The influence of organized crime on politics undermines the functioning of a democracy. This paper argues that, to the extent that criminal organizations participate in the political game, they adopt strategies which are influenced by the electoral context and the rules of the game. That is, the strategy of violence rationally reacts to the timing of elections, the popularity of various parties and changes in voting rules. To begin with, the intensity of political violence (like any ‘normal’ campaign strategy) is higher closer to elections. Also, based on the assumption that violent intimidation influences (honest) politicians’ electoral effort, our model predicts that criminal organizations find it optimal to exert violence in contested districts under majoritarian (‘first-past-the-post’) electoral systems but not under proportional electoral systems where the location of the violence matters much less. Both the assumptions and the predictions of our theoretical model are supported by empirical evidence from Italy. We uncover a political cycle of homicides in regions with criminal organizations. Using regional data going back as far as 1887, we find that mafia regions, but not other regions, exhibit spikes in the homicide rate before elections. We also show changes in criminal organization strategies when the electoral voting system changed. Under majoritarian elections such spikes are more pronounced in provinces where the election results are more uncertain. Also, evidence from Sicily during the post-war period suggests that electoral violence significantly disadvantages parties opposed by the Mafia. We demonstrate this result with an interesting event study and a

full sample analysis.

Finally we investigate whether indeed politicians feel threatened and decrease their anti-mafia activities as a result of violence. Using a very large data set of electoral speeches, we find strong evidence that anti-mafia activities by politicians elected in Sicily are, in fact, negatively correlated with the levels of pre-electoral violence.

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## Appendix 1: Proofs

**Proof of Proposition 1.** The (equilibrium) profit of a type- $\theta$  criminal organization is:

$$\pi_{\theta}^* \equiv b[1 - h(e_{\theta}^*, \alpha)] - k(\nu_{\theta}^*, \theta) = \begin{cases} b[1 - \alpha - \frac{1+\alpha}{s}] - \frac{\nu_s^*}{s} & \Leftrightarrow \theta = s, \\ b[1 - \alpha - \frac{1+\alpha}{w}] - \frac{\nu_w^*}{w} & \Leftrightarrow \theta = w. \end{cases}$$

In order to construct equilibria we must now specify off-path beliefs. Note that, for any  $\nu_w^*$ , a weak type has no incentive to mimic the strong type as long as  $\nu_s^* \geq \hat{\nu}$ , with  $\hat{\nu}$  being solution of

$$b[1 - h(e_s^*, \alpha)] - k(\hat{\nu}, w) = b[1 - h(e_w^*, \alpha)] - k(\nu_w^*, w) \quad \Leftrightarrow$$

$$\hat{\nu}(\nu_w^*) = \nu_w^* + b(1 + \alpha) \frac{\Delta}{s}.$$

The most natural separating equilibria are those in which the observed violence level is high and the organization is strong. That is, a candidate for a PBE has to set beliefs such that

$$\beta(\nu) = 1 \quad \Leftrightarrow \quad \nu \geq \hat{\nu},$$

$$\beta(\nu) = 0 \quad \Leftrightarrow \quad \nu < \hat{\nu}.$$

If the criminal organization optimizes its behavior given these beliefs then, it is easy to show that it chooses no violence when it is weak – i.e.,  $\nu_w^* = 0$ . Indeed, if  $\nu_w^* > 0$  the weak organization would strictly gain by choosing  $\nu = 0$  regardless of the off-equilibrium belief associated with this choice. By contrast, when it is strong, it chooses

$$\hat{\nu}(0) \equiv b(1 + \alpha) \frac{\Delta}{s}.$$

Note that this level of violence also satisfies the incentive compatibility constraint of the strong type – i.e.,

$$b[1 - h(e_s^*, \alpha)] - \frac{\nu_s^*}{s} \geq b[1 - h(e_w^*, \alpha)] \quad \Leftrightarrow \quad \nu_s^* \leq b \frac{\Delta}{w} (1 + \alpha),$$

with  $b \frac{\Delta}{w} (1 + \alpha) > \hat{\nu}(0)$ . Hence, the separating equilibrium that is least costly requires a level of violence equal to  $b \frac{\Delta}{s} (1 + \alpha)$ . ■

