ORGANIZED CRIME AND FIRMS: EVIDENCE FROM ANTI-MAFIA ENFORCEMENT ACTIONS

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Abstract

We exploit staggered municipality-level anti-mafia enforcement actions over the period 1995–2015 in Italy to study the effect of organized crime on firms. Following anti-mafia enforcement actions, we find increases in competition among firms, innovation activity, and competition for public procurement contracts. Firms that do not exit after a weakening of organized crime shrink in size and experience a reduction in profitability, particularly subsequent to higher enforcement intensity. These results are more pronounced among firms founded during the heyday of the mafia and operating in the non-tradable sector. Our findings are consistent with accounts of organized crime groups acting as a barrier to entry and affecting economic growth.

Keywords: Organized Crime, Corruption, Competition, Innovation, Money laundering.

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"We suffered severe blows … if they [the law enforcement agencies] continue like this, they will arrest even the chairs."

(Francesco Messina Denaro, in a secret message to Bernardo Provenzano, taken from Cordella 2006)[1]

Organized crime affects societies and economic activities throughout the globe. In Italy, organized crime in the form of the mafia has affected the lives of millions of people across most if not all of the Southern municipalities since the nineteenth century. Mafia-based activities include extortion, racketeering, gambling, prostitution, drug and people trafficking, money laundering, murder, and political influence, among other undertakings (Bandiera 2003; Acemoglu, De Feo, and De Luca 2017; Alesina, Piccolo, and Pinotti 2018).[2] Other organized crime groups influence economic activity in Japan (the Yakuza), Hong Kong (the Triads), Russia (the Russian mafia), South and Latin America (various drug cartels), the United States, and low-income areas within São Paulo and Rio de Janeiro in Brazil and Soweto and Durban in South Africa (Skaperdas 2001). The revenues generated from organized crime activities in 2009 are estimated at $870 billion, or 1.5% of global GDP (UN Office on Drugs and Crime 2012), and former U.S. Secretary of State John Kerry assessed the five most influential organized crime organizations to represent the third largest business in the world (Kerry 1998).

Organized crime also affects firms. Narratives reveal its role in protecting incumbent firms from new market entrants, using legitimate businesses as a front for laundering money, and allocating public contracts to firms under its protection (Gambetta 1993; Konrad and Skaperdas 2012). At the same time, survey evidence has highlighted the perceived costs of organized crime to firms: Managers in 122 out of 137 countries surveyed perceive organized crime to impose some cost on their firms.[3] But despite such narrative and survey evidence, little is known about the net benefits (or costs) to firms associated with organized crime.

In this paper, we study the effect of organized crime on firms. An important empirical

[1] Denaro was a mafia boss who later became (and is currently thought to be) the boss of all bosses of the Sicilian mafia. Provenzano was head of the Sicilian mafia at the time of the message. In the secret message, Denaro comments on the adverse effects of anti-mafia enforcement actions.

[2] In this paper, we use the term "mafia" to describe organized crime in Italy in general, irrespective of geographic origin. This term is often used more specifically to refer to the Sicilian Mafia in Sicily. Other influential Italian mafia groups include the Camorra in Campania, the 'Ndrangheta in Calabria, and the Sacra Corona Unita in Puglia.

[3] Based on the World Economic Forum's *Global Competitiveness Report (2017–2018)*. Managers were asked: "To what extent does organized crime (mafia-oriented racketeering, extortion) impose costs on businesses?' with a response of 1 indicating huge costs and 7 indicating no costs; 122 out of 137 countries scored no higher than 6. Moreover, managers in one out of five countries consider organized crime to impose medium to huge costs.

challenge in understanding the impact of organized crime on firms is that organized crime is largely unobserved. In order to address this observability problem, we employ a quasi-experimental design that provides us with plausibly exogenous shocks to the power of the mafia. Specifically, we exploit staggered municipality-level anti-mafia enforcement actions in Italy over the period 1995–2015 to study municipality and firm-level outcomes using difference-in-difference techniques. These enforcement actions, in which mafia assets are confiscated by authorities, reduce the mafia's local influence by taking away its economic resources and weakening its reputation, the organization's most valuable asset (Gambetta 1993 and Reuter 1995). Consistent with this argument—and in line with the opening quote—we find that following enforcement actions, mafia activity in the form of intimidation of public officials declines.

In our empirical analysis, we assume that a municipality-level enforcement action against a mafia cell affects the entire municipality. We base this assumption on two characteristics of Italian organized crime. The first one is that generally no more than one mafia cell exerts power over a municipality.[4] The second one is that since operations are highly dependent on local resources such as loyal soldiers and agents in charge of gathering information, mafia families tend to be small and operate typically in no more than one municipality (Gambetta 1993; Gambetta and Reuter 1995; Polo 1995).[5] Where a family exerts power over several municipalities, e.g. through a hierarchical structure,[6] it is likely that anti-mafia enforcement actions damage the family's reputation locally and that it may take time and effort to rebuild. Where enforcement actions are additionally associated with arrests, local knowledge and enforcement mechanisms are damaged for years.

Importantly, we are able to match anti-mafia enforcement actions to Italian municipalities. We consider *municipalities* as treated when they first experience an asset confiscation, and firms

[4] Large cities might be an exception, with several families or clans exerting power over them. We show that our results are robust to excluding these cities.

[5] Gambetta and Reuter (1995) estimate the scale of the Sicilian mafia at 3,000 members and over 100 families. This stands in stark contrast to the New York mafia families, where 5 families had an estimated 1,200 members in the 1990s, down from 3,000 in the early 1970s (Reuter 1995).

[6] This is common, among others, in Sicily: Clans control criminal activities in towns, cities, and neighborhoods, and are organized into districts (*mandamenti*), which, in turn, are under the control of the Regional Commission (*cupola*). The 'Ndrangheta is organized according to similar principles, while the Camorra is organized more horizontally (see, e.g., Catino 2014 and Alesina, Piccolo, and Pinotti 2018).

as *treated* when their headquarter municipality is first treated.[7] The majority of the more than 1.8m firms in our database are small private firms, with a median annual revenue of USD 611,000, that typically operate at the municipality level and therefore come under the jurisdiction of a single mafia family or clan. Approximately 91,300 of those firms were treated gradually over the sample period, through staggered confiscations affecting 434 municipalities (10.8 percent of municipalities containing at least one sample firm).

There are multiple channels through which organized crime may influence firms, as described in seminal work by Gambetta (1993), Bliss and Di Tella (1997), Fiorentini and Peltzman (1997), and Dickie (2004). First, organized crime enforces cartels, which includes protecting incumbent firms from new entrants and allocating customers to existing firms. Reduced competition increases firms' profits, allowing organized crime to demand more graft from protected firms (Bliss and Di Tella 1997). For protected firms, increased profit comes at the explicit cost of protection payments as well as indirect costs associated with being forced to use potentially inefficient or expensive mafia-protected suppliers. In this function, organized crime is likely associated with reduced competition, which may result in large and potentially inefficient firms (Gambetta 1993). Reduced competition may in turn affect firms' innovation activities. Since firms that are protected by the mafia do not compete primarily on price or quality and since organized crime might siphon off the upside to innovation activity, the presence of organized crime might reduce firms' incentives to innovate (Vives 2008). Relatedly, and partly with the help of public officials (Fenizia 2018 and Di Cataldo and Mastrorocco 2019), organized crime interferes with the allocation of public procurement contracts and public spending, which may have anticompetitive effects. A second channel through which organized crime may affect firms is through its substantial stake in illegal activities such as drug trafficking, gambling, and prostitution. In an effort to launder the proceeds from such activities, organized crime may funnel

[7] We also obtain two dates for each enforcement action from the *L'Agenzia Nazionale per l'amministrazione e la destinazione dei beni sequestrati e confiscati alla criminalità organizzata* (ANBSC). The first date denotes when an enforcement action is initiated (*procedura data*) and an asset is removed from the individual suspected of having ties to the mafia. This is a temporary measure used when a suspect's lifestyle does not match their reported income. The second date denotes when the confiscation is legally confirmed (*decreto data*) and the asset is redeployed. Throughout the paper we use the term 'confiscation' to refer to the first date. For example, in 1995 the government confiscated land and a farmhouse from Bernardo Brusca, the boss of the Sicilian crime family behind the killing of anti-mafia Judge Giovanni Falcone in 1992. In 2000, the confiscation was legally confirmed and the farmhouse opened as a bed-and-breakfast run by a farming co-operative. (Source: https://www.nytimes.com/2010/07/04/travel/04explorer.html, accessed on July 15, 2019.)

funds through legitimate stores. Money laundering thus inflates firms' revenues and profits and may help some inefficient firms to survive.

In our empirical analysis, we start by examining whether anti-mafia enforcement actions affect competition among firms. We find that in treated municipalities, the turnover rate, defined as the sum of the number of firms that enter and exit scaled by the number of active firms in the previous year, increases by 1.2 percentage points after anti-mafia enforcement actions, which constitutes a 11.8% increase over its baseline level. The increased turnover rate is driven by both increased exit of incumbents and increased entry of new firms, and is more pronounced when a municipality is repeatedly affected by asset confiscations. For robustness, we repeat the analysis using matching techniques, excluding very large municipalities and including only confiscations initiated by higher-level courts to mitigate endogeneity concerns. We find similar results across all the tests. We also find municipality-level evidence consistent with the notion that organized crime hinders innovation activity and competition for procurement contracts. Overall, organized crime appears to act as a barrier to market entry.

