The Coercive Power of Mafia Reputation on Inter-firm Interactions[*]

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Organized crime represents a pervasive threat to countries worldwide. Yet, it is difficult to underpin how organized crime can jeopardize firms' relationships and economic transactions in the legal economy. We explore this issue by analyzing to what extent firms' behavior can be distorted due to the perceived threat of coercive actions from mafia-type organizations. We document that firms with top executives that have a mafia surname receive a greater trade credit extension than other similar firms. Reallocation of resources due to mafia reputation has relevant consequences for the real economy.

Keywords: *Mafia, Trade Credit, Capital Structure, Supply Chain*

JEL Classifications: G18, G21, G28

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1. Introduction

Organized crime[1] have a disruptive and pervasive influence on the legal economies of countries all over the world. According to the Global Organized Crime Index (GOCI, 2021), the impact of organized crime has spread across the globe, particularly in the last two decades, driven by geopolitical, economic, and technological forces. [2] Despite the differences in national laws worldwide, criminologists agree that organized crime encompasses illegal activities pursued to attain material benefit by specific groups through the use of extreme violence, corruption of public officials, penetration of the legitimate economy (e.g., through racketeering and money-laundering) and interference in the political process (Kenney and Finckenauer 1995; Levi, 2002), as well as the racket of coercive private protection to landowners and businesses (Gambetta, 1993; Michalopoulos and Papaioannou, 2013; Acemoglu et al., 2020).[3]

Organized crime exerts an enormous control over local territories (Acemoglu et al., 2013; 2020; UNICRI, 2016; Alesina et al., 2018; Le Moglie and Sorrenti, 2020)[4] and it represents a *de facto* parallel authority structure that exerts unique state-like functions such as the policing and enforcement of contracts to regulate illicit transactions among criminal organizations (e.g., Gambetta, 1993; Volkov, 2002; Koivu, 2016). It can distorts the functioning of the market (Pinotti, 2015a,b; Ferrante et al., 2021), increases the cost of funding (Bonaccorsi di Patti, 2009), hampers foreign direct investments (Daniele and Marani, 2011), facilitates the misallocation of public funds

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[1] For the remainder of the paper, we will use the expressions organized crime, criminal organizations, mafia-type organizations, and mafia as synonyms. While the term "Mafia" originated in Sicily it is, however, widely used to indicate other organized crime groups across the globe (Europol, 2013). We instead refer to Mafia from Sicily as "Sicilian Mafia" or "Cosa Nostra".

[2] "More than three-quarters of the world's population live in countries with high levels of criminality, and in countries with low resilience to organized crime" (GOCI, p.12). Asia has the highest level of criminality, closely followed by Africa and America.

[3] Many of these aspects have been included in anti-Mafia laws of some countries, such as the USA, Italy and Hungary (Fijnaut and Paoli, 2004) but are also used by the European police community (Levi, 2002).

[4] According to the UNODC (2011), organized crime's worldwide proceeds accounted for $2.1 trillion in 2009, with $1.6 trillion reinvested in the legal economy.

(Barone and Narciso, 2015; Daniele and Dipoppa, 2017), and affect firms' revenues (Mirenda et al., 2022). What emerges from these studies is that mafia is capable to acquire competitive positions with respect to firms operating within the law by exerting its intimidating power. Although the pervasive market-disrupting power of the organized crime[5] is cultivated by the fear that there may be retaliations against those who oppose their criminal activities, this phenomenon however is difficult to measure and still largely overlooked.

In this paper we address this issue by studying the effect of organized crime on the legal economy stemming from the perceived threat and, thus, fear induced by the presence and action of criminal organizations. To this purpose, we consider whether the perceived association of firms with organized crime creates a distortive effect on firms' relationships. On this respect, we argue that the threat and fear induced by the potential presence and action of criminal organizations in businesses may alter the economic transactions between customers and suppliers. From an empirical viewpoint, we explore this phenomenon by considering whether firms whose top executives' surnames happen to be the same as those of Mafiosi (members of organized crime' clans or families) receive additional liquidity resources from their suppliers via a greater payment delay.[6] This is because anecdotal evidence[7] worldwide suggests that people perceive a mafia surname as a credible signal of mafioso identity (Smith and Varese, 2001), which can therefore

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[6] Here, as in the remainder of the paper, we use the expression "mafia-surname customers" or "mafia-surname firms" to indicate the firms whose top executive's surname happened to be the same as that of Mafiosi. We also use "mafia surnames" to indicate surnames that happened to be the same as those of Mafiosi.

[7] There are several examples of individuals using mafia surnames, although never members of mafia-type clans, to extort money or gain benefits from others all over the world. For example, according to the policy report, Salvadore Badalamenti, whose surname happened to be the same as that of a well-known Sicilian Mafioso, Tano Badalamenti, managed to extort money from entrepreneurs in a Piedmont village in the North of Italy (Smith and Varese, 2001). These impostors (people who claim to be Mafiosi but are not in reality, or people who claim to be protected by Mafiosi but are not) try to pass as real Mafiosi by using mafia surnames to benefit from the mafia reputation with the aim of extrapolating rents and taking advantage of others.

exert an intimidating effect on others. Similarly, we argue that individuals with a mafia surname could be considered as a legitimate member of mafia organizations particularly in the circumstances where there could be more asymmetric information regarding their identity.

We specifically hypothesize that individuals can be intimidated by the possibilities of threatening and violent retaliations by these trade partners under the presumption that they could be associated with mafia businesses (even if there is no direct evidence that they collude with them). Consequently, suppliers may attribute more bargaining power to customers whose top executive has a mafia surname and offer them a greater liquidity compared to other customers. We proxy transfer of liquidity with trade credit which represents an important financing source for both small and large firms (e.g. Demirgüç-Kunt and Maksimovic, 2002, Coricelli and Frigerio, 2019; Giannetti et al., 2021; Gofman and Wu, 2022). Indeed, prior studies show that suppliers tend to extend a greater payment delay, which consists of having a larger share of goods sold on credit, when they deal with influential buyers (Fisman and Raturi, 2004; Giannetti et al., 2011; 2021; Klapper et al., 2012; Fabbri and Klapper., 2016; Chod et al., 2019).[8]

As an alternative hypothesis, we conjecture that the disclosure of new mafia surnames could discipline the market by inducing costumers happening to share the same surnames with those of Mafiosi to pay sellers in advance. In this case, customers aware of the bias induced by their mafia

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[8] A large amount of studies has proposed alternative frictions to explain the existence of trade credit (Klapper et al., 2012; Murfin and Njoroge, 2015; Barrot, 2016; Fabbri et al., 2016; Breza and Liberman, 2017; Coricelli and Frigerio, 2019; Giannetti et al., 2021; Gofman and Wu, 2022). Trade credit has specifically been attributed to the presence of taxes, transaction costs, imperfect market competition, information asymmetries, and moral hazard concerns (Cuñat and Garcia-Appendini, 2012). In this strand of literature, suppliers are thought to experience an information advantage over traditional lenders with respect to customers' creditworthiness as well as the condition of the buyers' business (Petersen and Rajan, 1997). They can also limit agency problems by enforcing repayment of credit under the threat of stopping the supply of intermediate goods to their customers (Klapper et al., 2012). However, there could also be uncertainty in the supplier-customer relationship as information asymmetry can reside in the quality of the products, which is known only by sellers but not by buyers (Smith, 1987). While this literature attributes to the suppliers the capability to identify the types of the different buyers and to benefit from information advantages over banks, supplier relationships are also the result of interactions between individuals who could act according to rule-based behavior. For example, Levine et al. (2018) show that greater trustworthiness and cooperation among individuals may favor credit extensions.

surnames could be more inclined to shorten their payment duration to preserve their reputation although this is not an optimal choice. In this case, mafia-surname firms should experience a decrease of trade credit extension.

Our theoretical arguments draw on the behavioral finance literature that has extensively documented that individuals' probabilistic perceptions and judgments are subject to various systematic errors (see, for example, Benjamin, 2018, for a review). Among them, a representativeness heuristic bias is associated with the tendency to judge as likely events that are merely representative, resulting in judgment errors regarding the probability of an outcome (Kahneman and Tversky, 1972; 1973). In finance it is not in fact unusual that a lender may assess the borrower's creditworthiness based on the extent to which the borrower reflects the essential characteristics of a stereotyped group (Baker and Nofsinger, 2010). Furthermore, there is a well-documented body of management literature which argues that individuals tend to interact with each other following heuristic rules for information gathering and analytical cognitive elaboration in uncertain environments (e.g., Busenitz and Barney, 1997; Kahneman, 2002; Bingham et al., 2007; Bingham and Eisenhardt, 2011; Kahneman, 2011; Guercini et al., 2014). Similarly, the perceived association of costumers with organized crime could induce suppliers to extend more trade credit to buyers to avoid risk consequences stemming from "bad" choices.

From an empirical viewpoint, we test our hypothesis by focusing on Italy that represents an ideal setting for this analysis as it is characterized by a high presence of several criminal organizations (mainly *Sicilian Cosa Nostra, Neapolitan Camorra,* and *'ndrangheta*) dating back to the nineteenth century.[9] It is in fact estimated that these organizations have profoundly damaged

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[9]According to the Law 646/82 Article 416-bis mafia organizations ('associazione a delinquere di stampo mafioso') are defined as those groups that "exploit the power of intimidation granted by the membership in the organization, and the conditions of subjugation and omerta that descends from it, to commit crimes and acquire the control of economic activities, concessions, authorizations, and public contracts".

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Italy's local economic development leading to economic losses in terms of GDP and productivity up to around 16% over a thirty-year period (Peri, 2004; Albanese and Marinelli, 2013; Pinotti, 2015a,b). For the identification strategy, we consider changes in trade credit supply triggered from an external shock induced by the disclosure of information on new mafia-type organizations' members. In particular, we make use of the semi-annual reports on mafia-type organizations published by judiciary police – the Anti-Mafia Investigation Directorate – under the Department of Public Security of the Ministry of the Interior in Italy over the period 2005-2018. The Anti-Mafia Investigation Directorate also known as the DIA is an Italian multi-force investigatory body established in 1991 which operates under the Department of Public Security of the Ministry of the Interior. Its main tasks are to conduct preventive investigations into activities relating to organized crime, as well as investigations connected exclusively to crimes of mafia association. Every six months, the Minister of the Interior reports to Parliament the information related to the activities carried out and the results achieved by the DIA. Contextually, the DIA discloses a detailed report with an updated granular picture of the criminal organization's exponents operating on the Italian territory from the period 1992 up to the current year. The DIA report is also discussed in the Italian Parliament by the Ministry of Interior who also writes a report on the DIA's investigation activities. All reports are advertised on the Ministry of Interior's webpage. Furthermore, information included in the DIA reports receive an extensive media coverage (major national and local tv channels, YouTube, radio, local and national newspapers).[10]

From the DIA reports, we extrapolated all the surnames of mafia clan members that we then matched with the top executives' surnames of the firms retrieved from Orbis-Bureau Van Dijk.

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[10] See for example: https://www.interno.gov.it/it/sicurezza-relazione-semestrale-dia-sulle-infiltrazioni-mafiose; https://www.interno.gov.it/it/notizie/relazione-dia-ii-semestre-2020-interessi-delleconomia-criminale-nel-perdurare-dellemergenza-sanitaria;https://www.youtube.com/watch?v=hMuNcjmBHp8&t=13s; https://www.youtube.com/watch?v=oOTQQP7A_DE

Finally, we collected the financial data for a large sample of Italian firms for the period of 1999-2018 from AIDA (Analisi Informatizzata delle Aziende – Computerized Analysis of Firms), the Italian Bureau Van Dijk database.