**Equilibrium selection (proportional system).** The intuitively plausible PBE identified in Proposition 1 is not unique: many other separating equilibria exist. In fact, note that, for any equilibrium candidate such that  $\nu_s^* > 0 = \nu_w^*$ , incentive compatibility

requires

$$b[1 - h(e_s^*, \alpha)] - \frac{\nu_s^*}{s} \geq b[1 - h(e_w^*, \alpha)] \Leftrightarrow \nu_s^* \leq b(1 + \alpha) \frac{\Delta}{w},$$

for the strong type. And, equivalently,

$$b[1 - h(e_w^*, \alpha)] \geq b[1 - h(e_s^*, \alpha)] - \frac{\nu_s^*}{w} \Leftrightarrow \nu_s^* \geq b(1 + \alpha) \frac{\Delta}{s},$$

for the weak type. One can find off-equilibrium beliefs which support any  $\nu_s^*$  such that

$$\nu_s^* \in \mathcal{S} \equiv \left[ b(1 + \alpha) \frac{\Delta}{s}, b(1 + \alpha) \frac{\Delta}{w} \right].$$

Essentially, this requires  $\beta(\nu) = 1$  for every  $\nu \geq \nu_s^*$  and  $\beta(\nu) = 0$  otherwise. The least-costly separating equilibrium has two appealing properties. First, it maximizes the criminal organization's expected profit (this property is straightforward to verify). Second, it is the only one that meets the Cho and Kreps (1987) intuitive criterion. To see why, recall that a PBE is 'unreasonable' in the Cho-Kreps sense if it is sustained by off-path beliefs that 'attribute' some deviations to types that prefer to play their equilibrium strategy rather than the observed deviation, even if these beliefs would treat such types in the best possible way following the deviation (see Fudenberg and Tirole, 1998). In other words, beliefs conditional on out-of-equilibrium actions should reflect the fact that these actions are more likely to be chosen by one organizational type rather than another. More formally, using our notation,  $\beta(\nu) = 1$  for some  $\nu \neq \nu_s^*$ , is compelling in the Cho-Kreps sense whenever

$$\begin{aligned} \pi_w^* &> b[1 - h(e_s^*, \alpha)] - k(\nu, w), \\ \pi_s^* &\leq b[1 - h(e_s^*, \alpha)] - k(\nu, s). \end{aligned}$$

Similarly,  $\beta(\nu) = 0$  for some  $\nu \neq \nu_s^*$ , is compelling in the Cho-Kreps sense whenever

$$\begin{aligned} \pi_w^* &\leq b[1 - h(e_s^*, \alpha)] - k(\nu, w), \\ \pi_s^* &> b[1 - h(e_s^*, \alpha)] - k(\nu, s). \end{aligned}$$

Meaning that when a deviation is *dominated* for one type of organization but not for the other, this deviation should never be attributed to the player for which it is dominated. When an equilibrium does not satisfy this criterion, it fails the Cho-Kreps test. Applying this logic to the set  $\mathcal{S}$  of separating equilibria, it can be shown that every  $\nu_s^* > \hat{\nu}(0)$  fails to satisfy its requirements except for the least-costly one  $\hat{\nu}(0)$ . In fact,

consider any  $\nu \in [\hat{\nu}(0), \nu_s^*]$ . By construction

$$\pi_s^* = b[1 - h(e_s^*, \alpha)] - k(\hat{\nu}(0), s) > b[1 - h(e_s^*, \alpha)] - k(\nu, s),$$

but

$$\pi_w^* \leq b[1 - h(e_s^*, \alpha)] - k(\nu, w).$$

Meaning that, a reasonable system of off-equilibrium beliefs should be such that  $\beta(\nu) = 1$  for every  $\nu \in [\hat{\nu}(0), \nu_s^*]$ , which is in contradiction with the fact that  $\nu_s^*$  is sustained by off-equilibrium beliefs such that  $\beta(\nu) = 1$  for every  $\nu \geq \nu_s^*$  and  $\beta(\nu) = 0$  otherwise. Hence, all separating equilibria strictly contained in  $\mathcal{S}$  are discarded by the intuitive criterion.