When we turn to the firm-level response to anti-mafia enforcement actions, we find that treated firms that do not exit after an anti-mafia enforcement action in their municipality experience a 4.4 percent decline in revenue. For the mean (median) firm, this constitutes an USD 401,808 (USD 26,884) decline in revenue. Moreover, firms' asset bases decline by 1.5 percent on average. The effects are more pronounced when firms are treated repeatedly and for such firms, profitability also declines. These results suggest that incumbent firms benefit economically from the presence of organized crime. Anti-mafia enforcement actions reduce some of these benefits, as they lead to increased competition among firms, a reduction in rents, and a decline in the previously protected customer base enjoyed by incumbent firms.

Since some firms may benefit more than others from organized crime, we next examine firm-level cross-sectional characteristics. First, firms in the non-tradable sector may be forced to pay protection money but benefit from the enforcement of cartels, since they are able to charge oligopolistic prices. In contrast, prices for firms in the tradable sector are not set locally, and thus these firms likely benefit less from the presence of organized crime. The effect of the crackdown on mafia should therefore be more pronounced among firms in the non-tradable sector. We find this to be the case. In fact, we find that firms in the tradable sector appear to benefit from anti-

mafia enforcement actions, suggesting that the presence of organized crime is costly to these firms. Notably, this focus on firm-level cross-sectional characteristics allows us to control for shocks at the municipality-year level, which further mitigates concerns that our results are driven by omitted shocks at the municipality level that drive both competition and enforcement actions.

Second, we test whether firms with stronger ties to the mafia benefit more from mafia presence, and hence suffer more from a crackdown on organized crime. While we cannot directly observe the strength of the ties between firms and organized crime, we use historical homicide rates to proxy for the strength of organized crime at the time of firms' incorporation (Pinotti 2015a,b). We find that our results are more pronounced among firms incorporated during peak periods of organized crime.

In our study, anti-mafia enforcement actions allow for identification if they do not occur in response to other, non-mafia-related developments at the municipality level that might in turn affect firms, and if organized crime does not influence the occurrence and timing of anti-mafia enforcement actions. We therefore dedicate a large part of our analysis describing the institutional surroundings of anti-mafia enforcement actions (Section I.C) and mitigating concerns about potential endogeneity or omitted variable biases (Section II.C). For instance, one helpful feature of the anti-mafia enforcement process in Italy is that it is often initiated by non-local authorities and that whether or not the process results in an enforcement action is determined by courts at the provincial level. Since there are many municipalities per province (74 on average), we can control for time series changes in characteristics of the provincial courts through *province* × *year* fixed effects. To further alleviate concerns that municipality-level developments drive enforcement activity, we also examine whether municipalities affected by anti-mafia enforcement actions are different from unaffected ones. Affected municipalities have a larger population and more tourism, characteristics on which we match for part of our analysis. In addition, we find that confiscations are unrelated to other municipality-level developments, such as election cycles. In supplementary tests, we focus exclusively on confiscations initiated by higher-level courts and on cross-sectional firm characteristics that allow us to employ *municipality x year* fixed effects.

One alternative interpretation of our results that certainly merits consideration is that, since confiscated assets are often used by local enforcement agencies, our results are driven by a strengthening of enforcement agencies rather than a weakening of organized crime. Confiscated

real estate, for instance, has been redeployed to create new police stations. Since there is usually a multi-year lag between the time of a confiscation and the time of redeployment, we can test whether our findings respond to the former or latter. We find a significant effect following confiscations, but no effect following redeployments, allowing us to rule out this alternative interpretation.

In a further robustness test, we study whether our results are affected by differences in the degree to which local politicians are influenced by the mafia. It could be argued that confiscations occur when the local mafia organization is relatively weak, while strong local mafia clans exert their political influence to prevent anti-mafia actions. In this case, treated municipalities in our analysis might experience a decline in organized crime that likely would have occurred irrespective of enforcement actions. To alleviate this concern, we test whether our results differ when local politicians are influenced by the mafia, which we proxy using information on municipalities that later experienced a council dissolution due to infiltration by organized crime.[8] We find similar results across municipalities that subsequently experienced a council dissolution and those that did not, suggesting that our results do not respond to the influence of mafia on local politicians. Additionally, it is possible that regional variation in enforcement explains our findings. We test this hypothesis and find that regional variation in the fraction of asset seizures that subsequently lead to redeployments does not explain our results. Further details on these robustness tests are provided in Section III.D.

Our paper contributes to several strands of the literature. First, our paper relates to a large body of work on organized crime. Such work has typically focused on the historical roots of organized crime (Skaperdas 2001; Bandiera 2003; Buonanno and Pazzona 2014; Buonanno et al. 2015; Acemoglu, De Feo, and De Luca 2017; Dimico, Isopi, and Olsson 2017), as well as its impact on economic development, productivity, growth, and politics (Daniele and Marani 2011; Acconcia, Corsetti, and Simonelli 2014; Daniele and Geys 2015; Pinotti 2015a, 2015b; Pinotti and Stanig 2016; Bianchi et al. 2017; Daniele 2017; Le Moglie and Sorrenti 2017; Ganau and Rodríguez-Pose 2018; Scognamiglio 2018).[9] To the best of our knowledge, ours is one of the first to examine the effect of organized crime on firms. Two other contemporaneous working papers

[8] Importantly, these dissolutions are initiated by national authorities, thus are less likely to be subject to local biases.
[9] See Section I for a detailed literature review.

study criminal firms' financial statements and accounting quality (Bianchi et. al. 2019) and the performance of peer firms when criminal firms are removed in Northern Italy (Fabrizi et. al. 2019). Both papers rely on a regional set of firms that were found to be infiltrated by organized crime. This has the advantage of directly identifying treated firms but comes at the cost of selection concerns—not all mafia firms are detected—and concerns on whether detected firms are reflective of typical mafia firms. In contrast, our identification strategy assumes that all firms in a treated municipality are affected by organized crime. This reflects the fact that most firms in a treated municipality are either protected by the mafia or do business as suppliers or customers of firms that are connected to organized crime (Gambetta 1993). Our firm-level results on incumbents therefore constitute average effects. A further difference is that the aforementioned papers rely on one shock per unit of observation, whereas we are able to exploit thousands of staggered municipality-level events in the spirit of Bertrand and Mullainathan (2003) to show how organized crime reduces competition and benefits incumbents using first treatment and intensity of treatment measures. In addition, compared to these papers on criminal firms, we are able to control for other province-year and even municipality-year specific developments that might explain the outcome variable of interest.

Second, we contribute to the literature on barriers to entry and collusion, in which the focus has been on explicit and tacit collusion agreements as mechanisms to enforce cartels (Dasgupta and Zaldokas 2017; Bourveau, She, and Zaldokas 2018).[10] We establish empirically that organized crime serves as an external mechanism to enforce collusion among firms, as argued by Gambetta (1993) among others. We show that organized crime is associated with less competition, the presence of potentially inefficient firms, and barriers to entry, all of which likely foster corruption and hence are detrimental to economic growth (Shleifer and Vishny 1993; Mauro 1995; Djankov et al. 2002; Pinotti 2015a,b).

Overall, while our results are specific to organized crime in Italy, they can be interpreted more generally within the theoretical framework provided by Olson (1993). Olson (1993) argues that in the presence of *stationary bandits* (a designation which includes organized crime), there is some incentive to invest, create, and innovate. Notably, unlike *roving bandits* who steal everything and thereby discourage investment, *stationary bandits* impose a partial, recurring tax that may take

[10] See Levenstein and Suslow (2012) for a literature review on cartels and collusion.

the form of protection money. Nevertheless, that recurring tax is likely higher than taxes in a *democratic state* which is why investment and economic activity may lag behind in the presence of *stationary bandits* vis-à-vis *democratic states*. Within our setting, anti-mafia enforcement actions are means by which the influence of weaker institutions (stationary bandits/organized crime) declines while that of stronger institutions (the Italian state) increases, which results in increased competition, reduced monopoly power, and innovation, as predicted by Olson's (1993).

I. BACKGROUND AND INSTITUTIONAL SETTING

To provide context to our paper, we give an overview of the history of the mafia in Italy, describe its economic impact, and summarize actions taken to fight the mafia. Appendix A provides additional background on organized crime in Italy and around the world.

A. Historical background

The Italian mafia has existed and, at times, thrived for more than a century. Described most simply as a secret organization by Gambetta (1993) and Dickie (2004) in their seminal books, the mafia is traditionally at home in the regions of Campania, Calabria, Puglia, and Sicily, and its origins have been tracked to the time of the unification of Italy during the second half of the nineteenth century (Skaperdas 2001; Lupo 2004). At the beginning of the twenty-first century, organized crime was present and operated throughout Italy.[11]

The mafia's reach across Italy may hide the fact that each mafia family tends to be small and operates within local districts, typically in no more than one municipality. Also, no more than one mafia family exerts power in a municipality. Polo (1995) argues that the limited expansion of mafia families is due to severe agency conflicts (members can easily entrench themselves) met by enforcement constraints. Gambetta (1993) adds that the mafia business is labor intensive, since it relies on an intelligence network formed by individuals that gather information that can later be used to enforce power. Thus, a mafioso has a comparative advantage over one territory—generally the one in which he was born—since it is there that he knows most of its residents. As Gambetta (1993, p. 37) points out, a mafioso is better off "protecting *all* transactions over a small territory than *some* over a variety of territories."