Several key results emerge from the analysis. First, customers whose top executives' surnames coincide with mafia surnames newly disclosed by the DIA reports receive greater trade credit extension in the form of increasing levels of payables – i.e. amounts due to suppliers for goods or services received on credit which is a measure widely used in the literature (see, for example, Love et al., 2007; Shenoy and Williams, 2015; Zhang, 2019).[11] Specifically, they experience an increase of the ratio of account Payables to Cost of goods *(Cogs)*, *PtC*, by six percentage points (one fifth of the median value of *PtC* for the entire sample), which corresponds to an average payment delay of about 23 days for mafia-surname customers after the disclosure of the DIA reports compared to the case in pre-DIA report years. Such a result is consistent with the hypothesis that customers in the treatment group obtain longer payment delays than other firms, thereby benefiting from a form of bargaining power associated with mafia surnames. This finding is also economically relevant as, on average, the payment duration of suppliers in Western Europe is around fifty days from invoicing (Ferrando and Mulier, 2013).[12] Furthermore, additional trade credit supply generate a sizeable competitive advantage for mafia-surname firms as they channel part of their additional liquid resources to their own customers by increasing levels of receivables – i.e., amounts owed by customers for purchases made on credit. Conversely, they do not appear to receive greater external financing through the traditional banking channel.

[11] We find consistent results when substituting *Payables to Cost of goods* with a broader ratio such as *Payables to Sales*.
[12] Source: Atradius Payment Practices Barometer – October 2019. Differently from the US industrial sector, in Italy majority of trade credit is extended on net terms (with no discount offered for prompt payment) (Cannari et al., 2004). In general, the extension of trade credit mainly depends on product quality guarantee and customer relationships more than financial motives (Cannari et al., 2004). This makes our empirical setting particularly suitable to address our research question.

To further corroborate our interpretation of the results, we verify whether the bias induced by mafia surnames is more severe when there could be more information asymmetry on top executives' real identity. On this respect, we argue that this phenomenon is particularly accentuated in contexts where there could be more uncertainty related to top executives' identities such as outside the regions where mafia organizations originate. In those regions, it is in fact more likely that real Mafiosi are well-known and thus the bias phenomenon is less probable to occur.

Consistently, we find that mafia-surname firms receive more trade credit extension in northern and central regions, and therefore outside the regions where mafia families are generally rooted. In northern and central regions, entrepreneurs are less likely to know the real identity of Mafiosi and, thus, are more subject to the bias phenomenon. We also show that the effect associated with mafia surnames is stronger in provinces of northern and central regions with a greater presence of mafia-type organizations (Transcrime, 2015).[13] Last, we show that that the effect of mafia surnames prevails for customers dealing with suppliers offering services and differentiated products. These suppliers provide unique or highly customized inputs tailored to the specific needs of the buyer, in this way making both undesirable suppliers and customers difficult to substitute.

We rule out alternative explanations for our results. We mitigate possible concerns related to omitted variables associated with the characteristics of top executives and board of directors. Next, we run two tests to alleviate the possibility that our findings are driven by top executives being really connected to mafia-type organizations or pretending to relate to mafia-type organizations. If our results are not driven by behavioral bias, we should not find a positive correlation between the number of times that mafia surnames appear on DIA reports and trade credit extension.[14] Firms that are really connected with mafia organizations should be able to extrapolate rents from other

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[13] Regions are NUTS2 regions, while provinces are NUTS3 regions.
[14] Surnames included multiple times on DIA reports are likely to receive more media attention.

firms by way of violence or their intimidating power, regardless of mafia surnames' media attention. As an additional test we exclude that the effect of mafia surnames is limited to provinces with a low level of social capital,[15] and thus low resilience to organized crime. Finally, we rule out the possibility that our findings are driven by stereotypes towards certain groups of people based on their geographical origin. For the scope, we rerun the analysis by excluding typical surnames in mafia-origins regions and in central-northern regions that could reflect a certain attitude toward people coming from those geographical areas.

Results are also robust to a variety of tests for sample selection criteria, endogeneity concerns, different sets of control variables, and alternative variables' specifications. To address potential selection bias, we employ a matching technique to construct suitable control/treatment samples for the comparison of trade credit mechanisms. Next, we rerun the analysis using a three-year window setup, an alternative treatment' definition, and a subsample of firms without top executives' turnover.[16] We also consider as an alternative dependent variable the abnormal deviations of payables to cogs ratio from the provincial and industrial average values as an alternative dependent variable. Our main findings remain robust to all these alternative specifications.

Moreover, we check the robustness of our results by running a set of placebo and falsification tests to corroborate the interpretation of the baseline results as evidence of the bargaining power of mafia reputation on trade credit supply. Our results confirm that the effects observed for mafia-surname firms are not driven by sample variation. Furthermore, we test the validity of our quasi-natural experiment by verifying whether firms' trade credit reversely affects the likelihood that

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[15] Social capital is a broader concept that usually refers to people's participation in social activities where they trust each other, and is related to better functioning institutions, bigger firms, and higher economic growth (Putnam, 1995).
[16] Top executives that cover this leading role since the first year of observations.

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their top executives' surnames are disclosed by the DIA report as mafia surnames. Finally, we show that our results also persist when we exclude mafia surnames related to *'ndrangheta* clans, which consist of strong family ties rather than of affiliation ties (Mirenda et al., 2022), and firms in the construction sector where mafia are typically more active (Transcrime, 2015).

Our article contributes to several strands of literature. First, we add to the growing body of literature emphasizing the pervasive impact of organized crime for the economy and society. Specifically, increased attention has been devoted to macro-effects (although difficult to investigate)[17] associated with the distortion in the functioning of the market due to criminal organizations' infiltration in the economy. The majority of previous studies have mostly examined the effect of organized crime's investment in the legal economy at the aggregate level (Peri, 2004; Bonaccorsi di Patti, 2009; Daniele and Marani, 2011; Albanese and Marinelli, 2013; Barone and Narciso, 2015; Pinotti, 2015a,b; Daniele and Dipoppa, 2019; Le Moglie and Sorrenti, 2020; Ferrante et al., 2021). Conversely, to date, only Mirenda et al. (2022) conduct an analysis at the firm level, finding that firms more exposed to mafia infiltration experience a significant rise in their own revenues. Taking a different trajectory, this study represents the first attempt to underpin to what extent firms' economic behavior can be distorted because of the perceived threat of coercive actions from mafia-type organizations. Specifically, we underpin the presence of negative externalities associated with a state of fear imposed by mafia-type organizations due to their coercive power and violence. It also the first attempt to explore how and to what extent mafia-type organizations' bargaining power can jeopardize relationships between firms and their commercial credit transactions. Our findings also provide new evidence to the stream of studies showing the increasing effect of mafia-type organizations outside their area of origin (Pinotti, 2015b). This

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[17] Direct costs refer to the resources i) deployed in the fight against criminal organizations and ii) directly subtracted from the economy by mafia-type organizations (e.g., through thefts, robberies, or extortions) (Mirenda et al., 2022).

aspect has drawn increased concerns in the policy debate as mafia-type organizations have progressively diversified and expanded, embracing macro-economic proportions (UNODC, 2010).

Second, we offer new insight on the explanations related to trade credit (Klapper et al., 2012; Murfin and Njoroge, 2015; Barrot, 2016; Fabbri et al., 2016; Breza and Liberman, 2017; Coricelli and Frigerio, 2019; Giannetti et al., 2021; Gofman and Wu, 2022). We complement this line of research by documenting the importance of heuristics between supplier and customers relationships as non-financial reason for trade credit.

Third, we offer new evidence on the importance of heuristics and judgment biases for financial transactions. While prior studies have mainly focused on credit cycle and financial markets (e.g., Kahneman and Tversky, 1972; 1973; Gennaioli and Shleife, 2010; Bordalo et al., 2016, 2018), as a distinguishing feature, we also show that heuristics matters for firms' economic relationships.

This paper is organized as follows. Section 2 describes the institutional setting, and Section 3 presents the data and methodology. Section 4 discusses the main results while Section 5 shows the robustness checks and additional analyses. Section 6 presents the real economic adjustment and impact. Finally, Section 7 concludes the paper.

2. Institutional setting: Mafia-type organizations in Italy

Italy is home to a complex and well-branched system of criminal activities managed by mafia-type organizations, which encompasses three major organizations: *Sicilian Mafia or Cosa Nostra* – originated from the Sicily region; ii) *Neapolitan Camorra* – originated from the Campania region; and iii) *'ndrangheta* – originated from the Calabria region. Although all mafia-type organizations expanded their criminal activities to the more productive and profitable regions, *'ndrangheta* still dominates the North-West, whereas the *Sicilian Cosa Nostra* and *Neapolitan Camorra* appear to

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be more active in Central Italy (Mirenda et al., 2022) (Figure 1). Furthermore, all these mafia-type organizations are seen as a threat to the European Union (EU) and are widely present in the continents of North and South America, and Australia, as well as the South African region (Europol, 2013). For example, *'ndrangheta* has highly infiltrated the formal economy and banking sectors to launder their illicit proceeds, such as in the UK or Germany (GOCI, 2021). Although Italy is one of the countries with most powerful crime groups in the European continent, like Spain, Montenegro, Albania and Serbia, among others, it is however characterized by moderately high resilience to organized crime due to engagement in cooperation with the international community, including through cross-border judicial and law enforcement cooperation (GOCI, 2021).[18]

[Insert Figure 1 about here]

Even though mafia-type organizations are different from one another with respect to economic and social conditions, and history, they do however share several common features among themselves (Acemoglu et al., 2020). Indeed, criminal organizations appear to emerge alongside a weak state, a state's failure to preserve the monopoly of coercion, and widespread lack of trust in the institutions (Koivu, 2016; Acemoglu et al., 2020). Particularly in Italy, criminal organizations have been traditionally aggressive in holding the monopoly in violent activities (Pinotti, 2015b). In this context, mafia-type organizations manage to find a certain consensus in a segment of the population by providing alternative capital and jobs in more disadvantaged areas (Gambetta and Reuter, 1995; Le Moglie and Sorrenti, 2020).

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[18] Like the United States, although Italy has robust mechanisms to counter organized crime, it continues to be afflicted by pervasive illicit economies (GOCI, 2021).

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3. Data and Methodology

3.1 Data

We collect data from multiple sources to explore the effect of mafia surnames on trade credit supply. The main source of information for mafia surnames is the semi-annual DIA report, which provides an updated granular picture of the criminal organizations' exponents operating on Italian territory. This includes information drawn from judicial and investigative evidence on the mafia-type organizations. In particular, the semi-annual report contains the surnames of the members of the mafia-type clans that are active on the territory.[19] We collect 5,235 mafia surnames from the DIA reports over the period 1992-2018. Then, we link these mafia surnames with the top executives' surnames retrieved from Orbis.[20] We exclude from the sample all the firms whose top executives' surnames are associated with mafia surnames since the beginning of the entire sample period as we cannot estimate any differential effect due to disclosure in the DIA reports for them.[21] Our final sample includes 7,647 firms whose top executives have a mafia surname (matching 3,357 mafia surnames from the DIA reports).

We retrieve accounting data on Italian firms from Aida - Bureau Van Dijk that contains balance sheet data for most of the limited liability firms in Italy (*Società per Azioni* and *Società a*

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[19] See Figures A.1 and A.2 for an example of DIA report.

[20] After carefully investigating the data, we developed the following ranking hierarchy to identify firms' Top Executives in Orbis: 1) Sole Administrator; 2) Chief Executive Officer; 3) Chairman/President of the Board; 4) President of the Management Board; 5) General Manager or Managing Director; 6) Administrator; 7) Director; and 8) Sole Partner. For each firm we consider the Top Executive with the highest title following our eight-part hierarchy. We, however, highlight that there is rarely an overlap between the above titles for the same firm. Overall, the result is that the first three ranks account for almost 65% of the total observations available in Orbis.

[21] We found that 57,032 firms, corresponding to around 10% of the firms in our sample, have top executives with mafia surnames since the beginning of our sample period. In an unreported t-test available upon request, we find that firms whose top executive has a mafia surname since the beginning of the sample period have a *PtC* value (mean: 0.747) significantly higher (p-value 0.0000) than those firms whose top executive's surname has been associated with new Mafiosi during the sample period (mean 0.668). The difference is even larger (p-value 0.0000) with respect to firms whose top executive does not have a mafia-surname (mean: 0.600). As expected, well-established mafia surnames exert a stronger effect on *PtC* than new mafia surnames.