By construction, the least-separating equilibrium cannot be discarded by the Cho-Kreps intuitive criterion – i.e., it survives the test. Indeed:

$$\pi_w^* < b[1 - h(e_s^*, \alpha)] - k(\nu, w),$$

and

$$\pi_s^* < b[1 - h(e_s^*, \alpha)] - k(\nu, s),$$

at any  $\nu < \hat{\nu}(0)$ . So that  $\beta(\nu) = 0$  for  $\nu < \hat{\nu}(0)$  is plausible in the Cho-Kreps sense.

By the same token, it can be shown that

$$\pi_w^* > b[1 - h(e_s^*, \alpha)] - k(\nu, w),$$

and

$$\pi_s^* > b[1 - h(e_s^*, \alpha)] - k(\nu, s),$$

for any  $\nu > \hat{\nu}(0)$ . So that  $\beta(\nu) = 1$  for  $\nu > \hat{\nu}(0)$  is plausible in the Cho-Kreps sense. ■

**Pooling Equilibria (proportional system).** In a pooling equilibrium, the criminal organization always chooses  $\nu^*$  regardless of its type. In this case, honest politicians base their effort choice on the prior, i.e.,  $\beta(\nu^*) = \beta$ . Hence, the electoral effort chosen by the honest candidates in any of these (candidate) equilibria solves the following maximization problem

$$\max_{e \in [0, 1-\alpha]} \left\{ h(e, \alpha) - \mathbb{E}[\theta | \nu^*] \frac{e^2}{2(1+\alpha)} \right\},$$

where

$$\mathbb{E}[\theta | \nu^*] = \beta s + (1 - \beta) w.$$

The solution for is:

$$e^* = \frac{1 + \alpha}{\beta s + (1 - \beta) w}.$$

In equilibrium we must have:

$$\nu^* \in \mathcal{P} \equiv \left[ 0, \frac{b(1+\alpha)\beta\Delta}{\beta s + (1-\beta)w} \right]$$

For any  $\nu^*$  in this interval, one can construct off-equilibrium beliefs that support this outcome as a PBE. Intuitively, the set of pooling equilibria is determined by the fact that the weak organization could induce an effort of  $\frac{1+\alpha}{w}$  without the need to exert violence. That is

$$b[1 - h(e^*, \alpha)] - k(\nu^*, w) \geq b[1 - h(e_w^*, \alpha)] \Leftrightarrow \nu^* \leq \frac{b(1+\alpha)\beta\Delta}{\beta s + (1-\beta)w}. \quad (5)$$

This is because, there cannot exist a pooling equilibrium such that  $\beta(0) = 1$ . Hence,  $\beta(0)$  must be equal to 0 in any pooling equilibrium. Condition (5) is in fact a necessary condition for a pooling equilibrium to exist, otherwise a weak organization would always profit from revealing its type. As before, it is possible to find appropriate out-of-equilibrium beliefs that support each of these levels of violence as a pooling equilibrium. For example,  $\beta(\nu) = \beta$  whenever  $\nu \geq \nu^*$  and  $\beta(\nu) = 0$  otherwise. Under these beliefs, a strong organization never profits from revealing its type if the weak organization doesn't, nor can it gain by pretending to be a weak type. Indeed, any level of violence higher than the equilibrium level is always attributed (off equilibrium) by candidates to the weak type, which leads them to increase effort at the expense of the deviating organization.