[11] For instance, operation *Infinito* that started in 2003 and was carried in the northern region of Lombardy concluded with the arrest and sentencing of more than 200 members of the 'Ndrangheta and Milanese gang members.

Along these lines, Polo (1995) argues that mafia families act locally due to enforcement constraints rather than for technological reasons. Specifically, the nature of the mafia business is to enforce contracts between principals and agents that are hard to enforce by an external legal authority. Thus, agents for the mafia may act opportunistically when an opportunity arises. Of course, the mafia has a very large set of incentive instruments (including those prohibited by law) but monitoring costs increase substantially -and hence families' deterrence power decreases-with geographic distance. This creates incentives for mafia families to recruit along blood lines (within families), limiting the availability of "soldiers" and expansion opportunities.

B. Economic impact

In the regions of Campania, Calabria, Puglia, and Sicily, the different organized crime organizations operate in 610 towns and affect millions of lives through legal and illegal operations. Though its true economic impact is inherently hard to measure, estimates of mafia revenues from criminal activity range from 6.6 percent to 8 percent of Italy's GDP, while revenues from legitimate businesses with mafia ties are estimated to amount to 12 percent of Italy's GDP (Ruffolo et al. 2010; Calderoni 2014; Dimico, Isopi, and Olsson 2017)

There appears to be wide agreement that organized crime is a major obstacle to economic development (Daniele and Marani, 2011; Pinotti 2015a, 2015b; Scognamiglio, 2018). In our own cross-country analysis, presented in Figure 1, Italy stands out as a developed country with a particularly high rate of organized crime compared to other OECD countries (except Mexico) and is a highly developed country vis-à-vis other countries infiltrated with organized crime.

-- Figure 1 about here --

This country-level perspective, however, masks the significant regional variation in economic development across Italy. The traditional mafia regions in Southern Italy are substantially less developed than the regions in the North (see Figure 2, Panel A). Although establishing a causal link between economic development and organized crime is difficult, Pinotti (2015b) studies whether this link exists in Puglia and Basilicata, two regions that experienced a surge in organized crime in the 1970s and 1980s. The author estimates that the mafia presence lowered GDP per capita by 16 percent in these regions.

-- Figure 2 about here --

If the presence of organized crime has a negative impact on economic development, how does its presence affect the outcomes of individual firms? Firms come under mafia control by paying protection money, by buying from mafia-related suppliers, and/or by having a mafioso as a business partner. In return, the mafia uses its power to enforce cartels, which actively intimidate businesses to keep them out of the market, generate sales for firms under its protection by reducing competition or channeling sales to them, arbitrate disputes, provide reliable material flow, and mediate with locals (Gambetta 1993).

By enforcing cartels, the mafia essentially also acts as a barrier to market entry, protects monopolistic or oligopolistic rents, directly affects individuals' choices and efficient resource allocation, and, more generally, makes collusion more likely, elaborate, and enduring (Gambetta 1993, Gambetta and Reuter 1995; Bandiera 2003). This results in less efficient production, higher prices, lack of incentives to reduce production costs, the presence and survival of inefficient firms, and slower growth among efficient firms (Reuter 1987).

Typically, firms under the protection of the same mafia family operate in different industries. The mafia harmonizes activities between these firms by putting all connections in touch, and more specifically, generating sales between firms. For some firms, this may generate additional sales while for others this may mean having to resort to less efficient suppliers (Bonanno and Lalli 1983). In addition to channeling firms' purchases through protected suppliers in which a mafioso is a partner, direct cash payments constitute another form of protection payment. Evidence on the size of protection payments is scarce, but Balletta and Lavezzi (2019) analyze a novel database on extortion in Sicily and find that the percentage of profits appropriated by organized crime ranges from 40% for small firms to 2% for large firms. Ultimately, firms forced to make protection payments incur higher operational costs. And since they may have to share the upside with the mafia, they may avoid investing in equipment that can be easily destroyed (Konrad and Skaperdas 1998). Overall, these opposing effects make it hard to anticipate the effect of organized crime on firms' outcomes.

Besides actively managing competition, the mafia is oftentimes directly involved in the allocation of public procurement contracts and public investment funds, controlling concessions, and granting authorizations. This may lead to contracts that are allocated to less efficient firms (Schelling 1971; Barone and Narciso, 2015; Alesina, Piccolo, and Pinotti 2018). Moreover, the

effect of the mafia is also seen in the labor market. Sanchez-Jankowski (1991) argues that the long-term effects can be even higher as the more able entrepreneurial youth may choose to join the mafia. Even after the dissolution of organized crime, it can take a generation to reverse these effects. Lastly, there are the costs of violence, extortion, destruction of property, illegal drug trafficking, and death (Skaperdas 2001; Collier and Hoeffler 2002; Skaperdas 2002; Bandiera 2003).

In addition, while racketeering and the protection provision have always been part of the mafia's business activities, throughout the years the mafia adapted to exploit other market opportunities. In the 1950s, the mafia penetrated the construction and cement industries, and in the 1970s the mafia reorganized its operations around cigarette smuggling. In addition, drug trafficking has been one of the mafia's most profitable businesses, and legal businesses may act as a tax cover for the illegal activities the mafia is involved in (Anderson 1995).

C. Fight against the mafia

Accounts of the mafia were scarce for many decades due to the secrecy associated with it. The early 1980s saw new legislation reflecting the Italian government's willingness to combat the mafia, and accounts of the mafia increased in number from those individuals charged under these regulations.[12] Specifically, the Rognoni-La Torre Law (Law #646) introduced into the Italian Penal Code in 1982 Article 416-bis, which defines organized crime as a "stable association that exploits the power of intimidation granted by the membership in the organization, and the condition of subjugation and *omertà* that descends from it, to commit crimes and acquire the control of economic activities, concessions, authorizations, and public contracts."[13]

Most important for the government's effort against the mafia, Law #646 introduced a crucial procedure by which authorities can confiscate assets belonging to individuals suspected of mafia ties, with the intention of weakening the mafia's power. The evidence needed to confiscate an asset under this law is relatively weak, amounting to proving that an individual's lifestyle does

[12] The first legal attempts at anti-mafia regulation date back to at least 1965. Under Law #431, the Italian government banned individuals suspected or convicted of having ties with mafia-type organizations from entering public contracts. However, this law was considered ineffective since the concept of a mafia-type association was undefined, creating a legal loophole. Attempts at closing this loophole gained backing only after Sicilian Mafia assassinated General Carlo Alberto Dalla Chiesa, prefect of Palermo, in 1982.

[13] In the following years, additional laws and decrees that amended the framework were introduced, resulting in the Decree 159 of 2011 – also known as the Anti-mafia Code- which consolidated existing laws and regulations on criminal organizations and confiscation of assets.

not match their reported income.[14] In 1983 alone, there were 207 asset confiscations, compared to 46 confiscations over the 1965-1982 period. The government's actions against the mafia heated up substantially after the killing of anti-mafia judges Giovanni Falcone and Paolo Borsellino in 1992. As of 2013, 5,470 people had been charged with this crime, 4,148 in Calabria, Campania, and Sicily (Alesina, Piccolo, and Pinotti 2018).

As of September 2019, the Italian government had confiscated more than 33,000 mafia-owned properties and more than 4,000 companies. Panel B of Figure 2 shows the number of confiscations by province. As expected, given the abundance of organized crime, Southern Italy had experienced the largest number of confiscations, although confiscations take place in almost every province. This may partly reflect the mafia's active outreach throughout Italy, but also policies enforced in the 1960s and 1970s to send suspected mafia members to small towns outside of the typical mafia regions, a policy that backfired and resulted in the geographical expansion of the mafia.[15] The 1994 Italian Parliamentary Anti-mafia Commission stated that "[f]orced resettlement, largely used without careful choices and without appropriate guarantees of control, has practically dispersed in many areas in Italy several individuals belonging to the mafia and has implanted them in areas that would have probably been otherwise immune" (Scognamiglio 2018, p. 4).[16] For the interested reader, in Appendix B we map the number of confiscations scaled by GDP (Panel A) and population (Panel B), respectively, to show that the prevalence of anti-mafia enforcement actions in the Southern regions is not just an artefact of larger population or economic activity.

II. DATA AND METHODOLOGY

In order to study the effect of organized crime on firms, we use multiple data sources that we describe here. We then discuss our methodology and our strategy to alleviate endogeneity and

[14] For a detailed description of the procedures, historical background, and limitations, see Balsamo et. al. (2010), De Lia (2017), Manna (2018), and Finocchiaro (2019). Similar procedures have been used elsewhere. Donald Trump's former campaign chairman Paul Manafort, for instance, faces questions over his luxurious lifestyle (clothing, real estate, and vehicles) supported using undisclosed foreign bank accounts.

[15] For instance, 2,360 people were resettled between 1961 and 1972 (Scognamiglio 2018), and such resettlements have been found to help organized crime infiltrate firms in distress in the center and north of Italy (Mirenda, Mocetti, and Rizzica 2017).

[16] Translated from *Italian Parliamentary Antimafia Commission* (1994): Relazione sulle risultanze dell'attivita' del gruppo di lavoro incaricato di svolgere accertamenti su insediamenti e infilitrazioni di soggetti ed organizzazioni di tipo mafioso in aree nontradizionali, vol. doc. n. 11.

other identification concerns.

A. Data and variables

We merge multiple dataset that include information on anti-mafia enforcement actions, firms' characteristics and financial statements, applications for patents, and macroeconomic measures for municipalities in Italy. We now describe key datasets and variables; in Appendix C, we provide detailed variable definitions.