Responsabilità Limitata).[22] For our analysis, we only consider firms in the nonfinancial business economy, also excluding primary industries and utilities because of their peculiarities. Based on the NACE Rev.2 classification, we specifically drop the following sectors: agriculture, forestry, and fishing (section A); mining and quarrying (section B); utilities (sections D and E); financial and insurance activities (section K); public administration, education, health, and entertainment (sections O to R); and other service activities (section S). We also exclude from our sample any firms that have been seized by the Italian government and put under judicial administration in the period of investigation as they could collude with the organized crime. By dropping them from the sample, we can better underpin the representative bias associated with mafia surnames. [23] Following prior studies (e.g., Calamunci and Drago, 2020; Calamunci, 2022), we detect firms subject to legal procedures from AIDA and dropped them from the sample.[24] In addition, we removed from the final sample firms with zero values for both account payables and account receivables since we are aware that missing data on trade credit at the firm level could sometimes be recorded as zeros (Coricelli and Frigerio, 2019). The final sample encompasses 2,191,466 observations for 393,050 firms spanning from 2000 to 2018, with complete accounting and top executives' information.

As reported in Table 1, most firms are distributed within the following activities: manufacturing (19.3%), construction (17.2%), wholesale and retail trade (25%), real estate activities (15.2%), and professional, scientific, technical, and other activities (12.1%). As shown in Table 1, most of the firms whose top executives share the surname with mafia clans' members

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[22] Under the Italian law, it is mandatory for firms to file and deposit annual reports with the local Chamber of Commerce.

[23] Although we cannot exclude with certainty that there are firms related with mafia-type organizations in our sample, we mitigate such an issue by removing firms under judicial administration.

[24] We found 238 firms in the following AIDA categories: court ordered administration, court ordered liquidation, court ordered seizure, court order of cancellation.

belong to similar industrial sectors, with a higher percentage in the wholesale and retail trade sector (30%). While firms are mainly located in Northern and Central regions (around 57%), most firms with mafia surnames are instead located in Southern regions (65.5%).

[Insert Table 1 about here]

3.2 Methodology

To explore the effect of coercive power of mafia surnames on trade credit we implement a difference-in-differences strategy that relies mainly on three major factors: (i) accounting and governance information for the Italian firms over the entire territory; (ii) the exogeneity of the semi-annual report issued by DIA on mafia-type organization; and (iii) identification of top executives with surnames in common with the members of mafia clans. Specifically, we compare *PtC* before and after the disclosure of new mafia clans' surnames from DIA semi-annual reports for firms with and without mafia surnames. The baseline equation is given as the following:

$$PtC_{i,t} = \beta_0 + \beta_1 \text{Mafia-surname firm}_{i,t} + \beta_2 \text{Top-Executives-Origin}_{i,t}$$
$$+ \beta_3 W_{i,t-1} + \delta_i + \eta_t + \varepsilon_{i,t}$$

Eq. (1)

where our main dependent variable is *PtC*, or *Payables to COGS* ratio, measures the amount of trade credit extended to firm *i* at time *t* as a percentage of its yearly purchases (proxied by the cost of goods).

The main variable of interest, *Mafia-surname firm*, is a binary dummy equal to one for firm *i* in year *t* whose Top executive: i) has the same surname as those of Mafiosi disclosed by DIA reports; and ii) was born in one of the regions of the mafia-origins regions (Sicily, Apulia, Campania, Basilicata, or Calabria);[25] and zero otherwise. The birth-place criterion captures the

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[25] We rerun the analysis by using only the first criteria (i.e., the top executive has the same surname as that of known Mafiosi, based on information disclosed by the DIA report) to define the main variable of interest, *Mafia-surname*

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degree of asymmetric information that could affect our estimation. The association with a mafia clan's member could, in general, be stronger when if he/she is born in mafia-originated regions where mafia families are rooted.[26] However, the bias associated with mafia surname is likely to be weaker when the top executive is born in the same region where a firm has its own headquarters as the top executive's identity is more likely to be known. *Top Executives Origin* equals to one if the firm's top executive is born in one of the mafia-origins regions, and zero otherwise. *W* is the vector of firm characteristics at time *t-1* including *Size, Age, Leverage Profitability, Tangibility, Cash,* and *Receivables* (see Table A.1 in the Appendix for a detailed description of all the variables employed in this study). All the financial ratios of our interest are winsorized at 1%. We also incorporated firm and year fixed effects to avoid a potential bias from the omission of unobservable firm-specific and time-specific characteristics. Standard errors are clustered at the province level. Table 2 presents descriptive statistics on the relevant firm-level ratios, while Table 3 shows the correlation matrix.

[Insert Table 2 about here]

[Insert Table 3 about here]

We estimate Eq. (1) based on a full sample-, a matching sample-, and an event study setup. In the matching sample, we consider the possibility that mafia-surname firms may be associated with some fundamental characteristics possibly affecting our estimations. To address this potential selection bias, we employ a matching technique to construct suitable control/treatment samples for the comparison of trade credit mechanisms. Specifically, for each treated firm, we identify the

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firm. Untabulated results suggest that the results are quantitively like those in Table 4. The table is available upon request.

[26] For example, people could preserve the accent from the region of origin as this is a common sociolinguistic phenomenon in Italy. This could facilitate the association of an individual with a specific part of Italy (Cavanaugh, 2005). In a further test, we rerun the baseline model by defining the main variable of interest – mafia surnames – only based on the first criterion: top executives having the same surname as that of Mafiosi based on information newly disclosed by the DIA reports.

'treatment year' in which the top executive's surname is associated for the first time with mafia surnames (based on DIA reports). Then, for each treated firm, we select the five closest control firms in terms of their size (total assets) in the year before the treatment year, and their industry and geographical location, i.e., province. By considering firms within the same province and industry we limit the possibilities that firms in the treated and control groups can be exposed to different local supply chain characteristics and conditions. Then we rerun our main regressions in the matched sample, which consists of the treated firms, i.e., mafia-surname firms, and the matched control firms. We also rerun the analysis using a three-years window setup – to limit the analysis of mafia surnames to window period. Next, we assign zeros to *Mafia-surname firm* if the firm appoints top executive(s) whose surname coincides with that of Mafiosi disclosed by DIA reports. This allows to control for the possibilities that our findings could be driven by top executive's turnover rather than the disclosure of new mafia surnames in the DIA reports.[27] Alternatively, we also refine the sample to only include top executives that have been in charge of the firm since the beginning of the sample period – to exclude the effect of turnover among top executives and isolate the effect of DIA disclosure. This should also mitigate the possibility that our findings are driven by missing information on top executive's turnover.[28] Finally, we employ the *PtC* deviation from the average value of industry-region-year as an alternative dependent variable. This further alleviates possible concerns that firms in the treated and control groups may be exposed to different local industrial conditions.

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[27] In an unreported test, we also exclude these firms from our sample. The main result holds. The table is available upon request.
[28] As pointed out by Bedendo et al. (2020), Orbis reports the latest available information on the composition of firm's top executives. We retrieve the latest available data on board composition (as of July 2020).

4. Empirical Findings

4.1 Main Findings

Table 4 implements the identification strategy of Eq. (1) based on different settings: the entire sample (Column 1); the matched sample (Column 2); the three-year window setup (Column 3); alternative definition of the main variable of interest (Column 4); the subsample of firms without top executives' turnover (Column 5); and *PtC* deviation from average values by industry-region-year as an alternative dependent variable (Column 6). Our findings in Table 4 show that firms receive greater trade credit supply when their top executives are found to share their surnames with new mafia organizations' members disclosed by DIA reports. Specifically, *Mafia-surname firm* dummy is significantly and positively related to *PtC*. The effect is also economically significant; for example, an increase of 6.3 percentage points in *PtC* (as reported in Column 1) is corresponding to an extension of the payment delay by about 23 days (obtained by multiplying the estimated coefficient by 365). Similar results are found when estimating Eq. (1) based on the matched sample (in Column 2) and the three-years window setup (in Column 3), recurring to an alternative definition of *Mafia-surname firm* (in Column 4), and removing firms with top executive's turnover over the period of investigation (in Column 5). Finally, Column 6 considers an alternative measure on *PtC* which captures the excess value over the cross-sectional peer firms from the same industry and province. Our findings are robust across these settings. In the remainder of the paper, we refer to the specifications in Columns (1) and (2), with the full and matched samples, as the main models.

[Insert Table 4 about here]

4.2. Criminal infiltration and origins

In this section we explore whether the effect of mafia surnames is stronger when there could be more severe asymmetric information regarding top executives' identity. We argue that such an

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issue could be more relevant for firms located outside the regions where mafia families are generally rooted. Accordingly, we split our sample based on the geographical locations of firms' headquarters. Consistent with our conjecture, Table 5 shows that the effect of clans' surname disclosure derives from firms located in central-northern regions, while the effect disappears for mafia-origins regions. Interestingly, *Top Executive Origin* dummy is negatively related to *PtC*, suggesting that suppliers have less trust in customers whose top executive is born in one of the mafia-origins regions. Conversely *Top Executive Origin* dummy is positively and significantly related to PtC in mafia-origins regions. A possible explanation could be that payments are in general done on delay in these regions.

[Insert Table 5 about here]

As a further analysis, we rerun the baseline model for the full and matching samples, only considering the firms located in in central-northern regions. Then, we split these firms according to the level of mafia presence in their headquarters' provinces. Following Le Moglie and Sorrenti (2020), we adopt the Transcrime Mafia Index (TMI) as the baseline measure for mafia presence. The TMI measures the territorial mafia infiltration based on military occupation and the mafia's dominance in the illegal goods and services activities.[29] We use the median of the TMI distribution at the provincial level to distinguish between provinces with and without high mafia presence. Table 6 shows that the estimates for *Mafia-surname firm* are only significant in Columns (2) and (4) in the case of a *High Mafia Index*, suggesting that the effect of mafia surnames on trade credit extension can only be detected in the provinces with a greater presence of mafia-type

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[29] The TMI employs the records of those convicted of being in a mafia-type organizations according to Law 646 and art.416- bis, murders ascribed to Mafiosi, city councils dissolved because of mafia infiltration, and assets seized due to organized crime.

organizations.[30] Thus, suppliers are more willing to extend trade credit to mafia-surname customers in the provinces where the threat of mafia punishment is perceived as more concrete and probable.

[Insert Table 6 about here]

4.3. Hold-up problems

In this section, we consider whether the effect of representative bias may vary with hold-up concerns which stem from product characteristics (Fee et al., 2006). This is important because if goods are more tailored to the needs of customers, such as differentiated goods, this may prevent buyers' unethical behavior.[31] Furthermore, both suppliers and customers are more likely to be locked-in to a specific relationship in the case of customized goods and services (Giannetti et al., 2011, Fabbri et al., 2016). This implies that suppliers facing high switching costs cannot easily replace existing undesirable customers. Consistently, we expect that the representative bias associated with mafia surnames should be stronger in the case of customers dealing with suppliers of differentiated goods and services that are usually more likely to experience hold-up problems (e.g., Fee et al.,2006; Giannetti et al., 2011).[32]

We follow Giannetti et al. (2011) to distinguish between suppliers producing *differentiated goods* and *standardized goods*.[33] Then, we consider a firm using a high (low) proportion of differentiated inputs if the share of inputs that comes from sectors producing differentiated inputs is above (below) the median value for the entire sample. We follow the same procedure for

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[30] Regions are NUTS2 regions, while provinces are NUTS3 regions.

[31] Customers facing high switching costs cannot easily replace existing suppliers to find compliant firms that are eager to allow delayed repayments because of the treat induced by mafia surnames.

[32] Differentiated goods embed multidimensional characteristics, and therefore exhibit highly heterogeneous prices, while standardized goods tend to have a clear reference price listed in trade publications (Giannetti et al. 2011). For this reason, differentiated goods are usually more difficult to liquidate and are tailored to the needs of specific buyer.