How robust are these equilibria? Following the logic used in the case of separating equilibria it is straightforward to show that the Cho-Kreps intuitive criterion discards all of them.<sup>40</sup> Let  $\pi_\theta^p$  be type  $\theta$ 's equilibrium expected profit in a pooling equilibrium. The idea is that since the pooling outcome is sustained by beliefs such that  $\beta(\nu) = 0$  for every  $\nu \geq \nu^*$ , and the strong type has lower costs of violence, there always exists a  $\nu' > \nu^*$  such that

$$\pi_s^p > b[1 - h(e_w^*, \alpha)] - k(\nu', s),$$

$$\pi_w^p \leq b[1 - h(e_w^*, \alpha)] - k(\nu', w),$$

but yet  $1 - \beta(\nu') > 0$ , which is implausible in the Cho-Kreps sense.

We can thus conclude that the least-costly separating outcome characterized in Proposition 1 is the most appealing equilibrium of the game. ■

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<sup>40</sup>Of course, there may also exist semi-separating equilibria, in which at least one type mixes between two signals, one of which is also chosen with positive probability by the other type. These equilibria, however, do not satisfy the intuitive criterion – for a simple exposition, see, e.g., Bolton and Dewatripont, (2005, Ch. 3.1.).

**Proof of Proposition 2.** First, note that condition (2) can be rewritten as

$$\frac{1}{s} < \psi\left(\frac{1}{2} - \alpha_i, \alpha_i, 1\right) < \frac{1}{w},$$

where

$$\psi\left(\frac{1}{2} - \alpha_i, \alpha_i, 1\right) \equiv \frac{\left[\frac{1}{2} - \alpha_i\right]^2}{2(1 + \alpha_i)},$$

which is strictly decreasing in  $\alpha_i$  for  $\alpha_i \in [0, \frac{1}{2}]$ . Hence, it is satisfied only if  $s$  is not too small – i.e.,  $\frac{1}{s} < \lim_{\alpha_i \rightarrow 0} \frac{[\frac{1}{2} - \alpha_i]^2}{2(1 + \alpha_i)} = \frac{1}{8}$  – and if  $\alpha_i \in [\underline{\alpha}, \bar{\alpha}]$ , with

$$\underline{\alpha} \equiv \frac{1}{2} + \frac{1}{w} - \sqrt{\frac{3}{w} + \frac{1}{w^2}} < \bar{\alpha} \equiv \frac{1}{2} + \frac{1}{s} - \sqrt{\frac{3}{s} + \frac{1}{s^2}} < \frac{1}{2},$$

and  $\underline{\alpha} > 0$  by assumption A3.

Recall that, under assumption A2, the objective function of the criminal organization is separable across districts. Hence, focus (without loss of generality) on a generic district  $i$ , and assume that  $\alpha_i \in [\underline{\alpha}, \bar{\alpha}]$ . In this region of parameters a weak type can never induce the honest candidate(s) to lose the election. As a result, in equilibrium it must be  $\nu_{i,w}^* = 0$ , so that it makes no profit – i.e.,  $\pi_{i,w}^* = 0$ . By contrast, in a separating equilibrium, the strong type can allow the corrupt party to win the election. Hence, its (equilibrium) profit is

$$\pi_{i,s}^* \equiv \frac{b}{N} - k(\nu_{i,s}^*, s).$$

That is, the benefit of ruling the district  $\frac{b}{N}$  net of signaling cost  $k(\nu_{i,s}^*, s)$ .