Anti-mafia enforcement actions. Measuring the strength of the mafia is intrinsically difficult. Thus, we exploit anti-mafia enforcement actions to proxy for the weakening of mafia families. More specifically, we use staggered anti-mafia enforcement actions across municipalities in Italy in the form of asset confiscations. As Gambetta (1993) and Reuter (1995) point out, the organizational reputation and its name are the most valuable assets a criminal organization has. Thus, these actions weaken those organizations where it hurts the most, regardless of the value of the assets confiscated. We collect data provided by the ANBSC (the national Italian agency responsible for the administration and destination of assets seized and confiscated from organized crime) on the date, location (municipality), and number of assets confiscated from the mafia.[17] The more than 36,000 confiscations that occurred between 1968 and 2019 are spread across every region, although most occurred in the original mafia strongholds in the south (see Table I). Provinces in Campania, Calabria, and Sicily saw large numbers of confiscations, but so did some northern provinces (Figure 2, Panel B).

-- Table I about here --

Once Mafia assets are confiscated, the government's goal is to guarantee their effective social reuse.[18] The ANBSC manages confiscated assets until they are redeployed. As of 2019, 16,700 assets have been redeployed, while 20,200 are still under the management of the agency. Our analysis focuses on assets that have been redeployed since, for undisposed assets, confiscation

[17] The agency provides two dates. First, the date in which an asset is removed from the suspect. Second, when the confiscation is legally confirmed, and the asset is redeployed. We use the first date as the time of the confiscation.

[18] In many cases where real estate is confiscated, redeployed assets are used by the municipality and new police stations are opened, but in other cases these properties are assigned to civil associations and social centers. One example is Café de Paris, a bar on the Via Veneto in Rome. This café was glorified by the Italian filmmaker Federico Fellini in the movie "La Dolce Vita." In 2009, the property was confiscated by the ANBSC and reopened two years later, selling products produced by Libera, an anti-mafia group that runs cooperative farms on land confiscated from the mafia.

dates are unavailable. However, the geographical distribution of the deployed assets and assets confiscated but not yet redeployed is highly correlated (ρ=0.96), which alleviates concerns that our confiscation measure might be biased by redeployment rates.

Using the confiscation data, we define two measures to capture the weakening of local mafia families. First, *Confiscation Dummy* is a dummy set equal to one following the first confiscation at the municipality level. Second, *#Confiscations* is the natural logarithm of one plus the accumulated number of asset confiscations at the municipality level at any point in time. A potential concern is that the value of the confiscated asset is in general economically small compared to the value of the assets owned by the mafia. However, as stated before, asset confiscations challenge mafia families' most valuable asset, their reputation as a guarantor of protection and effective intimidator (Gambetta 1993; Reuter 1995).[19] In addition, since only a small fraction of the assets are auctioned instead of being redeployed, confiscations unlikely generate a wealth shock for the municipality that might entail confounding effects.

Organized crime activity. We obtain data on intimidation of public officials compiled by *avviso pubblico*, an Italian network of anti-mafia organizations. The data is published by the organization on a yearly basis via reports that include detailed information on the location and date of attacks such as shootings, arson, and threats made by the mafia. The data is available starting in 2010, and we collect data from 2010 until 2015.

Competition and firm-level variables. We obtain financial information for all Italian public and private firms reported in the *Analisi Informatizzata delle Aziende Italiane* (AIDA) database, provided by Bureau Van Dijk through the Orbis database. As is standard in the literature, we download and combine information from multiple vintage DVD editions of the database for the 2005-2015 period to address survivorship bias concerns over that period. Each DVD provides financial statements for the current year and the previous ten years, allowing us to study the 1995-2015 period. A key advantage of Italian data is that all limited liability companies are obliged to

[19] It could be argued that confiscations vary in size and that the damage made to the reputation of the mafia depends on the value of the confiscated assets. Unfortunately, there are two data restrictions that limit our ability to test this. First, the value of the confiscated assets is only available for auctioned assets auctioned. Since most of the assets are redeployed for social uses, the information on the value of the assets' is very limited. Second, the auction value does not accurately reflect the value of the asset at the time of confiscation. In many cases, a number of years pass between the confiscation and the auction, and the value of the asset diminishes rapidly due to deterioration and lack of maintenance. ("The Italian experience in the management, use and disposal of frozen, seized and confiscated assets," Open-ended Intergovernmental Working Group on Asset Recovery, Vienna, September 11-12, 2014).

disclose financial information including major income statement and balance sheet items, therefore allowing us to study an unusually large sample of firms that includes many small firms. After restricting our sample to firms with non-missing assets, we obtain over 1.8m unique firms, which we use to study competition. In our analysis of incumbent firms, we rely on firms that have at least two consecutive observations with non-missing asset, and this leaves us with more than 1.1m firms and close to 8.2m firm-year observations. At the municipality-year level, we rely on more than 4,000 municipalities and more than 80,000 municipality-year observations with at least one firm over the 1995-2015 sample period.

Using incorporation years and information on firms' exit (by declaring bankruptcy or being dissolved), we construct three measures of competition at the municipality-year level, specifically, *Turnover Rate*, *Entry Rate*, and *Exit Rate*. Our first measure is *Turnover Rate,* defined as the number of new firms that enter plus the number of firms that cease to exist scaled by the number of active firms at the beginning of a given year. Entry rate and exit rate are defined as the number of new firms created and the number of firms that cease to exist over a given year, respectively, each scaled by the number of active firms at the beginning of the year. The mean turnover rate at the municipality-year level is 9.77 percent, composed of an entry rate of 9.34 percent and an exit rate of 0.43 percent (Table II, Panel A).

-- Table II about here --

At the firm level, we use *Revenues* and *Assets* to capture size. Profitability is measured by *Return on assets* (after-tax profit divided by assets). We winsorize these variables at the 1 percent and 99 percent levels, although this choice does not affect our results. The mean (median) firm in our sample has revenue of USD 9.132 (0.611) million and assets of USD 25.639 (0.945) million, reflecting the fact that Orbis contains many small firms (Table II, Panel B). Unsurprisingly, since our sample period includes the recent financial crisis and many small firms did particularly poorly, the mean return on assets (ROA) is negative (-2.1 percent); however, the median ROA is positive (0.3 percent).[20]

Other variables. We gather information from various sources to run additional tests. In particular, we exploit time series variation in the strength of the mafia at the time firms were incorporated.

[20] To further confirm that the negative mean sample ROA is not an artefact of poor data quality, we verify that ROA is negative predominantly during the crisis.

To this end, we proxy the intensity of mafia activity by looking at homicide rates, following Pinotti (2015b), who finds a very strong correlation between homicide rates and organized crime activity across regions in Italy. The data on homicide rates are from the Eurostat database. We also construct *Tradable*, a dummy variable set equal to one if a firm operates in the tradable sector using the categories in Mano and Castillo (2015). In addition, we obtain the registry of election dates and name of elected officials for local offices from the Ministry of the Interior. This database includes time-series information on the identity of public officers for each municipality and allows us to study whether confiscations are driven by political cycles.

In order to measure innovation, we use patent data from the European Patent Office (EPO). EPO provides information on all patent applications made in Italy between 1995 and 2015, a total of 137,936 applications.[21] For each patent, we obtain a list of inventors and their domiciles. To create a measure of innovation at the municipality-year level, we aggregate the number of inventors domiciled in each municipality that apply for a patent in a certain year. To avoid overweighting innovation due to the existence of multiple inventors on a patent, we assign each inventor a weight of $1/N$ for that patent, where N is the total number of inventors on a patent. Thus, our final measure of innovation is:

$$I_{m,t} = \sum_{p=1}^{P_{m,t}} \frac{1}{N_{p_{m,t}}},$$

where $I_{m,t}$ is the level of innovation in municipality m at time t; $P_{m,t}$ is the number of applications for patents made at time t that include inventors domiciled in municipality m; and $Np_{m,t}$ is the total number of inventors on the application for patent p made in municipality m at time t.[22] The results are in Panel C in Table II. In total, we have information on 23,866 municipality-years, with a mean (median) of 10 (4) inventors.

We obtain data on public procurement contracts from the Italian Ministry of Infrastructure and Transportation which, starting in 2006, publishes detailed information on public contracts, their calls for proposals, bids, and outcomes. The information for 2006-2008 is incomplete, so we

[21] A patent application can be made simultaneously in different countries. Thus, to avoid double counting, we focus on applications made in Italy.

[22] For example, consider a municipality *y* that in year 2010 had 3 inventors applying for patents. Inventor A filed for one patent that is solo authored (weight=1), Inventor B filed for one patent that has one additional co-author (weight=0.5), and Inventor C filed for one patent that has three additional co-authors (weight=0.25). Then, municipality *y* in year 2010 would have a measure of innovation of 1 + 0.5 + 0.25 = 1.75.

restrict our sample to 2009-2015. Where data on the municipality contracting a service are missing, we manually extract the municipality from the contract description. The summary statistics are in Panel C in Table II.

B. Empirical strategy

We start by studying whether anti-mafia enforcement actions effectively weakened organized crime activities. For this, we test whether anti-mafia enforcement actions result in fewer instances of intimidation against public officials in a difference-in-difference setting. Our outcome of interest is the natural logarithm of one plus the number of intimidation events happening in a municipality within a year. The results in Table III show that anti-mafia enforcement actions lead to a lower frequency of intimidatory events. In particular, the coefficients in columns (1) to (4) show that the number of intimidatory events decline following a first anti-mafia enforcement action, suggesting a weakening of the power of the local organized crime cell.