[33] Rauch (1999) and Giannetti et al. (2011) use the SIC code industrial classification. To run this analysis, we convert the SIC codes to NACE Rev.2 codes (2-digit), and then to the ATECO codes, the Italian industrial classification.

standardized inputs. As hypothesized in Section 3, Table 7 shows that the bias associated with mafia surname is stronger for firms dealing with a high proportion of differentiated inputs (and thus a low level of standardized inputs). The result suggests that the bias is stronger in the case of goods that are more tailored to the needs of customers. This attenuates the possibility that costumers replace the existing suppliers with others more eager to allow delayed repayments because of the threat induced by mafia surnames. It also indicates that the bias is stronger for suppliers that cannot easily replace existing undesirable customers.

[Insert Table 7 about here]

5. Robustness checks and additional analysis

5.1. Alternative explanations

This section presents a battery of additional exercises carried out to mitigate alternative stories and to verify our findings. First, we account for the possibility that our estimates can be affected by omitted variables related to top executives' and board of directors' characteristics (Section 5.1.1). Then, we mitigate the possibility that the effect of mafia surnames is driven by the fact that top executives are really connected to mafia-type organizations or pretend to relate to mafia-type organizations by acting like "impostors" (Section 5.1.2). Finally, we control for the possibilities that top executives' surnames can be typical in certain regions and therefore reflect the general attitude towards individuals coming from those areas (Section 5.1.3).

5.1.1 Top executives' and board of directors' characteristics

We account for possible bias due to omitted information on either top executives' or Board of Directors' characteristics. As a further test, we therefore add to the baseline model top executives' specific variables that could affect the usage of firms' trade credit. Specifically, in Columns (1)

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and (4) of Table 8 we control for age (*Top Executive age*), tenure (*Top Executive tenure*), and an indicator variable that takes a value of one if the top executive is female (*Top Executive female*). Similarly, in Columns (2) and (5) we repeat the estimations using board of directors' characteristics; i) average age of board of directors (*Board of Directors age*); ii) average tenure of board of directors (*Board of Directors tenure*); and iii) percentage of females in the Board of Directors (*Board of Directors female*). The estimates reported in Columns (1-2) and (4-5) of Table 8 are very similar to those in Table 4, in this way mitigating concerns over omitted variables related to governance and top executives' characteristics.

[Insert Table 8 about here]

We also corroborate our baseline estimates using an alternative set of fixed effects. We specifically consider the possibility that our baseline results could also be affected by unobservable top executives' characteristics associated with their province of origin. In Table 8, we saturate our baseline model by including top executives' provincial fixed effects. Columns (3) and (6) of Table 8 shows similar results to the baseline model.

5.1.2 Real Mafiosi or "impostors": DIA reports' coverage and social capital

In this section we rerun the baseline model by considering the number of times that mafia surnames appear in the DIA reports. This test should further mitigate the eventuality that top executives with mafia surnames are really related to mafia families as we expect that media coverage on surnames only matters in the case of the representative bias phenomenon. Specifically, we predict that the effect of *Mafia-surname firm* dummy should be stronger for mafia surnames that appear multiple times in the DIA reports as they are likely to receive more media attention. For this analysis we only focus on central-northern regions where the effect of mafia surnames is more predominant. Consistent with our expectations, Table A2 shows that *Mafia-surname firm* has a stronger impact

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on *PtC* for high cited (above the median) mafia surnames than for low cited (below the median) mafia surnames in the DIA reports.

Next, we run an additional analysis to verify whether our findings are driven by the local level of social capital which could offer an alternative explanation to our phenomenon (e.g., Levine et al., 2018). We argue that mafia-surname firms should be able to extrapolate rents from other firms by pretending to be related (or being related) to mafia-type organizations in areas with a low level of social capital. For this test, we draw on the concept of social capital implemented by Guiso et al. (2004) which encompasses two indicators at the provincial level: the efficiency of law enforcement,[34] and civic engagement measured through voter turnout at referenda. Our results in Table 9 do not show any statistically significant difference between the coefficients of *Mafia-surname firm* dummy for firms in provinces with high and low levels of social capital. This suggests that mafia surnames' effect does not emerge in provinces with weak law enforcement bodies and low resilience to organized crime.

[Insert Table 9 about here]

5.1.3 Excluding typical regional surnames

A further concern could be related to the fact that our main results could be affected by the general attitude towards people with a surname that is typical (more common) in mafia-origins regions or central-north regions. Although we control for the top executive origin as a regressor in the main model to mitigate such an issue, we run a further test to detect whether our findings are driven by surnames that are more frequent in certain geographic areas. Specifically, we rerun Eq. (1) after

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[34] Data are retrieved from ISTAT. The court inefficiency reflects the mean number of years it takes to complete a first-degree trial by the courts located in a province. We identify provinces with Low (High) Judicial Inefficiency if the average number of years to complete the first-degree trial for all the courts located in those provinces is below (above) the national median value.

excluding from the sample all surnames that are typical in mafia-origins regions (but not in central-northern regions) in Columns (1) and (3) of Table 10. Secondly, we additionally exclude surnames that are typical in central-northern regions (but not in mafia-origins regions) in Columns (2) and (4) of Table 10. For this analysis, we define 'typical surnames' as those belonging to the last decile of the distribution of all the surnames in our sample, considering mafia-origins regions and central-northern regions separately. Table 10 shows that the results are still consistent with those of the baseline model in Table 4 for both the full and matching samples.

[Insert Table 10 about here]

5.2. Robustness Checks

Then, we run several tests to corroborate the validity of our quasi-natural experiment. First, we focus on parallel trend and placebo test (Section 5.2.1). Next, we control for the validity of our quasi-natural experiment by checking whether firms' trade credit does not reversely affect the probability of a firm being treated (Section 5.2.2). Finally, we run additional tests for mafia affiliation types, the construction sector where mafia is particularly present, and firm size (Section 5.2.3).

5.2.1 Dynamic treatment analysis and placebo test

We perform a dynamic treatment analysis that examines the timing of a firm's trade credit relative to the timing of the mafia surnames' disclosure by the DIA semi-annual report. This analysis enables us to assess whether observed changes to trade credit extension already occur prior to mafia surnames' disclosure by the DIA semi-annual report. In this case our results could be capturing a pre-existing trend. For the scope, we split the *Mafia-surname firm* dummy into six dummy variables based on the time interval that precedes or succeeds the publication of the DIA reports.

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If the assumption of parallel trends is violated, we should find that a relationship between the interaction terms of our interest and trade credit extension (PtC) already exists before the publication of the DIA report, thus revealing significant coefficient estimates on $Mafia-surname\ firms^{-3+}$, $Mafia-surname\ firms^{-2}$, and $Mafia-surname\ firms^{0}$. We report the results of our dynamic treatment analysis in Table 11.

[Insert Table 11 about here]

Table 10 shows that the coefficient estimates of *Mafia-surname firm* dummies before the publication of the DIA report are statistically insignificant for the entire sample, but also for the subsample focusing respectively on firms located in the central-northern regions and in mafia-origins regions, suggesting no significant differences in pre-trends between the treated and control firms. This indicates that the parallel trends assumption holds (Roberts and Whited, 2013). Therefore, mafia-surname firms' *PtC* increases significantly only after the DIA report's publication on mafia surnames. These results mitigate the reverse causality issues. *Mafia-surname firm* dummies after the DIA release are especially significant in case of central-northern regions consistently with Table 5.

To ensure that our baseline results are not driven by sample variation, we perform a placebo test by randomizing the assignment of treatment (with no replacement) chosen from the sample period between 2000 and 2018 for the matching sample. We estimate the effect of pseudo-treatment with the full set of control variables as presented in the baseline model. We store the estimated coefficient of *Mafia-surname firm* and repeat this procedure 1,000 times to generate the distribution of the placebo estimates (mean, standard error, and relevant percentiles). Table 12 shows that the estimated coefficient is not significant, suggesting that the baseline findings are not driven by chance or by other omitted firm-level characteristics.

[Insert Table 12 about here]

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5.2.2 Probability of a firm being treated

We further check the validity of our quasi-natural experiment by checking whether firms' trade credit does not reversely affect the probability of a firm being treated. We consider as a firm's characteristics the regressors reported in Eq.(1) plus *PtC*. For this analysis, we employ a logit model. We drop the firms from the sample after they became "treated" (e.g., the surname of top executives appears for the first time in the DIA report). Estimation results are shown in Table A3. Column (1) only considers the variable of interest *PtC*, while Column (2) includes all the other firms' characteristics from Eq.(1). In both Columns (1) and (2), *PtC* does not significantly affect the likelihood of a firm being treated, in this way mitigating reverse causality issues.

5.2.3 Other tests

In further analysis, we explore whether our baseline results also persist when we exclude mafia surnames related to *'ndrangheta* clans, which consist of strong family ties rather than of affiliation ties (Mirenda et al., 2022). In this case, the association of top executive surnames with those of Mafiosi could be stronger as it will be more likely to observe the arrest and legal prosecution of a high number of people who share the same surname (Varese, 2006). This means that bias could be mainly driven by top executives with *'ndrangheta* clans' surnames, as they could be more easily related to mafia families.

We also rerun the baseline analysis without considering the firms in the construction sector where mafia typically operates (Transcrime, 2015). Table A4 shows that the main findings for both the full and matching samples also hold by excluding mafia surnames related to *'ndrangheta* clans and firms in the construction sector.

Finally, we further condition our baseline model on firm size. We argue that the effect of representative bias should be weaker for large firms. Indeed, these firms exhibit a more complex

and sophisticated internal controls, and better corporate governance than small firms. It is therefore less likely that trade credit conditions can be driven by representative bias phenomenon in this case. For this further test, we rerun the analysis by splitting the sample between large and medium sized firms with total assets of more than 10 million of euros, and small and micro sized firms with total assets of less than 10 million of euros. As expected, Table A5 shows that the effect of *Mafia-surname firm* is significantly and positively related to *PtC* only in the case *of* small and micro sized firms.

6. Real economic adjustment and impact

In this section, we examine the potential real implications of increasing *PtC* on balance sheet items for mafia-surname firms. To do so we explore whether the fact that mafia-surname firms receive a greater trade credit supply can confer them with competitive advantages that they would not have experienced without the bias phenomenon. Indeed, mafia-surname firms could gain an additional rise in both investment ratio and wages/employment with respect to competitors thanks to the additional liquidity supply they receive via trade credit. However, mafia-surname firms may also use their additional liquidity to support customers in need of extra liquidity (Cuñat, 2007) or strengthen their customer base by attracting firms and encouraging customer loyalty (Petersen and Rajan, 1997; Ng et al., 1999).[35]

To investigate this issue, we split the sample into quintiles according to the variations of *PtC*. The quintile classification is based on the variations of *PtC* from the pre-event period (e.g., the average ratio in the three years before the Event Year) to the post-event period (average ratio in the

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[35] A reduction of receivables over sales might be instead associated with an unethical behavior from mafia-surname firms. Mafia-surname firms could take in fact advantage of the bias induced by mafia surnames to receive payments in advance from their customers.

three years after the Event Year). Average variations within each quintile refer to observations in the matching sample. For this analysis, we cannot infer any casual effects between the variables, but we offer instead evidence of correlations between them.

Table 13 reports the variations in the different items of firms' balance sheets for the I, III and V quintiles based on *ΔPtC* for both mafia-surname firms and other firms. Specifically, Column (1) of Table 13 shows that the strongest increase in *PtC* (V quintile) is associated with a greater level of variation in receivables over sales. This suggests that mafia firms transfer liquidity to their customers by extending their payment terms. On the liability side, Columns (2) and (3) indicate a negative association between an increase of *PtC* and debt financing variation. Indeed, both *Leverage*, which is the sum of long-term debt and loans divided by total assets, and *Short-term leverage,* which is the ratio of short-term debt divided by total assets, exhibit the smallest variations in correspondence with the strongest increase in *PtC* (V quintile). Both *Leverage* and *Short-term leverage* are mostly related to bank lending which represents the most important source of SMEs' external financing (Demirgüç-Kunt and Maksimovic 2002; Carbó-Valverde et al., 2013). This would suggest that there could be a substitution effect between trade credit liquidity and bank loans. It also excludes that mafia-surname firms can take advantage of the bias to get more access to the lending market. This is also confirmed by the fact that they behave similarly to the firms in the control group (other firms) as indicated by the insignificant t-test.