Hence, a separating equilibrium in which  $\nu_{i,s}^* > 0$  can exist if, and only if, the following incentive compatibility constraints hold

$$\frac{b}{N} - k(\nu_{i,s}^*, s) \geq 0 \geq \frac{b}{N} - k(\nu_{i,s}^*, w).$$

This defines the set of separating equilibria

$$\nu_{i,s}^* \in \mathcal{S}' \equiv \left[ \frac{wb}{N}, \frac{sb}{N} \right].$$

As before, the off-equilibrium beliefs that support each of these equilibria are such that  $\beta(\nu) = 1$  for every  $\nu \geq \nu_{i,s}^*$ , and  $\beta(\nu) = 0$  otherwise. We have thus established the existence of the least-costly separating equilibrium, in which  $\nu_{i,s}^* = \frac{wb}{N}$ . ■

**Equilibrium selection (majoritarian system).** The least-costly separating equilibrium characterized in Proposition 2 not only maximizes the organization's expected profit, but it is also the only one that survives the intuitive criterion. To see why, consider any  $\nu_{i,s}^* \in \mathcal{S}'$  strictly larger than  $\underline{\nu}_{i,s}^*$ , sustained by off-equilibrium beliefs such that  $\beta(\nu) = 1$

for every  $\nu \geq \nu_{i,s}^*$ , and  $\beta(\nu) = 0$  otherwise. Consider a deviation  $\nu \in [\frac{wb}{N}, \nu_{i,s}^*)$ . The following is true

$$\pi_{i,s}^* = \frac{b}{N} - k(\nu_{i,s}^*, s) < \frac{b}{N} - k(\nu, s),$$

whereas by incentive compatibility

$$0 = \frac{b}{N} - k(\frac{wb}{N}, w) > \frac{b}{N} - k(\nu, w).$$

Hence, the off-equilibrium beliefs such that  $\beta(\nu) = 0$  for every  $\nu < \nu_{i,s}^*$  cannot satisfy the intuitive criterion.

By contrast, the least costly separating equilibrium is consistent with Cho-Kreps because

$$0 < \frac{b}{N} - k(\nu, w),$$

and

$$\frac{b}{N} - k(\frac{wb}{N}, s) < \frac{b}{N} - k(\nu, s)$$

for every  $\nu < \frac{wb}{N}$ . So that  $\beta(\nu) = 0$  for  $\nu < \frac{wb}{N}$  is plausible in the Cho-Kreps sense.

By the same token, it can be shown that

$$0 > \frac{b}{N} - k(\nu, w),$$

and

$$\frac{b}{N} - k(\frac{wb}{N}, s) > \frac{b}{N} - k(\nu, s),$$

for every  $\nu > \frac{wb}{N}$ . So that  $\beta(\nu) = 1$  for  $\nu > \frac{wb}{N}$  is plausible in the Cho-Kreps sense.

The analysis of pooling equilibria under a majoritarian system follows the same logic as in the proportional system and is omitted for brevity. ■

**Information externalities.** Consider the most interesting case in which in both districts the  $c$  party can win if the criminal organization signals its type – i.e.,  $\alpha_i$  that satisfies (2) for  $i = 1, 2$ . Clearly, when  $\lambda_1 = \lambda_2 = 0$  the organization exerts the same level of violence in both districts – i.e.,  $\nu_{i,s}^* = \frac{wb}{2}$  and  $\nu_{i,w}^* = 0$ . The same option is feasible when  $\lambda_1 > \lambda_2 \geq 0$ , and yields the (strong) organization a total payoff

$$\sum_{i=1,2} \frac{b}{2} \left[1 - \frac{w}{s}\right] = b \left[1 - \frac{w}{s}\right].$$

However, an alternative strategy that the organization could enact would be to exert violence, say  $\nu^*$ , only in district 1, in order to exploit the informational externality between districts while saving on the cost of signaling in district 2. In this case, the equilibrium

expected payoff of the strong organization is

$$\frac{b}{2}(1 + \lambda_1) - \frac{\nu^*}{s},$$

which does not induce mimicking by the weak type when

$$0 \geq \frac{b}{2}(1 + \lambda_1) - \frac{\nu^*}{w} \Leftrightarrow \nu^* \geq \frac{bw}{2}(1 + \lambda_1).$$