--- Table III about here ---

Having shown that they have an effect on mafia activity, we use anti-mafia enforcement actions to proxy for the weakening of mafia families in a difference-in-difference setting, in order to study the effect of anti-mafia enforcement actions on entry and exit rates at the municipality-year level and on firm-level outcomes at the firm-year level. Municipalities are defined as treated when they first experience an asset confiscation, and firms are defined as treated by an asset confiscation when headquartered in a municipality that has been affected. This choice of assigning asset confiscations to municipalities is consistent with accounts of mafia families operating locally (Polo 1995) and not competing directly within the same territory (Gambetta and Reuter 1995).

We estimate the effect of anti-mafia enforcement actions on municipality-level outcome variables using a difference-in-difference approach in the spirit of Bertrand and Mullainathan (2003). Specifically, we estimate:

$$(1) \qquad y_{m,p,t} = \alpha_m + \alpha_{p,t} + \beta TREATED_{m,p,t-1} + \varepsilon_{m,p,t},$$

where $y_{m,t,p}$ is an outcome variable of interest (e.g., *turnover*, *entry*, and *exit* rates) for municipality m in province p in year t. $TREATED_{m,p,t-1}$ identifies treated municipalities and in a variation of (1), we additionally control for $\#Confiscations_{m,p,t-1}$ to capture the intensity of treatment. We include municipality fixed effect (α_m) to account for the time-invariant characteristics of each municipality

and province-year fixed effects ($\alpha_{p,t,}$) to control for provincial economic and other types of shocks that might coincide with treatment of a municipality. $\varepsilon_{m,p,t}$ is the error term. Standard errors are clustered at the municipality level, but results are robust to alternative clustering specifications.

We then estimate the effect of confiscations on firm-level outcome variables using a similar approach. Specifically, we estimate:

$$(2) \qquad y_{i,m,p,t} = \alpha_i + \alpha_{p,t} + \beta TREATED_{m,p,t-1} + \varepsilon_{i,m,p,t},$$

where $y_{i,p,t}$ is one of several dependent variables of interest for firm i in municipality m, province p, at time t. $TREATED_{i,p,t-1}$ identifies treated firms and as before, in a variation of equation (2), we additionally control for the number of confiscations. We include firm (α_i) and province-time ($\alpha_{p,t}$) fixed effects, thereby comparing treated firms within a province in a given year to other firms in that same geography and year.[23] $\varepsilon_{i,p,t}$ is the error term. Standard errors are clustered at the municipality level and again, all results are robust to alternative clustering specifications. We also use equation (2) to examine how the anti-mafia enforcement actions affect firms with different cross-sectional characteristics. To this end, in Section IV.B we run variations of specification (2) where we interact $TREATED_{i,p,t-1}$ with such characteristics. These variations of the main specification allow us to additionally control for *municipality x year* fixed effects.

C. Endogeneity, omitted variables, and other concerns

For the econometrician interested in the impact of organized crime, municipality-level anti-mafia enforcement actions constitute an almost ideal quasi-experimental setting. However, there is a list of potential concerns that need to be addressed. In this subsection, we discuss them and describe the robustness tests that we run to mitigate concerns about the experimental design.

One potential concern with our study is that our results might be concentrated in one specific year. An economic development during such year might coincide with a large fraction of anti-mafia enforcement actions and drive our results. Figure 3 shows that this does not appear to be the case. The number of anti-mafia enforcement actions varies significantly over the two decades studied, with a substantial number of confiscations during each year (Panel A). Importantly, the number of municipalities and firms treated for the first time varies considerably

[23] We estimate equations (1) and (2) using a Stata package for high-dimensional fixed effects (Guimaraes and Portugal 2010).

each year over the 1995-2015 period (Panels B-C). At the end of our sample period, about 91,300 firms (9.6 percent of all sample firms) and 434 municipalities (5.5 percent of all Italian municipalities and 10.8 percent of all municipalities with at least one sample firm) are treated. No more than 3 percent of sample firms and 1.25 percent of sample municipalities are treated for the first time in any given year.

--- Figure 3 about here ---

Another related potential concern is that asset confiscations could be driven by geography-specific developments, such as greater prospects for economic development in certain regions or provinces or changes in the judiciary system.[24] Thus, our results could be in response to efforts to achieve economic development—unobservable to the econometrician—and not by the anti-mafia enforcement action itself. To rule out this possibility, throughout our tests we include *Province x year* fixed effects, which constitute a simple control for most potentially omitted variables.

However, the argument about geography-specific developments can further be taken to municipality level developments that might simultaneously drive confiscations and our results. To mitigate this concern, we conduct multiple additional tests. First, we exploit the fact that confiscations can be initiated by the central public prosecutor's office or by local authorities. If initiated by the latter, confiscation activity might coincide with or be driven by municipality-level events that in turn drive our results. This is less of a concern for confiscations initiated by central authorities. We therefore repeat our analysis using the subset of such confiscations.

Second, we examine the possibility that a change in the local political environment drives asset confiscations and economic development. To this end, we obtain time-series information on the identity of the mayor for each municipality from the registry of elected officials for local offices from the Ministry of the Interior. This allows us to study confiscation activity around political changes. In Figure 4, we plot the average number of confiscations per year following the election of a mayor (Panel A) and before a mayor leaves office (Panel B). The patterns in Figure 4 suggest that confiscations are not associated with political cycles.

--- Figure 4 about here ---

[24] The Italian judiciary system is divided into *tribunalis*, or law courts, each with power over a circuit that in most instances coincides with a province. There are 20 regions, which are divided into 107 provinces. Each province consists of municipalities (7,926 as of January 2019).

Third, to account for municipality-level developments other than political cycles, in our firm-level cross-sectional tests we control for municipality-year fixed effects. This allows us to mitigate concerns that events at the municipality level other than weakening of the mafia drive our results.

Another concern with our experiment is the possibility that municipalities are different along other observable characteristics that correlate with our outcome variables. In a first test, we compare the initial conditions of municipalities that were later affected by anti-mafia enforcement actions with those of municipalities that were not (Panel A of Table IV). The results show that, at least on a series of observable dimensions, these municipalities are similar. Municipalities do not differ with respect to proxies for economic and social development, such as water usage per capita, social expenditure per capita, or number of tourism-related businesses per capita. However, they do differ in population and the number of firms per capita and naturally on firms' outcomes due to the influence of organized crime on firms. Our results are robust to matching on population.[25] In a second test, we examine whether observable municipality-level characteristics measured in or prior to 1995 can predict subsequent enforcement actions. We use variables including population, water usage, and measures of tourism, and also aggregate data on firms' activity obtained from Orbis at the municipality level to capture municipality-level economic development. We then run a probit model where the dependent variable is an indicator on whether the municipality experiences an enforcement action between 1995 and 2015 and all controls are measured in 1995 or before. In addition, due to the institutional setting and the nature of the judiciary system in Italy, we include province fixed effects. In columns 1 and 2 of Panel B, Table III, we present the marginal effects based on a probit model.[26] Our results show that larger cities in terms of population and cities with more tourism are more likely to experience an anti-mafia enforcement action, but that proxies for economic development such as water usage and firms per capita or social indicators such as the percentage of foreign-born residents do not predict anti-mafia enforcement actions. In addition, we run an alternative specification where our dependent variable is the time elapsed between the beginning of our sample period (1995) and the year in which a municipality experienced its first enforcement action. The results in columns 3 and 4 of Panel B, Table IV, show

[25] When matching on population, the difference in number of firms per capita disappears.
[26] Fernández-Val (2009) shows that estimates of marginal effects based on a probit fixed effects model exhibit no bias or negligible bias.

that larger municipalities tend to experience confiscations later on in our sample period, but that no other proxy for economic development seems to be related to the timing of a confiscation.

--- Table IV about here ---

Besides these analyses, we also conduct various robustness tests. For instance, we repeat our municipality-level analysis on the subset of treated municipalities and same-province municipalities matched by population. Along similar lines, we repeat our firm-level analysis on the subset of treated firms and firms matched by industry, size, and geography. Moreover, since one in five Italian firms operate in one of the largest six cities where potentially more than one mafia family operates (Rome, Milan, Naples, Turin, Palermo, and Genoa), we repeat our analysis excluding firms headquartered in those cities.

III. MUNICIPALITY-LEVEL EVIDENCE

We now investigate the municipality-level implications of anti-mafia enforcement actions. We provide evidence for firm *turnover*, *entry*, and *exit*, and examine innovative activities and competition for public procurement contracts.

A. Turnover, entry, and exit

We study whether the mafia in a municipality acts as a barrier to entry for new firms and protects existing firms. More specifically, we test whether anti-mafia enforcement actions lead to an increase in competition, ex-ante limited by organized crime to increase firms' profits and demand higher graft (Bliss and Di Tella 1997). We estimate equation (1) for firms' *turnover*, *entry*, and *exit rates* (Table V) and find this to be the case. After a municipality experiences its first anti-mafia enforcement action, the *turnover rate* of firms' increases by 1.15 percentage points, or 11.8 percent of the mean *turnover rate* (Panel A, column (1)). This change in *turnover rate* is due to both increased *entry* (1.09 percentage points, or 11.67 percent of the mean, column (2)) and, to an economically smaller extent, increased *exit* (0.06 percentage points, or 14.18 percent of the mean, column (3)). We next include a measure of the intensity of anti-mafia enforcement actions and find that a larger number of confiscations is associated with higher turnover, entry, and exit.