Focusing on the asset side, Column (4) shows a positive association between greater *PtC* and *Tangibility* although not significant for mafia-surname firms. However, we do not find a significant difference in the V quintile between other firms and mafia-surname firms. It is therefore possible that the lack of significance in the V quintile for mafia-surname firms could be due to the limited number of observations for this group. Like other firms, we also find a larger drop in *Cash to Total Assets* for mafia-surname firms in top quintile, as highlighted in Column (5).

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Columns (6) and (7) of Table 13 examine the impact of the change in *PtC* on wages and employment. It appears that an increase in *PtC* is associated with lower employment as well as wages measured in terms of employment costs to total assets. Such behavior seems to be in line with those of the firms in the control group (t-test significant). This could have important social and economic implications as small and private firms, which mainly characterize our sample, represent the major source of employment in European economies (Coricelli and Frigerio, 2019). Overall, these results reveal that mafia-surname firms do not use the additional liquidity from greater trade credit supply in a different way than other firms (such as for example for money laundering). This confirms that our results are not driven by the infiltration of real Mafiosi in mafia-surname firms.

[Insert Table 13 about here]

7. Concluding remarks

In this work, we intend to shed new light on organized crime's destructive effect on the correct functioning of the economy, mainly caused by its tendency to control society using coercive power and by imposing a state of fear. We specifically offer new evidence on the fact that individuals' perceptions of the threat of organized crime may jeopardize economic transactions. To test this, we explore whether firms extend more liquidity to their trade partners whose top executive could be representative of mafia-type organizations' members. By using the semi-annual publication of the Anti-Mafia Investigative Directive (DIA) on Italian mafia families' surnames over the period 2005-2018 as an exogenous shock, we document whether firms whose top executives happen to have the same surname of Mafiosi receive a payment delay from their suppliers. Quantitatively, mafia firms experience greater trade credit extension (e.g., a higher *payable to cost of goods* ratio) of about six percentage points, which corresponds to 23 days of payment delay in the post-DIA report's

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disclosure. This effect is more pronounced in central-northern regions; and particularly in the provinces with a high mafia presence where the threat of mafia punishments is more likely. The results of this study are robust to endogeneity concerns, different sample selection criteria, omitted variables related to top executives' and board of directors' characteristics, alternative treatment's specification, validation and placebo tests, and the use of different empirical specifications. Finally, we find evidence of a strong positive association between greater *PtC* and level of variation in receivables over sales, which could help them to strengthen their customer base. Conversely, we observe that a greater *PtC* is associated with a drop in labor market variables. However, we find that mafia firms also act as liquidity providers for other firms by offering greater payment delay. Our findings suggest that mafia reputation can, *per se,* jeopardize firms' economic decisions and alter the correct functioning of the competitive forces in the industrial markets. Indeed, firms whose top executives could be associated with Mafiosi based on their surnames are forged with bargaining power with respect to their suppliers. Consequently, policies against criminal organizations should also aim to weaken the roots of the social consensus achieved through mafia investment in the legal economy. Policy makers could, for example, consider strengthening Anti-Mafia Law Enforcement, but also promote initiatives aimed at consolidating the relationship between institutions and citizens so that communities are not left vulnerable to criminal groups. One possibility could also be to further strengthen and diffuse the use of anti-mafia certification which provides a guarantee that the entrepreneurs and family members living with them have not been convicted of mafia-type crimes, criminal association, or other serious crimes. In some countries (e.g., Italy) such certification is now only mandatory for firms that intend to participate in public contracts and other suppliers of services provided by Public Administrations. The integration of granular information on organized crime' activities and families on a unique platform could also be useful. More information from the authorities and industrial associations on the initiatives aimed at contrasting

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mafia activities and infiltration would certainly reduce the intimidating power of mafia-type organizations. Future research avenue might consider the supplier-customer relationship characteristics to underpin further possible mechanisms associated with criminal organizations.

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Figure 1

This figure shows the geographical distribution of the Transcrime Mafia Index (TMI), indicating mafia presence at the provincial level.

Mafia Index

(20.030001,101.57]
(8.1400003,20.030001]
(2.1900001,8.1400003]
(1.08,2.1900001]
(.68000001,1.08]
(.30000001,.68000001]
(.15000001,.30000001]
[.01,.15000001]
No data
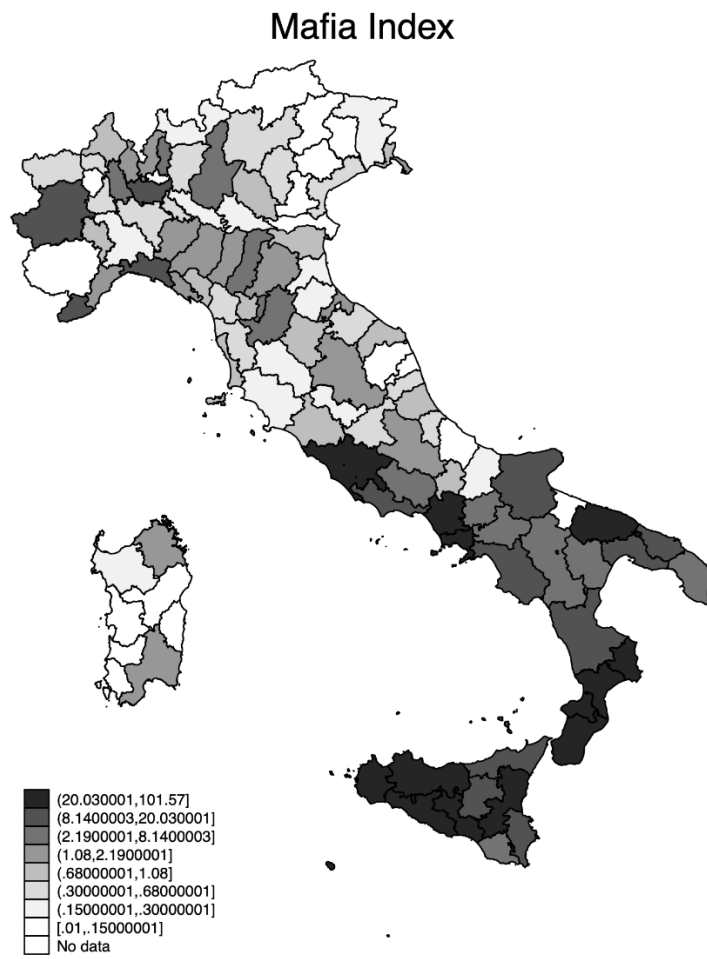
Table 1 – Sample Description

This table presents the percentage of mafia-type firms and other firms for both the full and matching samples by i) Nace Rev.2 section and ii) Macro-region and Legal form type. The reference period is 2000 to 2018.

	Full Sample				Matching Sample			
	Mafia-type firms		Other firms		Mafia-type firms		Other firms	
Nace Rev.2 section	# Firms	Per cent	# Firms	%	# Firms	Per cent	# Firms	%
Manufacturing	1,290	16.9	74,454	19.3	753	13.6	2,351	11.9
Construction	1,562	20.4	66,206	17.2	1,275	23.0	4,839	24.6
Wholesale and retail trade	2,360	30.9	96,200	25.0	1,853	33.5	6,050	30.7
Transportation and storage	440	5.8	15,780	4.1	297	5.4	1,073	5.4
Accommodation and food service activities	496	6.5	23,044	6.0	367	6.6	1,436	7.3
Information and communication	72	0.9	4,208	1.1	43	0.8	160	0.8
Real estate activities	532	7.0	58,756	15.2	407	7.3	1,745	8.9
Professional, scientific, technical and other act.	895	11.7	46,755	12.1	544	9.8	2,052	10.4
Total	7,647	100.0	385,403	100.0	5,539	100.0	19,706	100.0
Italian Macro-region								
North	1,810	23.7	222,507	57.7	1,083	19.6	4,982	25.3
Center	832	10.9	96,740	25.1	517	9.3	2,382	12.1
South	5,005	65.5	66,156	17.2	3,939	71.1	12,342	62.6
Total	7,647	100.0	385,403	100.0	5,539	100.0	19,706	100.0
Legal form								
Private limited companies	6,923	90.5	352,495	91.5	5,147	92.9	18,424	93.5
Public limited companies	362	4.7	12,597	3.3	144	2.6	342	1.7
Partnerships	254	3.3	15,480	4.0	194	3.5	742	3.8
Other legal forms	108	1.4	4,831	1.3	54	1.0	198	1.0
Total	7,647	100.0	385,403	100.0	5,539	100.0	19,706	100.0

Table 2 – Descriptive statistics

This table presents the summary statistics of all the main variables in this study. The sample spans the 2000-2018 window. All variables obtained as ratios based on Orbis or AIDA data are winsorized within the 1st and 99th percentiles. See Table A1 for variables' definitions. Normalized difference refers to the difference in mean values between the subsample of mafia-type firms and other firms. Normalized difference is obtained according to the definition in Imbens and Woolridge (2009).

Variable	Whole Sample						Mafia-type firms	Other firms	Normalized diff.
	#Obs.	Mean	St. Dev.	p25	Median	p75	Mean	Mean	
Firm characteristics									
Payables to COGS (*PtC*)	2,191,466	0.60	1.35	0.16	0.29	0.49	0.67	0.60	0.04
Size	2,191,466	1.89	0.24	1.74	1.90	2.05	1.90	1.89	0.05
Age	2,191,466	2.58	0.73	2.08	2.56	3.14	2.54	2.58	-0.04
Leverage	2,191,466	0.19	0.21	0.00	0.12	0.33	0.17	0.19	-0.08
Profitability	2,191,466	0.05	0.11	0.01	0.04	0.08	0.05	0.05	-0.01
Tangibility	2,191,466	0.24	0.28	0.03	0.11	0.36	0.20	0.24	-0.09
Cash	2,191,466	0.11	0.15	0.01	0.04	0.15	0.11	0.11	0.01
Receivables	2,191,466	0.38	0.53	0.08	0.26	0.45	0.41	0.38	0.04
Top executive characteristics									
Top Executive origin	2,191,466	0.17	0.37	0.00	0.00	0.00	0.96	0.15	1.98
Top Executive age	2,191,466	52.55	12.80	43.00	51.00	61.00	50.91	52.59	-0.09
Top Executive tenure	2,191,466	6.67	5.85	2.00	5.00	10.00	7.43	6.66	0.09
Top Executive female	2,191,466	0.19	0.39	0.00	0.00	0.00	0.18	0.19	-0.03
Board characteristics (avg.)									
Board of Directors age (avg)	2,191,466	52.39	12.42	44.00	51.33	61.00	50.88	52.42	-0.09
Board of Directors tenure (avg)	2,191,466	6.72	5.79	2.00	5.00	10.00	7.64	6.70	0.11
Board of Directors female (avg)	2,191,466	0.20	0.39	0.00	0.00	0.00	0.18	0.20	-0.04

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Table 3 – Correlation Matrix

This table presents the correlation matrix of the main variables in this study. The sample spans the 2000-2018 window. All variables obtained as ratios based on Orbis or AIDA data are winsorized within the 1st and 99th percentiles. See Table A1 for variables' definitions.