Restricting attention (as before) to the least-costly separating equilibrium – i.e.,  $\nu^* = \frac{bw}{2}(1 + \lambda_1)$  – we have

$$b \left[1 - \frac{w}{s}\right] \frac{1 + \lambda_1}{2} \leq b \left[1 - \frac{w}{s}\right].$$

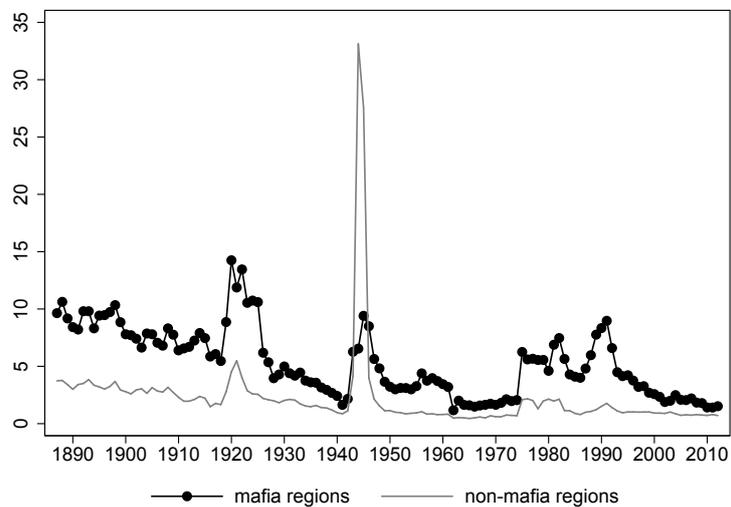
Hence, it is never convenient to exert violence only in district 1. Of course, since,  $\lambda_2 < \lambda_1$  it is also not profitable for the organization to engage in violence only in district 2 to save on the signaling cost in district 1. ■

## Appendix 2: Lists of victims of the Sicilian Mafia

Organization	Web Address
Fondazione Progetto Legalità	<a href="http://www.progettolegalita.it/it/prodotti_sociali/elenco_vittime_della_mafia.php">http://www.progettolegalita.it/it/prodotti_sociali/elenco_vittime_della_mafia.php</a>
Libera	<a href="http://www.libera.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/87">http://www.libera.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/87</a>
VittimeMafia	<a href="http://www.vittimemafia.it/">http://www.vittimemafia.it/</a>
Wikipedia	<a href="https://it.wikipedia.org/wiki/Vittime_di_Cosa_nostra_in_Italia">https://it.wikipedia.org/wiki/Vittime_di_Cosa_nostra_in_Italia</a>

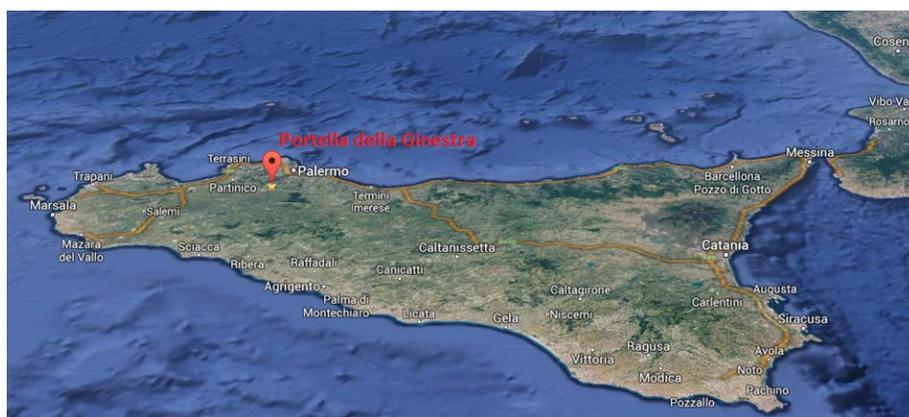
## Appendix 3: Additional figures and tables

Figure A1: Homicide rates in mafia and non-mafia regions, 1887-2012



*Note:* The graph shows the time series of homicides per 100,000 inhabitants in regions with an historical presence of mafia-type criminal organizations (Sicily, Campania, and Calabria) and in other regions.