--- Table V about here ---

These results are economically and statistically similar when we focus on municipalities with fewer than half a million inhabitants, which alleviates the concern that our results are driven

by large municipalities (Panel B).[27] The results also hold when we match municipalities to same-region and similar-size[28] municipalities that were unaffected by anti-mafia enforcement actions, as reported in Panel C of Table V. To further mitigate concerns about municipality-specific developments, we repeat the study by focusing on confiscations initiated at higher level courts, i.e. excluding those initiated by province-level law courts. We find similar results to those found including all the confiscations (Panel D).

For robustness, we repeat our analysis by randomly reallocating confiscations that occurred in one municipality to another. We repeat this placebo test multiple times and the results we obtain allow us to rule out spurious correlations between measures of competition and anti-mafia enforcement actions (Appendix D).

Next, we consider two alternative explanations for our *turnover* rate results. First, that the mafia "recycles" confiscated firms. That is, once the assets of a mafia-related firm are confiscated and the firm closes down, the mafia opens a new firm under a different name, causing an apparent increase in entry and exit rates. Second, that shadow firms become legitimate subsequent to the weakening of organized crime. In both cases, we should observe that firms that enter the market following anti-mafia enforcement actions are larger and grow faster than firms that are established in the absence of anti-mafia enforcement actions.[29] To test this idea, we compare the revenues of newly incorporated firms over the first five years of their existence. We find that on average, the revenues for firms established within five years of anti-mafia enforcement actions are no different from those established under regular circumstances, i.e., in the absence of anti-mafia enforcement actions (Figure 5, Panel A). Firms in both categories exhibit similar patterns, indicating that our results are not driven by firms that were set up to replace firms whose assets were confiscated during anti-mafia enforcement actions.

--- Figure 5 about here ---

We also examine firms that exit following anti-mafia enforcement actions and those that exit under regular circumstances. Firms that exit following anti-mafia enforcement actions were larger prior to these actions, a finding consistent with the notion that these firms were protected by

[27] Our results are also robust to excluding very small municipalities, i.e. those with fewer than 10 firms.
[28] We require control municipalities have no more or less than 50% of the treated municipality's population.
[29] While a confiscation captures the physical assets of a firm, it does not capture human capital or the value of intangibles, such as customer and supplier networks.

the mafia, although the pre-exit trend for both types of firms is similar (Figure 5, Panel B).

In addition, we test whether aggregate economic activity within a municipality is affected by enforcement actions, i.e. whether new entrants compensate for the economic activity of exiting firms. Since yearly data on municipality-level GDP is unavailable, we aggregate the revenues of firms operating within each municipality and compare them with those of municipalities of similar size matched on geographic proximity. Figure 6 shows that municipalities that experience anti-mafia enforcement actions subsequently benefit from an increase in economic activity, as measured by aggregate corporate revenues.[30]

--- Figure 6 about here ---

Overall, the results in this subsection support the idea that organized crime acts as a barrier to entry that protects firms from entry by new firms. Anti-mafia enforcement actions, which reduce the strength of organized crime, result in increased competition and economic activity.

B. Innovation

In addition to the change in the competitive landscape documented so far, our setting also allows us to examine the impact of organized crime on innovation. This is important since innovation is typically tied to economic growth. In particular, organized crime, by limiting entry, may reduce the incentives for firms to innovate. Firms do not compete primarily on quality or price, but by enlisting mafia protection (Gambetta 1993). Thus, we should expect an increase in innovation activity after anti-mafia enforcement actions.

Using the regression specified in equation (1) but using our measure of innovation for the 1995-2015 period as the dependent variable, we find that municipalities where anti-mafia enforcement actions take place for the first time experience an increase in innovation activities of approximately 6 percent. The results in Table VI show that once anti-mafia enforcement actions take place in a municipality, our measure of innovation activities increases by 5.71%. We find that this result is not driven by very large municipalities with more than half a million inhabitants (columns (3) and (4)). In columns (2) and (4), we find that for innovation activity the number of confiscations does not seem to be relevant, since only the coefficient for the indicator variable for

[30] This finding is in line with Pinotti (2015b), who focuses on regional GDP in Puglia and Basilicata around the strengthening of organized crime in these two regions and finds a decline in economic activity.

whether a municipality was affected is significant.

--- Table VI about here ---

C. Competition for public procurement contracts

The mafia has also been accused of manipulating the allocation of public procurement contracts. To further understand the effect of anti-mafia enforcement actions on competitiveness, we examine whether these actions make the allocation of public contracts more competitive. The results in Table VII provide evidence that they do. In particular, we find that in a municipality where anti-mafia enforcement actions take place for the first time, there is a 28 percent increase in the number of public procurement contracts (column (1)), a 12 percent increase in the number of applications to bid on each contract (column (2)), a 36 percent increase in the number of firms invited to bid (column (3)), a 31 increase percent in the number of offers per contract (column (4)), a 34 percent increase in the number of offers submitted (column (5)), a 140 percent increase in the value of the work (column (6)), and an almost 400 percent increase in the price reduction obtained by the municipality over the estimated contract value (column (7)).

--- Table VII about here ---

Overall, the evidence of this subsection suggests that a weakening of organized crime results in increased firm turnover, innovation activity, and competition for public procurement contracts. These results are in line with the notion that the mafia acts as a barrier to market entry and limits competition.

D. Robustness

We perform several robustness tests to further support our interpretation. First, we test whether our results are affected by municipalities that experienced confiscations prior to 1995 and for which anti-mafia enforcement actions during our sample period are subsequent shocks. The results in Panel A of Appendix E are similar to those previously found, allowing us to rule out this hypothesis. Second, since we observe heterogeneity in redeployment rates across regions (Table I), it might be that better-run regions redeploy assets faster and that our results are driven by this characteristic. To rule out this alternative explanation, we test whether our results differ across regions with different redeployment rates. More specifically, we run our baseline specifications and interact our explanatory variables with a dummy indicator, *High Redeployment*, that is set to

one for municipalities in regions with higher than median redeployment rates. We report the results in Panel A of Appendix F, where we find that the coefficients for the interaction terms are statistically insignificant, suggesting that the effects are similar across regions with higher and lower redeployment rates.

A potential threat to our identification is that in some municipalities, organized crime might influence authorities and affect the occurrence and timing of confiscations. While the institutional setting and our results on confiscations initiated at higher level courts helps us partly alleviate this concern, we provide additional evidence suggesting that this does not seem to be the case. In particular, we exploit the availability of information on municipalities' councils dissolved after being found to be infiltrated by mafia. First, we show that the number of confiscations does not seem to be affected by the influence of organized crime on local politicians. Figure 7 plots the year-by-year coefficient on the evolution of anti-mafia enforcement actions around dissolution of councils and provides evidence suggesting that mafia infiltration of local councils does not impact confiscations. Then, we formally test whether our results differ in municipalities subsequently found to be infiltrated by the mafia by interacting our explanatory variables with an indicator—infiltrated—that is set to one for municipalities in which the council was eventually dissolved. This indicator is set to zero once the council has been dissolved, to study the differential effect of enforcement actions on municipalities in which local authorities had ties to organized crime. The results in Panel A of Appendix G suggest that our findings do not differ among municipalities in which the council was subsequently dissolved due to infiltration of the mafia.

--- Figure 7 about here ---

IV. FIRM-LEVEL EVIDENCE

We next investigate the implications of anti-mafia enforcement actions for firms. By enforcing cartels, organized crime reduces competition and increases firms' revenues. Organized crime might also increase profitability by allowing firms to charge oligopolistic prices. However, since protected firms must pay protection money and rely on mafia-protected suppliers, the net effect on profitability is unclear. We implement our firm level tests using a difference-in-difference specification as outlined in equation (2). Importantly, due to firm fixed effects, identification stems from firms that exist prior to and after anti-mafia enforcement actions. Our results are therefore reflective of incumbent firms that survive the weakening of organized crime.

A. Main results

We examine whether organized crime benefits firms under its protection. In particular, we test whether anti-mafia enforcement actions negatively impact incumbent firms. Using the *Confiscation Dummy* to indicate the anti-mafia enforcement actions, we find this to be the case. Firms affected by anti-mafia enforcement actions experience a 4.4 percent decline in revenue (Table VIII, Panel A). Economically, this reflects a USD 401,808 (4.4 percent x 9.132 million) decline in annual revenue for the average firm and a USD 26,884 (4.4 percent x 611 thousand) decline in revenue for the median firm. The assets base of affected firms decline by 1.5 percent on average. Next, we examine whether anti-mafia enforcement actions affect profitability. ROA declines by 0.1 percent, but this decline is statistically insignificant (column (3) in Table VIII Panel A).

--- Table VIII about here ---

Having shown that firms located in municipalities affected for the first time by anti-mafia enforcement actions experience a decline in revenues and assets, we next examine whether additional anti-mafia enforcement actions also impact these variables. Using the (logged) number of accumulated asset confiscations, we find that the intensity of anti-mafia enforcement actions leads to additional declines in size (columns (4) and (5) in Table VIII Panel A). Profitability is also adversely affected by repeated treatment, as reflected by the coefficient in column (6).