	Payables to COGS	Size	Age	Leverage	Profitability	Tangibility	Cash	Receivables
Payables to COGS	1.0000							
Size	0.0459	1.0000						
Age	-0.0038	0.4038	1.0000					
Leverage	0.0500	0.2103	0.0525	1.0000				
Profitability	-0.0925	-0.0272	-0.0462	-0.1391	1.0000			
Tangibility	0.0979	0.1594	0.1829	0.1681	-0.0988	1.0000		
Cash	-0.1035	-0.2842	-0.1186	-0.3383	0.2491	-0.2396	1.0000	
Receivables	0.2432	0.0245	0.0506	0.0017	-0.0888	-0.0354	-0.1597	1.0000

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Table 4 – Baseline regressions

This table reports the estimation results of the baseline model. Column (1) considers the full sample; Column (2) considers the matching sample; Column (3) considers a three-years' window analysis; Column (4) assigns zeros to *Mafia-surname firm* if firm becomes Mafia-surname firms after the appointment of Top executives whose surname coincides with that of Mafiosi disclosed by DIA reports; Column (5) considers only firms with the same Top Executives over the sample period; and Column (6) uses the *PtC* deviation from average values by industry-region-year as an alternative dependent variable. Variables' definitions are provided in Table A1. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable: PtC	Full Sample	Matching Sample	[-3;+3] Window	Alternative treatment definition	Same Top Executives over the sample period	Deviations from average values by industry-region-year
	(1)	(2)	(3)	(4)	(5)	(6)
Mafia-surname firm	0.063***	0.040**	0.038**	0.068***	0.056**	0.050***
	[0.011]	[0.017]	[0.015]	[0.014]	[0.026]	[0.011]
TopExecutiveOrigin	-0.015	-0.043	-0.065	-0.002		-0.014
	[0.022]	[0.041]	[0.059]	[0.022]		[0.021]
Size	-0.150***	-0.244***	-0.102	-0.150***	-0.074	-0.121***
	[0.040]	[0.086]	[0.153]	[0.040]	[0.046]	[0.036]
Age	0.184***	0.160***	0.154***	0.184***	0.181***	0.162***
	[0.009]	[0.025]	[0.029]	[0.009]	[0.015]	[0.011]
Leverage	-0.117***	-0.190***	-0.145***	-0.117***	-0.155***	-0.110***
	[0.012]	[0.035]	[0.034]	[0.012]	[0.013]	[0.012]
Profitability	-0.255***	-0.236***	-0.219***	-0.255***	-0.221***	-0.239***
	[0.015]	[0.036]	[0.042]	[0.015]	[0.014]	[0.014]
Tangibility	0.222***	0.264***	0.142***	0.222***	0.235***	0.194***
	[0.017]	[0.050]	[0.048]	[0.017]	[0.023]	[0.016]
Cash	-0.006	-0.009	-0.044	-0.006	-0.005	-0.003
	[0.009]	[0.040]	[0.033]	[0.009]	[0.014]	[0.008]
Receivables	0.280***	0.400***	0.252***	0.280***	0.282***	0.259***
	[0.017]	[0.039]	[0.027]	[0.017]	[0.020]	[0.016]
Firm f.e.	YES	YES	YES	YES	YES	YES
Year f.e.	YES	YES	YES	YES	YES	YES
Observations	2,191,466	215,976	138,412	2,191,466	932,859	2,191,466
r2	0.65	0.63	0.70	0.65	0.64	0.63

Table 5 – Central-northern regions vs. Mafia-origins regions: full and matched samples

This table reports the estimation results of the baseline model by spitting the sample between firms located in central-northern regions and those in Mafia-origins regions. Variable definitions are provided in Table A1. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable: *PtC*	Full sample		Matched sample	
	Central-northern regions	Mafia-origins regions	Central-northern regions	Mafia-origins regions
	(1)	(2)	(3)	(4)
Mafia-surname firm	0.065***	0.014	0.086***	0.022
	[0.017]	[0.014]	[0.023]	[0.015]
TopExecutiveOrigin	-0.044***	0.202*	-0.147***	0.247**
	[0.012]	[0.103]	[0.040]	[0.110]
Size	-0.140***	-0.209*	-0.102	-0.301**
	[0.043]	[0.105]	[0.104]	[0.124]
Age	0.177***	0.192***	0.202***	0.127***
	[0.010]	[0.023]	[0.035]	[0.034]
Leverage	-0.108***	-0.213***	-0.139***	-0.225***
	[0.012]	[0.037]	[0.042]	[0.041]
Profitability	-0.241***	-0.360***	-0.169**	-0.289***
	[0.014]	[0.024]	[0.064]	[0.047]
Tangibility	0.208***	0.339***	0.221**	0.288***
	[0.017]	[0.049]	[0.087]	[0.060]
Cash	-0.004	-0.001	-0.032	0.003
	[0.009]	[0.041]	[0.044]	[0.056]
Receivables	0.264***	0.367***	0.283***	0.447***
	[0.017]	[0.030]	[0.045]	[0.040]
Firm f.e.	YES	YES	YES	YES
Year f.e.	YES	YES	YES	YES
Observations	1,910,180	281,286	70,528	145,448
r2	0.65	0.65	0.63	0.63

Table 6 – Mafia presence Index: full and matched samples. Only for central-northern regions.

This table reports the estimation results of the baseline model only for firms located in central-northern regions. Specifically, we split the sample according to whether firms are in provinces with a high Mafia Index (above the median), *High Mafia Index,* or in provinces with a low Mafia Index (below the median), *Low Mafia Index*. We adopt the Transcrime Mafia Index (TMI) as the baseline measure for mafia presence at the provincial level. For this analysis we consider both the full and matching samples. Variables' definitions are provided in Table A1. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Full Sample		Matched Sample	
	Low Mafia Index (1)	High Mafia Index (2)	Low Mafia Index (3)	High Mafia Index (4)
Mafia-surname firm	0.001	0.074***	-0.017	0.103***
	[0.073]	[0.016]	[0.092]	[0.020]
TopExecutiveOrigin	0.012	-0.055***	-0.052	-0.158***
	[0.044]	[0.011]	[0.163]	[0.042]
Size	-0.245***	-0.094**	-0.222	-0.087
	[0.043]	[0.045]	[0.284]	[0.107]
Age	0.164***	0.183***	0.263***	0.194***
	[0.012]	[0.012]	[0.083]	[0.035]
Leverage	-0.096***	-0.113***	-0.346**	-0.109**
	[0.023]	[0.014]	[0.149]	[0.043]
Profitability	-0.280***	-0.226***	-0.065	-0.181**
	[0.024]	[0.013]	[0.149]	[0.068]
Tangibility	0.211***	0.208***	0.313*	0.208**
	[0.030]	[0.021]	[0.182]	[0.097]
Cash	0.008	-0.008	-0.257**	-0.004
	[0.018]	[0.010]	[0.106]	[0.043]
Receivables	0.257***	0.266***	0.327***	0.277***
	[0.016]	[0.024]	[0.083]	[0.050]
Firm f.e.	YES	YES	YES	YES
Year f.e.	YES	YES	YES	YES
Observations	609,189	1,300,991	9,058	61,470
r2	0.64	0.65	0.64	0.63

Table 7. Industry characteristics

This table reports the estimation results of the baseline model for the full sample (Columns (1)-(3)) and matched sample (Columns (4)-(6)). Following Giannetti et al. (2011), we identify firms that rely on either *standardized goods* or *differentiated goods*. We consider a firm using a high (low) proportion of differentiated inputs if the share of inputs that comes from sectors producing differentiated inputs is above (below) the median value for the entire sample. We follow the same procedure for standardized inputs. Variables' definitions are provided in Table A1. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A Relevance of differentiated inputs

Dependent variable: *PtC*	Full Sample		Matched Sample	
	Low relevance of differentiated inputs (1)	High relevance of differentiated inputs (2)	Low relevance of differentiated inputs (3)	High relevance of differentiated inputs (4)
Mafia-surname firm	0.031	0.078***	0.023	0.059***
	[0.025]	[0.021]	[0.035]	[0.018]
TopExecutiveOrigin	0.056*	-0.020	0.104	-0.069
	[0.028]	[0.028]	[0.092]	[0.060]
Controls	YES	YES	YES	YES
Firm f.e.	YES	YES	YES	YES
Year f.e.	YES	YES	YES	YES
Observations	1220666	465093	98612	50414
r2	0.66	0.64	0.65	0.64

Panel B Relevance of standardized inputs

Dependent variable: *PtC*	Full Sample		Matched Sample	
	Low relevance of standardized inputs (1)	High relevance of standardized inputs (2)	Low relevance of standardized inputs (3)	High relevance of standardized inputs (4)
Mafia-surname firms	0.066***	0.016	0.044***	0.021
	[0.011]	[0.036]	[0.014]	[0.042]
TopExecutiveOrigin	0.006	0.067	0.023	0.072
	[0.031]	[0.047]	[0.067]	[0.137]
Controls	YES	YES	YES	YES
Firm f.e.	YES	YES	YES	YES
Year f.e.	YES	YES	YES	YES
Observations	944653	741106	83979	65047
r2	0.63	0.66	0.63	0.66

Table 8 – Controlling for omitted variables for top executives' and board of directors' characteristics

This table reports the estimation results of the baseline model for the full sample (Columns (1)-(3)) and matched sample (Columns (4)-(6)). Columns (1) and (4) consider top executives' characteristics such as age (Top-Executive Age), tenure (Top-Executive Tenure), and gender, (Top-Executive Female). Columns (2) and (5) consider the average values of Board of Directors' characteristics such as age (Board of Directors' age (avg)), tenure Board of Directors' tenure (avg), and percentage of female directors Board of Directors female (avg). Columns (3) and (6) consider top executive province of origin FE. Variables' definitions are provided in Table A1. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable: *PtC*	Full sample			Matched sample		
	(1)	(2)	(3)	(4)	(5)	(6)
Mafia-surname firm	0.063***	0.063***	0.063***	0.039**	0.039**	0.040**
	[0.011]	[0.011]	[0.011]	[0.017]	[0.017]	[0.017]
TopExecutiveOrigin	-0.023	-0.020		-0.048	-0.044	
	[0.023]	[0.022]		[0.045]	[0.044]	
Top Executive age	0.002***			0.002		
	[0.000]			[0.001]		
Board of Directors' age (avg)		0.002***			0.004*	
		[0.001]			[0.002]	
Top Executive tenure	-0.000			-0.002		
	[0.000]			[0.002]		
Board of Directors' tenure (avg)		0.000			-0.002	
		[0.001]			[0.003]	
Top Executive female	-0.002			0.030		
	[0.013]			[0.040]		
Board of Directors' female (avg)		-0.007			0.051	
		[0.017]			[0.067]	
Size	-0.151***	-0.150***	-0.150***	-0.244***	-0.244***	-0.244***
	[0.040]	[0.040]	[0.040]	[0.086]	[0.086]	[0.084]
Age	0.183***	0.183***	0.184***	0.161***	0.160***	0.159***
	[0.009]	[0.009]	[0.009]	[0.025]	[0.025]	[0.026]
Leverage	-0.117***	-0.117***	-0.117***	-0.190***	-0.190***	-0.191***
	[0.012]	[0.012]	[0.012]	[0.035]	[0.035]	[0.034]
Profitability	-0.255***	-0.255***	-0.255***	-0.236***	-0.236***	-0.236***
	[0.015]	[0.015]	[0.015]	[0.036]	[0.036]	[0.036]
Tangibility	0.222***	0.222***	0.222***	0.263***	0.263***	0.265***
	[0.017]	[0.017]	[0.017]	[0.050]	[0.050]	[0.050]
Cash	-0.006	-0.006	-0.006	-0.010	-0.010	-0.010
	[0.009]	[0.009]	[0.009]	[0.040]	[0.040]	[0.039]
Receivables	0.280***	0.280***	0.280***	0.400***	0.400***	0.399***
	[0.017]	[0.017]	[0.017]	[0.039]	[0.039]	[0.040]
Firm f.e.	YES	YES	YES	YES	YES	YES
Year f.e.	YES	YES	YES	YES	YES	YES
Top exec. province f.e.	NO	NO	YES	NO	NO	YES
Observations	2,191,466	2,191,466	2,191,466	215,976	215,976	215,976
r2	0.65	0.65	0.65	0.63	0.63	0.63