Figure A2: The Massacre of Portella della Ginestra



*Note:* The map indicates the location of the Massacre of Portella della Ginestra, on Labour Day 1947.

Table A1: Judicial investigations for mafia-related crimes and political alignment of members of the Italian Parliament, 1945-1993

	(1)	(2)	(3)	(4)	(5)	(6)
	mafia association (Article 416-bis)		criminal association (Article 416)		malfeasance (corruption, abuse)	
<i>mafia region</i>	0.009*** (0.003)		0.029*** (0.008)		0.032*** (0.009)	
<i>Left</i>	-0.001* (0.001)	-0.001 (0.001)	-0.007* (0.004)	-0.002 (0.004)	-0.019*** (0.004)	-0.015*** (0.004)
<i>Left X mafia region</i>	-0.009*** (0.003)	-0.009*** (0.003)	-0.021* (0.011)	-0.024** (0.011)	-0.024** (0.011)	-0.027** (0.011)
Constant	0.001* (0.001)		0.021*** (0.003)		0.032*** (0.003)	
Observations	6,043	6,033	6,043	6,033	6,043	6,033
Region FE	NO	YES	NO	YES	NO	YES
Legislature FE	NO	YES	NO	YES	NO	YES
R-squared	0.006	0.014	0.006	0.045	0.009	0.056

*Note:* This table shows the relationship between the MPs' probability of being investigated for mafia-related crimes, the region in which they were appointed, and their party affiliation. The dependent variable is a binary indicator equal to one for MPs investigated for various types of crime (indicated on top of each column) and equal to zero otherwise. The explanatory variables *mafia region* and *Left* are indicator variables equal to one for MPs elected in Sicily, Calabria, and Campania, and for politicians elected with a party of the Left, respectively. The data cover the period 1945-1993. \*, \*\*, and \*\*\* denote statistical significance at the 90%, 95%, and 99% confidence levels, respectively.

Table A2: Other crimes in mafia and non-mafia regions during the electoral period, 1956-2012

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	theft	robberies	extortions	kidnap	all predatory	smug	drug
<i>mafia X electoral period</i>	39.80 (69.49)	-0.757 (12.07)	0.205 (0.841)	0.218 (0.279)	9.123 (12.51)	12.42 (9.175)	-0.300 (6.148)
Average crime rate	1413.5	40.545	5.954	1.463	33.826	22.694	44.214
Observations	912	608	608	608	912	480	608
R-squared	0.805	0.435	0.722	0.803	0.566	0.156	0.814
Number of regions	16	16	16	16	16	16	16
Initial year	1956	1975	1975	1975	1956	1983	1975

*Note:* This table shows the differential effect of electoral cycles on various types of crime (other than homicides), indicated on top of each column, in mafia and non-mafia regions. The category 'all predatory' is the sum of robberies, extortions, and kidnappings. The dependent variable is the crime rate per 100,000 inhabitants in each region and year, the explanatory variable of interest is the interaction between the fraction of months in each calendar year within 12 months from the following national election (*electoral Period*) and an indicator variable equal to 1 for regions with an historical presence of mafia-type criminal organizations (*mafia*). All series extend through year 2012 but the initial sample year varies for each type of offense, and it is reported at the bottom of each column; the average crime rate for each type of offense is also reported in the table. Region and year fixed effects are included in all regressions. Robust standard errors are reported in parentheses and they are clustered by region and year using the two-way method described in ?. \*, \*\*, and \*\*\* denote statistical significance at the 90%, 95%, and 99% confidence levels, respectively.