We repeat our analysis in the subset of firms headquartered in municipalities with fewer than half a million inhabitants and our results remain unchanged (Panel B in Table VIII). In addition, we confirm that our results also hold when we match firms in affected municipalities to same-industry similar-size firms in neighboring municipalities that were unaffected by anti-mafia enforcement actions. In particular, for each treated firm, we construct a set of potential control firms operating within the same industry headquartered in the same region and within a municipality that has not and will not be treated, that has a population of not more or less than 50% of the treated municipality's population, and among those we find firms with volume of assets within 50% of those of the treated firm. From the set of potential control firms, we choose the one closest in geographic distance. We report the results of the matched sample in Panel C of Table VIII. Lastly, we find that the results are very similar when we focus exclusively on confiscations initiated by higher-level courts (Panel D in Table VIII). In Figure 8, we also show that the firm

effects due to anti-mafia enforcement actions documented in Panel A of Table VIII are relatively instantaneous. They do not seem to be the result of a violation of the parallel trend assumption.

--- Figure 8 about here ---

Considering that the evidence in this subsection is based on incumbent firms that exist prior to and after anti-mafia enforcement actions, our results suggest that organized crime is associated with larger and more profitable firms; anti-mafia enforcement actions reduce firm size and profitability. Put differently, for protected firms, the costs associated with organized crime (in form of, for instance, protection money) seem to be more than offset by the potential benefits (being able to charge oligopolistic prices, among others) on average. However, as seen in Section III, there are significant societal and economic consequences associated with organized crime, such as limited firm entry, innovation, competition, and the evident additional costs associated with the presence of organized crime, such as violence, extortion, destruction of property, illegal drug trafficking, and death.

B. Cross-sectional results

A potential concern is that an omitted variable at the municipality-year level might drive both asset confiscations and firm-level outcomes. Fortunately, our setting allows us to make certain cross-sectional predictions about industry and firm characteristics, which we then test by including *municipality x year* fixed effects in the specification. In this section, we describe these tests and the results obtained, which alleviate concerns about omitted variables at the municipality-year level.

Tradable and non-tradable sectors. We first analyze the differential effect of enforcement actions on firms in the tradable and non-tradable sectors. While firms in the non-tradable sector can charge oligopolistic prices when protected from competition, firms in the tradable sector cannot. Thus, firms in the non-tradable sector should benefit more from the presence of organized crime, and anti-mafia enforcement actions should be detrimental for these firms.

We find that firms in the tradable sector typically benefit from anti-mafia enforcement actions and experience an increase in revenue and assets (Table IX). This finding is consistent with the idea that firms in the tradable sector are less competitive prior to anti-mafia enforcement actions, since the costs associated with the presence of organized crime are not offset by some of

the potential benefits. In addition to the baseline test, we repeat the robustness tests performed in the previous analysis and find similar results (Panels B to D).

--- Table IX about here ---

Mafia strength. We next examine whether firms that have plausibly stronger ties to the mafia are more adversely affected by anti-mafia enforcement actions. To this end, we employ one additional dimension, the strength of organized crime in the year a firm is incorporated. Arguably, a firm that enters a market at a time when the mafia is stronger is more likely to require mafia permission to open for business and develop stronger ties. Since the level of organized crime activity is hard to measure, we proxy it with homicide rates, as suggested by Pinotti (2015a).

Consistent with the idea that firms founded during the height of the mafia activity benefit more from mafia protection, we find that firms that were incorporated in times of above-median homicide rates experience a larger decline in revenue and profitability following anti-mafia enforcement actions, while we find no effect on assets (Table X, Panel A). These results are robust across specifications in Panels B to D.

--- Table X about here ---

C. Alternative Explanations

We now explore an alternative interpretation of our results. Since confiscated real estate is often redeployed as new police stations, it might be that our results are driven by a strengthening of the enforcement agencies rather than by a weakening of organized crime. To rule out this alternative explanation of our results, we exploit the richness of our database on confiscations. In particular, in addition to the date in which an asset was confiscated we repeat the analysis including the date in which the asset was redeployed.[31] Because redeployments of assets confiscated early in the sample period may coincide with follow-up confiscations, we focus on municipalities that experience no more than one confiscation in our sample period. Table XI presents the results. We find evidence that is by-and-large consistent with the idea that our results are driven by confiscations rather than redeployments. Revenues and assets decline subsequent to the first confiscation but do not decline further after redeployment. Profitability declines significantly

[31] Oftentimes, redeployment happens years after the confiscation. In the data, we find a mean lag of 7 years between confiscations and redeployments.

following a confiscation, and also further declines after redeployment.

--- Table XI about here ---

D. Robustness

We perform a similar set of robustness tests as those conducted at the municipality-level analysis to further support our interpretation of the firm level results. Panels B and C in Appendices E through G report the results.[32] We find our results to be robust when we remove municipalities that experienced confiscations prior to 1995 (Appendix E), not to be driven by regions with higher redeployment rates (Appendix F), and not to depend on the influence of organized crime on local politicians (Appendix G).

V. CONCLUSION

Organized crime in the form of the mafia is pervasive in Italy and has plagued the regions of Calabria, Campania, and Sicily for well over a century. In this study, we examine the effects of organized crime on Italian firms. As anti-mafia enforcement actions reduce the power of organized crime, more firms enter and some incumbent firms exit. Incumbents that do not exit shrink in size and experience reduced profitability. These results are stronger among firms operating in the non-tradable sector or founded during the height of mafia power. Further, the decline of the mafia leads to increased innovation activity and competition for public procurement contracts.

Organized crime is a global phenomenon and countries besides Italy have initiated a fight against it. But whether that fight will have similar implications for firms will depend on the effectiveness of these attempts as well as the institutions that replace organized crime. Within our setting, confiscations of mafia assets across Italy potentially result in such a replacement of local mafia families by the Italian state. Elsewhere, the implications of anti-mafia enforcement actions will likely depend on whether organized crime is replaced by roving bandits, other stationary bandits, or the democratic state. Tests along these lines provide promising avenues for future research.

[32] For brevity, we provide for each test the main results at the municipality level and the main cross-sectional results. Additional tables (subsamples, matched samples) are available upon request.

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Table I: Confiscations by region

This table shows the number of confiscations of mafia properties and other characteristics by region. *Number of Confiscations* denotes assets confiscated by the government and *Redeployed Confiscations* denotes assets that were confiscated and consequently transformed for social purposes. The data on asset confiscations are from the Italian National Agency for the administration and destination of assets seized and confiscated from organized crime (*ANBSC*). The data on Gross Regional Product and Population are from the Italian National Institute of Statistics (*Istat*).

Region	Number of Confiscations	Redeployed Confiscations	GRP (EUR mn)	Population (000s)
Abruzzo	339	63	28,867	1,262
Basilicata	43	14	11,147	598
Calabria	5,216	2,821	32,419	2,011
Campania	5,599	2,575	101,682	5,702
Emilia-Romagna	849	157	134,164	3,983
Friuli Venezia Giulia	56	19	34,679	1,184
Lazio	2,426	901	177,058	5,112
Liguria	403	85	45,695	1,572
Lombardia	3,345	1,224	319,728	9,033
Marche	62	19	39,467	1,471
Molise	11	3	6,643	321
Piemonte	867	188	124,739	4,215
Puglia	2,769	1,614	69,479	4,021
Sardegna	337	107	31,950	1,632
Sicilia	13,539	6,589	88,154	4,969
Toscana	561	137	100,696	3,498
Trentino-Alto Adige	21	16	33,584	940
Umbria	122	44	21,858	826
Valle D'aosta	32	7	4,227	120
Veneto	395	127	141,078	4,528
Total	36,992	16,710	1,547,314	56,996

Table II: Summary statistics

This table shows summary statistics for the variables in our analysis. Detailed variable definitions are in Appendix C. Panel A presents summary statistics at the municipality-year level, Panel B at the firm-year level, and Panel C at the municipality-year level.

Panel A: Entry and exit (municipality-year level)

Variable	*N*	Mean	SD	P25	P50	P75
Confiscation Dummy	80,800	0.11	0.31	0	0	0
#Confiscations	80,800	1.39	14.93	0	0	0
#Active firms	80,800	468.91	2,416.79	69	167	403
Turnover Rate (%)	80,800	9.77	7.32	6.36	8.73	11.25
Entry Rate (%)	80,800	9.34	7.27	6.02	8.25	10.58
Exit Rate (%)	80,800	0.43	1.05	0	0	0.3

Panel B: Firms (firm-year level)

Variable	*N*	Mean	SD	P25	P50	P75
Confiscation Dummy	8,179,035	15.5%	36.2%	0.0%	0.0%	0.0%
#Confiscations	8,179,035	60	153	0	0	23
Revenue (000s)	8,132,745	9,132	1,108,373	123	611	2,268
Total Assets (000s)	8,179,013	25,639	2,545,723	297	945	2,890
ROA	8,161,643	-2.1%	17.5%	-1.8%	0.3%	2.7%

Panel C: Innovation and Procurement data (municipality-year level)

Variable	*N*	Mean	SD	P25	P50	P75
#Inventors	23,866	10.02	39.65	2	4	8
#Contracts	329	4.0	8.6	0.0	1.0	4.0
#Applicants	329	1.3	7.2	0.0	0.0	0.0
#Invitations	329	1.1	3.5	0.0	0.0	0.0
#Offers	329	11.6	26.7	0.0	2.3	10.0
#Admitted	329	10.0	23.8	0.0	2.0	9.0
Value	329	6,285,037	23,100,000	0	406,550	3,419,881
% Reduction	329	16.1	24.0	0.0	0.1	27.4