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Table 9 - Social Capital

This table reports the estimation results of the baseline model for the full sample (Columns (1)-(2)) and matched sample (Columns (3)-(4)) focusing on Northern regions. Columns (1) and (3) in Panel A consider firms located in provinces with low Judicial inefficiency, while Columns (2) and (4) consider firms located in provinces with high Judicial inefficiency. We identify provinces with Low (High) Judicial Inefficiency if the average number of years to complete the first-degree trial for all the courts located in those provinces is below (above) the national median value. Columns (1) and (3) in Panel B consider firms located in provinces with low referenda participation (above the national median participation rate), while Columns (2) and (4) consider firms located in provinces with high referenda participation (below the national median participation rate). We identify provinces with Low (High) Judicial Inefficiency if the average number of years to complete the first-degree trial for all the courts located in those provinces is below (above) the national median value. Variables' definitions are provided in Table A1. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A Judicial Inefficiency

Dependent variable: *PtC*	Full Sample		Matched Sample	
	Low Judicial Inefficiency	High Judicial Inefficiency	Low Judicial Inefficiency	High Judicial Inefficiency
	(1)	(2)	(3)	(4)
Mafia-surname firm	0.065***	0.066**	0.092***	0.078**
	[0.024]	[0.030]	[0.028]	[0.036]
TopExecutiveOrigin	-0.042**	-0.048***	-0.163***	-0.120**
	[0.018]	[0.015]	[0.055]	[0.058]
Controls	YES	YES	YES	YES
Firm f.e.	YES	YES	YES	YES
Year f.e.	YES	YES	YES	YES
[t-test] Difference in		0.001		-0.014
MafiaSurnames*DIA		[0.042]		[0.045]
Observations	1206032	704148	45741	24787
r2	0.65	0.65	0.63	0.63

Panel B Referenda participation

Dependent variable: *PtC*	Full Sample		Matched Sample	
	Low Referenda Participation	High Referenda Participation	Low Referenda Participation	High Referenda Participation
	(1)	(2)	(3)	(4)
Mafia-surname firm	0.049**	0.099*	0.079***	0.102*
	[0.020]	[0.050]	[0.025]	[0.057]
TopExecutiveOrigin	-0.060***	-0.006	-0.150***	-0.134*
	[0.010]	[0.031]	[0.050]	[0.072]
Controls	YES	YES	YES	YES
Firm f.e.	YES	YES	YES	YES
Year f.e.	YES	YES	YES	YES
[t-test] Difference in		0.050		0.023
MafiaSurnames*DIA		[0.046]		[0.052]
Observations	1046121	864059	51723	18805
r2	0.65	0.65	0.63	0.64

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Table 10 – Excluding typical regional surnames

This table reports the estimation results of the baseline model for the full sample (Columns (1)-(2)) and matched sample (Columns (3)-(4)). Columns (1) and (3) exclude the surnames that are typical in mafia-origins regions, while Columns (2) and (4) exclude the surnames that are typical both in mafia-origins regions and central-northern regions. We consider as typical surnames those belonging to the last quintile of the distribution of all the surnames in our sample. Variables' definitions are provided in Table A1. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable: *PtC*	Full Sample		Matched Sample	
	Excluding surnames typical of mafia-origins regions	Excluding surnames typical of mafia-origins regions and surnames typical of central-northern regions	Excluding surnames typical of mafia-origins regions	Excluding surnames typical of mafia-origins regions and surnames typical of central-northern regions
	(1)	(2)	(3)	(4)
Mafia-surname firm	0.068***	0.070***	0.057***	0.051**
	[0.015]	[0.016]	[0.021]	[0.021]
TopExecutiveOrigin	-0.031	-0.015	-0.044	0.023
	[0.033]	[0.046]	[0.052]	[0.074]
Size	-0.143***	-0.128***	-0.114	-0.144
	[0.042]	[0.046]	[0.099]	[0.117]
Age	0.179***	0.178***	0.141***	0.143***
	[0.009]	[0.011]	[0.029]	[0.029]
Leverage	-0.113***	-0.117***	-0.181***	-0.195***
	[0.012]	[0.013]	[0.036]	[0.043]
Profitability	-0.252***	-0.268***	-0.244***	-0.263***
	[0.015]	[0.016]	[0.041]	[0.046]
Tangibility	0.217***	0.213***	0.236***	0.236***
	[0.018]	[0.021]	[0.054]	[0.051]
Cash	-0.003	-0.001	-0.010	-0.012
	[0.010]	[0.012]	[0.050]	[0.058]
Receivables	0.273***	0.285***	0.365***	0.381***
	[0.017]	[0.016]	[0.033]	[0.029]
Firm f.e.	YES	YES	YES	YES
Year f.e.	YES	YES	YES	YES
Observations	1,982,810	1,1598,60	150,832	124,015
r2	0.65	0.65	0.64	0.64

Table 11 – Dynamic treatment analysis

This table reports the dynamic treatment analysis of the baseline results for the full sample. The dependent variable is *PtC*. *Mafia-surname firm* $^{-3+}$ and *Mafia-surname firm* $^{-2}$ are dummy variables equal to one for, respectively, three and more years and two years before the top executive' surname appears in the DIA report, and 0 otherwise; *Mafia-surname firms* ^{0} is a dummy variable equal to one in the year in which the top executive' surname appears in the DIA report; *Mafia-surname firms* $^{+1}$, *Mafia-surname firms* $^{2+}$ and *Mafia-surname firms* $^{+3+}$ are dummy variables that equal to one for one year, two years and three years and more after the top executive' surname appears in the DIA report, respectively. Variables' definitions are provided in Table A1. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable: *PtC*	Italy	Central-northern regions	Mafia-origin regions
	(1)	(2)	(3)
Mafia-surname firm $^{-3+}$	-0.040**	-0.050	-0.033
	[0.020]	[0.031]	[0.025]
Mafia-surname firm $^{-2}$	-0.024	-0.023	-0.024
	[0.017]	[0.025]	[0.023]
Mafia-surname firm ^{0}	0.006	0.045	-0.005
	[0.015]	[0.028]	[0.016]
Mafia-surname firm $^{+1}$	0.022	0.081***	0.000
	[0.027]	[0.026]	[0.031]
Mafia-surname firm $^{+2}$	0.042*	0.112***	0.015
	[0.024]	[0.034]	[0.024]
Mafia-surname firm $^{+3+}$	0.013	0.105**	-0.025
	[0.031]	[0.040]	[0.031]
Top Executive Origin	-0.063	-0.166***	0.292**
	[0.059]	[0.061]	[0.116]
Firm-Year controls	YES	YES	YES
Firm f.e.	YES	YES	YES
EventYear dummies	YES	YES	YES
Year f.e.	YES	YES	YES
Observations	138,412	44,336	94,076
r2	0.70	0.71	0.69

Table 12 – Placebo Test

This table plots the distribution of the coefficients on *Mafia-surname firm* estimated from the placebo test by randomizing the assignment of treatment (with no replacement) from the sample period between 2000 and 2018 for the matching sample. We estimate the effect of pseudo-treatment with the full set of control variables as presented in the baseline model. We store the coefficient of *Mafia-surname firm* and repeat this procedure 1,000 times to generate the distribution of the placebo estimates (mean, standard error, and relevant percentiles). p10_left refers to the 10th percentile of the left distribution, while p10_right refers to the 10th percentile of the right distribution. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable: *PtC*	
	_b[Mafia-surname firm]
Mean	-.0048
S.E.	[.0077]
p10_left	-.0174
Median	-.0044
p10_right	.0074
Controls	[see Tab. 4]

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Table 13 – Relevant financial ratios relative to Payables to Cost of Goods (*PtC*)

This table represents the changes in percentage points of various balance sheet items with respect to the quintile distribution of *PtC* for both mafia-surname firms and other firms. The quintile classification is based on the variation of *PtC* from the pre-event period (e.g., the average ratio in the three years before the Event Year) to the post-event period (average ratio in the three years after the Event Year). ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively for the T-tests comparing the average values in the I and V quintiles with respect to the average values in the III quintile (within each of the two groups). Average variations within each quintile refer to observations in the matching sample. Variables' definitions are provided in Table A1.

Quintiles, based on ΔPtC:		Receivables to Sales	Leverage	Short Leverage	Tangibility	Cash to Total Assets	Number of Employees to Total Assets	Cost of Employment to Total Assets
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mafia-surname firm	I	0.234**	0.883	0.132	-0.892	0.629*	-0.017**	0.394
	III	5.421	0.128	0.148	-0.276	-0.353	-0.182	-0.515
	V	40.982***	-0.867	-0.884**	0.292	-2.225***	-0.331**	-4.399***
Other firm	I	-0.693**	1.237*	0.636**	-0.743	0.491*	-0.059**	1.029***
	III	4.708	0.587	0.031	-0.297	-0.040	-0.142	-0.957
	V	40.032***	-1.257***	-1.102***	0.345**	-1.595***	-0.341***	-4.643***

Appendix A

Figure A.1: An example of a DIA report

Source: DIA semi-annual report, 2013. Note: This figure reports the list of mafia surnames in capital and bold letters for the province of Caserta.

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Figure A.2: An example of the text in the DIA report

Il clan "CAPRIATI", unitamente all'emergente frangia criminale costituita dal gruppo "RIZZO - LORUSSO", seguiterebbe a contrastare l'espansionismo della consorteria "STRISCIUGLIO - DE FELICE-CALDAROLA", per il controllo delle attività illecite in alcuni quartieri del capoluogo.

Nel quartiere San Paolo i gruppi rivali "TELEGRAFO - MONTANI" e "DIOMEDE - MERCANTE", artefici già dal 2002 di una lunga disputa armata, hanno ripreso a fronteggiarsi con l'intento di assumere il controllo delle attività illecite nel quartiere.

Source: DIA semi-annual report, 2013. Note: The mafia surnames are directly reported in capital letters for the reports published before 2012.

Table A1 – List of variables

Variable	Description	Source
Firm characteristics		
PtC - Payables to Cost of Goods	Creditors to Cost of Goods Sold ratio. Creditors is the volume of accounts payable, e.g., debt to suppliers	Our computation on AIDA-BvD data
Size	Total Assets in logarithms	Our computation on AIDA-BvD data
Age	Firm's age based on its year of incorporation	Our computation on AIDA-BvD data
Short-term Leverage	Loans divided by Total Assets. In the BvD dataset, Loans are defined as short-term financial debts (e.g., to credit institutions + part of long-term financial debts payable within the year)	Our computation on AIDA-BvD data
Leverage	Sum of Loans and Long-term Debt divided by Total Assets. In the BvD dataset, Long-term Debt is defined as long-term financial debts (e.g., to credit institutions (loans and credits), bonds)	Our computation on AIDA-BvD data
Profitability	Operating Profit over Total Assets	Our computation on AIDA-BvD data
Tangibility	Tangible Fixed Assets over Total Assets	Our computation on AIDA-BvD data
Cash	Cash and Cash Equivalent over Total Assets	Our computation on AIDA-BvD data
Receivables	Debtors to Sales ratio. Debtors is the volume of accounts receivable, e.g., trade receivables from clients and customers	Our computation on AIDA-BvD data
Number of Employees to Total Assets	Number of Employees divided by Total Assets	Our computation on AIDA-BvD data
Cost of Employment to Total Assets	Cost of Employees divided by Total Assets	Our computation on AIDA-BvD data
Top Executives' characteristics		
Mafia-surname firm	It is a binary dummy equal to one if, *in at least one year of observation*, the firm's Top Executive i) has the same surname of that of Mafiosi disclosed by DIA reports; and ii) was born in one of the regions of the mafia-origins regions (Sicily, Apulia, Campania, Basilicata, or Calabria); and zero otherwise.	Our computation on Anti-Mafia Investigative Directive (DIA) reports and AIDA-BvD data
Top Executive Origin	It is a binary dummy equal to one if the firm's Top Executive is born in one of the mafia-origins regions (Sicily, Apulia, Campania, Basilicata, or Calabria).	Our computation on Anti-Mafia Investigative Directive (DIA) reports and AIDA-BvD data
Top Executive age	Age of the Top Executive based on information about her/his date of birth.	Our computation on AIDA-BvD data
Top Executive tenure	Tenure of the Top Executive is calculated by the number of years she/he spent in office in that firm	Our computation on AIDA-BvD data

	based on information about her/his appointment date.	
Top Executive female	It is a binary dummy equal to one if the firm's Top Executive is a female.	Our computation on AIDA-BvD data
Typically surnames in mafia-origins regions	Accounts receivable to sales ratio	Our computation on AIDA-BvD data
Typically surnames in mafia-origins regions and central-northern regions	Accounts receivable to sales ratio	Our computation on AIDA-BvD data
Board of Directors' characteristics		
Board of Directors age (avg)	Average age of the members of the Board of Directors based on information about their date of birth.	Our computation on AIDA-BvD data
Board of Directors tenure (avg)	Average tenure of the members of the Board of Directors, calculated by the number of years they have spent in office in that firm based on information about their appointment date.	Our computation on AIDA-BvD data
Board of Directors female (avg)	Percentage of females in the Board of Directors.	Our computation on AIDA-BvD data
Regional Characteristics		
Low/High Mafia Index	Italian provinces are classified as "Low Mafia Index" if the value of the Index is below the median, and "Low Mafia Index" if the value is above the median. The Transcrime Mafia Index (TMI) is a measure of the mafia presence at the provincial level.	Our computation on Transcrime Mafia Index (TMI)
Mafia-origins regions	Sicily, Apulia, Campania, Basilicata, and Calabria.	Based on Anti-Mafia Investigative Directive (DIA) reports
Central-northern regions	All Italia regions excluding the Mafia-origins regions (see above).	Based on Anti-Mafia Investigative Directive (DIA) reports

Table A2 – Highly-cited Mafia Surnames

This table reports the estimation results of the baseline model for the full sample (Columns (1)-(3)) and matched sample (Columns (2)-(4)) focusing on Central-northern regions. Columns (1) and (2) consider mafia surnames that are cited in more than three DIA reports, while Columns (3) and (5) consider mafia surnames than are cited in three or fewer DIA reports. Variables' definitions are provided in Table A1. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable: *PtC*	Considering only highly-cited mafia surnames		Considering only lowly-cited mafia surnames	
	Full Sample (1)	Matching Sample (2)	Full Sample (3)	Matching Sample (4)
Mafia-surname firm	0.086***	0.108***	0.039	0.075*
	[0.031]	[0.036]	[0.035]	[0.038]
TopExecutiveOrigin	-0.025*	-0.119*	-0.042*	-0.279***
	[0.014]	[0.063]	[0.024]	[0.078]
Size	-0.130***	-0.126	-0.143***	-0.007
	[0.047]	[0.099]	[0.046]	[0.135]
Age	0.180***	0.224***	0.176***	0.205***
	[0.009]	[0.034]	[0.010]	[0.042]
Leverage	-0.101***	-0.132**	-0.111***	-0.163***
	[0.012]	[0.061]	[0.013]	[0.046]
Profitability	-0.242***	-0.173***	-0.236***	-0.157**
	[0.014]	[0.060]	[0.014]	[0.062]
Tangibility	0.208***	0.188**	0.215***	0.264***
	[0.018]	[0.092]	[0.018]	[0.093]
Cash	-0.006	-0.061	-0.003	-0.017
	[0.010]	[0.045]	[0.009]	[0.040]
Receivables	0.263***	0.274***	0.261***	0.274***
	[0.017]	[0.052]	[0.018]	[0.034]
Firm f.e.	YES	YES	YES	YES
Year f.e.	YES	YES	YES	YES
Observations	1758695	59201	1767285	61851
r2	0.65	0.63	0.65	0.64

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Table A3 – Probability of a firm being treated

This table shows whether firms' characteristics drive the probability of a firm being treated. For this analysis we employ a logit model, where the dependent variable takes a value of one for the firms being treated, and zero otherwise. Once a firm became treated, that firm is then dropped from the sample. We consider as a firm's characteristics the regressors reported in Equation 1 plus *PtC*, the main variable of interest. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable: Mafia-surname firm	(1)	(2)
Payables-to-COGS	-0.003	-0.001
	[0.010]	[0.010]
Size		0.463***
		[0.068]
Age		-0.001
		[0.019]
Leverage		0.162**
		[0.072]
Profitability		0.212*
		[0.128]
Tangibility		-0.299***
		[0.062]
Cash		-0.170*
		[0.098]
Constant	-4.026***	-4.870***
	[0.159]	[0.203]
Province f.e.	YES	YES
Industry (2-digit) f.e.	YES	YES
Year f.e.	YES	YES
Observations	2,154,076	2,154,076
Pseudo r2	0.17	0.17

Table A4 – Excluding firm with top executives born in Calabria or in construction industry

This table reports the estimation results of the baseline model for the full sample (Columns (1)-(2)) and matched sample (Columns (3)-(4)). Columns (1) and (3) exclude firm with top executives born in Calabria, while Columns (2) and (4) exclude firm in the construction sector. Variables' definitions are provided in Table A1. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable: *PtC*	Full Sample		Matched Sample	
	Excluding firm with top executives born in Calabria	Excluding firms in the construction industry	Excluding firm with top executives born in Calabria	Excluding firms in the construction industry
	(1)	(2)	(3)	(4)
Mafia-surname firm	0.068***	0.044***	0.070***	0.036*
	[0.015]	[0.012]	[0.016]	[0.019]
TopExecutiveOrigin	-0.031	0.027	-0.015	0.030
	[0.033]	[0.018]	[0.046]	[0.049]
Size	-0.143***	0.029	-0.128***	0.044
	[0.042]	[0.037]	[0.046]	[0.079]
Age	0.179***	0.127***	0.178***	0.079***
	[0.009]	[0.010]	[0.011]	[0.025]
Leverage	-0.113***	-0.108***	-0.117***	-0.177***
	[0.012]	[0.012]	[0.013]	[0.032]
Profitability	-0.252***	-0.237***	-0.268***	-0.252***
	[0.015]	[0.015]	[0.016]	[0.039]
Tangibility	0.217***	0.229***	0.213***	0.262***
	[0.018]	[0.019]	[0.021]	[0.044]
Cash	-0.003	0.020**	-0.001	0.033
	[0.010]	[0.009]	[0.012]	[0.032]
Receivables	0.273***	0.283***	0.285***	0.430***
	[0.017]	[0.018]	[0.016]	[0.046]
Firm f.e.	YES	YES	YES	YES
Year f.e.	YES	YES	YES	YES
Observations	2,151,783	1,829,222	203,794	164,146
r2	0.65	0.65	0.63	0.64

Table A5 – Firm Size

This table reports the estimation results of the baseline model for the full sample (Columns (1)-(3)) and matched sample (Columns (2)-(4)). Columns (1) and (2) consider large and medium sized firms with total assets more than 10 million of euros, while Columns (3) and (3) consider small and micro sized firms with total assets less than 10 million of euros. Variables' definitions are provided in Table A1. Standard errors are clustered at the provincial level and are reported in brackets. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable: *PtC*	Large & Medium-sized firms		Small & Micro firms	
	Full Sample (1)	Matching Sample (2)	Full Sample (3)	Matched Sample (4)
Mafia-surname firm	0.073	0.044	0.062***	0.038**
	[0.049]	[0.066]	[0.012]	[0.016]
TopExecutiveOrigin	0.020	0.001	-0.024	-0.060
	[0.059]	[0.109]	[0.028]	[0.049]
Size	-1.111***	-2.394***	-0.123***	-0.205**
	[0.236]	[0.633]	[0.043]	[0.086]
Age	0.233***	0.296	0.188***	0.163***
	[0.051]	[0.222]	[0.009]	[0.025]
Leverage	0.021	-0.286**	-0.125***	-0.186***
	[0.054]	[0.126]	[0.012]	[0.035]
Profitability	-1.148***	-0.650**	-0.235***	-0.230***
	[0.119]	[0.245]	[0.015]	[0.037]
Tangibility	0.238***	0.074	0.220***	0.270***
	[0.084]	[0.180]	[0.016]	[0.049]
Cash	0.041	-0.425	-0.007	0.001
	[0.076]	[0.274]	[0.008]	[0.038]
Receivables	0.246***	0.320***	0.283***	0.404***
	[0.022]	[0.081]	[0.017]	[0.040]
Firm f.e.	YES	YES	YES	YES
Year f.e.	YES	YES	YES	YES
Observations	138631	8441	2052835	207535
r2	0.63	0.65	0.65	0.63

APPENDIX B

A short historical overview of Mafia clans in Italy

The Sicilian Mafia (*Cosa Nostra*) made its first appearance in the nineteenth century in Sicily during the tumultuous process of the fall of the Bourbon Kingdom (which had included southern Italy and Sicily) and the unification of Italy (e.g., Gambetta, 1993; Lupo, 1996; Dickie, 2004;).[37] Besides the highly profitable business around illicit drug production and trafficking, the mafia has traditionally focused on private protection and racketeering, and on private and public construction. Similarly, *'ndrangheta* originated in the nineteenth century in the province of Reggio Calabria with brigandage movements on the Aspromonte uplands, to oppose Italy's unification, which was heralding the dismantling of the feudal system and introducing modern capitalism to the rural areas of the South (Mirenda et al., 2022). Today *'ndrangheta* has a dominant position in most of the transnational drug traffic and most of the organization's revenues are produced outside Calabria (Mirenda et al., 2022). The origin of *Neapolitan Camorra* is still debated. *Neapolitan Camorra* comprises many bands without a horizontal and community-based structure as in the case of *'ndrangheta*.[38] It mainly specializes in cigarette smuggling, drug trafficking, extortion and usury, and counterfeiting. Originally founded by the Camorra boss Raffaele Cutolo, Apulian Sacra Corona Unita is the youngest Italian criminal organization, which became active between the late

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[37] In the 1890s the mafia was present in most of the urban parts of Sicily, in some of the mining areas, such as Favara and Grotte in the Girgenti province, and in the most rural parts of the island (Buonanno et al., 2015). The spread of the mafia over the Sicilian territory was possible due to a pervasive use of coercive power by landowners and local politicians against the Peasant Fasci movement (Acemoglou et al., 2020), a popular movement of democratic and socialist inspiration in support of the poorest and most exploited working classes' rights. Although the mafia declined considerably during Mussolini's fascist dictatorship, however, after the war, former members of the mafia formed tight relations with the Christian Democrats, which became the major party in Italy (e.g., De Feo and De Luca, 2017). Only with the Maxi trials of 1986–87, and the murder of two judges, Giovanni Falcone and Paolo Borsellino, did the mafia appear to have started declining.

[38] During this post-Second World War period, Naples played a strategic role in the contraband market of cigarettes and, at the beginning of the 1970s, was a major base of international contraband and criminal traffic (Barbagallo, 1999; 2010). With the New Organized Camorra (Nuova Camorra Organizzata, NCO) established by the Boss Raffeale Cutolo in the 1980s and 1990s, Camorra changed its configuration from a criminal organization with a metropolitan ganger style into a more structured organization. During the same years, Camorra expanded its networks beyond the regional borders by acquiring a dominant position in the drug trafficking activities from Latin America.

1970s and early 1980s. The presence of close relationships with members of both the Calabrian *'ndrangheta* and *Neapolitan Camorra* has been crucial for the emergence of this new criminal organization (Massari, 2014). Apulian Sacra Corona Unita specializes in cigarette smuggling, arms trafficking, human trafficking, money laundering, extortion, and drug trafficking.[39] Finally, the so-called Basilischi was an Italian criminal organization, founded in 1994 in Potenza, and then extended to the rest of Basilicata. Since the late 1990s, this organization shrank significantly due to several arrests and interventions by the police. Nowadays, many areas are under the control of *'ndrangheta* clans.

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[39] DIA, 2008. Semi-annual publication.