Table III: Intimidation towards Public Officials

This table provides the results of the analysis of the relation between confiscations of assets and measures of threats and intimidation towards public officials. The sample period is 2010-2015 and the unit of analysis is the municipality-year level. The controls of interest are *Confiscation Dummy*, a dummy set equal to one the year after the first confiscation and the years thereafter and *#Confiscations*, the natural logarithm of one plus the number of accumulated asset confiscations lagged by one year. The dependent variable is the natural logarithm of one plus the number of intimidations to public officials in a municipality in a given year. All regressions include *municipality* fixed effects. In columns (1) and (3) we include *year* fixed effects, and in columns (2) and (4) we include *province x year* fixed effects. *t*-statistics are provided in parentheses; standard errors are clustered at the municipality level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1) Intimidations	(2) Intimidations	(3) Intimidations	(4) Intimidations
Confiscation Dummy	-0.0341***	-0.0303*	-0.0431**	-0.0408*
	(-2.62)	(-1.77)	(-2.39)	(-1.81)
#Confiscations			0.0103	0.0122
			(0.73)	(0.72)
Year FE	Yes	No	Yes	No
Municipality FE	Yes	Yes	Yes	Yes
Province-Year FE	No	Yes	No	Yes
N	8,886	8,784	8,886	8,784
Adj. R-Squared	0.164	0.169	0.164	0.169

Table IV: Municipality characteristics

This table provides results of the comparison between municipalities that experienced an anti-mafia enforcement action and those that did not. Panel A presents the univariate results. Panel B presents the marginal effects from a probit regression where the dependent variable indicates whether a municipality experiences an anti-mafia enforcement action over the sample period or not (columns 1 and 2) and the results of an ordinary least squares regression where the dependent variable is the time elapsed between 1995 and the first confiscation a municipality experienced (columns 3 and 4). All municipality-level controls are as of or prior to 1995 and obtained from the Italian National Institute of Statistics (*Istat*). In the regression for column (2), additional firm-level controls are aggregated at the municipality level using 1995 data. Robust standard errors are reported in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Univariate split

	Not shocked		Shocked		Difference
	Mean	*N*	Mean	*N*	
Population (logged)	7.712	7,196	9.613	414	-1.901***
Water usage per capita (000s cubic meters)	0.089	7,163	0.086	414	0.002
#Firms per capita	0.071	7,163	0.077	414	-0.006***
#Touristic establishments per capita	0.006	7,168	0.007	414	-0.001
#Foreigners per capita	0.067	7,168	0.073	414	-0.005*
Social Expenditure per capita	88.205	211	111.014	7	-22.808
Profit Margin (%)	2.17	2,117	1.29	540	0.87***
Revenue (logged 000s)	10.427	2,124	10.865	543	-0.438***
#Active firms (logged)	1.513	2,124	1.851	543	-0.338***

Panel B: Probit regressions and time to enforcement actions

	(1) Confiscation Dummy	(2) Confiscation Dummy	(3) Time to Confiscation	(4) Time to Confiscation
Population (logged)	0.107***	0.107***	0.672***	0.633***
	(14.29)	(11.13)	(6.76)	(6.70)
Water usage per capita	-0.0855	-0.0736	3.675	3.663
	(-0.30)	(-0.26)	(1.21)	(1.21)
#Firms per capita	0.119	0.154	5.645	4.766
	(0.24)	(0.30)	(1.25)	(1.02)
#Touristic establishments per capita	4.398**	4.253**	8.936	11.51
	(2.30)	(2.17)	(0.57)	(0.72)
#Foreigners per capita	0.316	0.294	2.288	2.313
	(1.42)	(1.32)	(1.16)	(1.17)
Profit Margin (%)		-0.00107		-0.00769
		(-0.84)		(-0.63)
Total Revenue (log)		0.00201		0.0213
		(0.24)		(0.24)
#Active firms (log)		-0.00152		0.0556
		(-0.11)		(0.38)
Province FE	Yes	Yes	Yes	Yes
Pseudo/adj. R-squared	0.4092	0.4161	0.107	0.107
N	1,908	1,901	1,908	1,901

Table V: Organized crime and competition

This table provides the results of the analysis of the relation between confiscations of assets and measures of competition at the municipality level. The sample period is 1995-2015 and the unit of analysis is the municipality-year level. The controls of interest are *Confiscation Dummy*, a dummy set equal to one the year after the first confiscation and the years thereafter and *#Confiscations*, the natural logarithm of one plus the number of accumulated asset confiscations lagged by one year. The dependent variables are the *Turnover Rate* ((Number of new firms that enter + Number of old firms that cease to exist) / Number of firms at the beginning of the period) in Columns 1 and 4, the *Entry Rate* (=Number of new firms / Number of firms at the beginning of the period) in Columns 2 and 5, and the *Exit Rate* (= Number of firms that cease to exist / Number of firms at the beginning of the period) in Columns 3 and 6. Panel A considers all municipalities and Panel B considers those with fewer than half a million inhabitants. Panel C considers a matched sample of municipalities, where municipalities are matched with replacement. For each treated municipality, the same-region municipality used as control is the closest in population (but no more than 50% off) among the set of municipalities that are never treated. In Panel D, we employ exclusively confiscations initiated by higher-level courts, excluding those initiated by provincial courts. All regressions include *municipality* and *province x year* fixed effects. All dependent variables are winsorized at the 1% and 99% level. *t*-statistics are given in parentheses; standard errors are clustered at the municipality level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: All municipalities

	(1) Turnover	(2) Entry	(3) Exit	(4) Turnover	(5) Entry	(6) Exit
Confiscation Dummy	1.153***	1.093***	0.0613***	0.389**	0.395**	0.00244
	(7.16)	(6.96)	(4.68)	(2.01)	(2.08)	(0.17)
#Confiscations				0.646***	0.590***	0.0498***
				(5.42)	(5.08)	(7.08)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	80,800	80,800	80,800	80,800	80,800	80,800
Adj. R-Squared	0.557	0.571	0.733	0.557	0.572	0.733

Panel B: Municipalities with fewer than half a million inhabitants

	(1) Turnover	(2) Entry	(3) Exit	(4) Turnover	(5) Entry	(6) Exit
Confiscation Dummy	1.163***	1.102***	0.0624***	0.423**	0.426**	0.00679
	(7.41)	(7.20)	(4.90)	(2.23)	(2.28)	(0.49)
#Confiscations				0.624***	0.570***	0.0469***
				(5.30)	(4.97)	(6.90)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	80,680	80,680	80,680	80,680	80,680	80,680
Adj. R-Squared	0.557	0.571	0.733	0.557	0.572	0.733

Panel C: Matched municipalities

LHS	(1) Turnover	(2) Entry	(3) Exit	(4) Turnover	(5) Entry	(6) Exit
Confiscation Dummy	0.337**	0.321**	-0.0000	-0.243	-0.211	-0.0386**
	(2.05)	(2.02)	(-0.01)	(-1.24)	(-1.10)	(-2.42)
#Confiscations				0.523***	0.481***	0.0347***
				(4.42)	(4.16)	(5.07)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	22,756	22,756	22,756	22,756	22,756	22,756
Adj. R-Squared	0.549	0.565	0.836	0.551	0.566	0.836

Panel D: Higher-level courts cases

LHS	(1) Turnover	(2) Entry	(3) Exit	(4) Turnover	(5) Entry	(6) Exit
Confiscation Dummy	1.249***	1.207***	0.0726***	0.805***	0.819***	0.0170
	(6.95)	(6.84)	(5.77)	(3.37)	(3.49)	(1.04)
#Confiscations				0.387**	0.338**	0.0485***
				(2.47)	(2.21)	(4.83)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	80,800	80,800	80,800	80,800	80,800	80,800
Adj. R-Squared	0.557	0.571	0.733	0.557	0.571	0.733

Table VI: Organized crime and innovation activity

This table provides results of the analysis of the relation between confiscations of mafia assets and innovation. The sample period is 1995-2015 and the unit of analysis is the municipality-year level. The control of interest is *Confiscation Dummy*, a dummy set equal to one the year after the first confiscation and the years thereafter and *#Confiscations*, the natural logarithm of one plus the number of accumulated asset confiscations lagged by one year. In columns (3) and (4) we restrict the sample to municipalities with fewer than half a million inhabitants. The dependent variable is the natural logarithm of one plus the number of inventors that contributed to a patent in a municipality in a given year. All regressions include *municipality* fixed effects and *province x year* fixed effects. *t*-statistics are provided in parentheses; standard errors are clustered at the municipality level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1) #Inventors	(2) #Inventors	(3) #Inventors	(4) #Inventors
Confiscation Dummy	0.0571***	0.0510**	0.0580***	0.0560**
	(2.84)	(2.23)	(2.88)	(2.44)
#Confiscations		0.00514		0.00168
		(0.42)		(0.14)
Municipality FE	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes
N	80,833	80,833	80,713	80,713
Adj. R-Squared	0.704	0.704	0.691	0.691

Table VII: Organized crime and competition for procurement contracts

This table provides results of the analysis of the relation between confiscations of mafia assets and the characteristics of procurement auctions. The sample period is 2009-2015 and the unit of analysis is the municipality-year level. The sample consists of all municipalities that experienced a confiscation for the first time in the 2009-2015 period. The control of interest is *Confiscation Dummy*, a dummy set equal to one the year after the first confiscation and the years thereafter. In the regression for column (1), the dependent variable is the natural logarithm of the number of contracts tendered publicly. In the regression for column (2), the dependent variable is the natural logarithm of the average number of applicants per tendered contract. In the regression for column (3), the dependent variable is the natural logarithm of the average number of invitations per tendered contract. In the regression for column (4), the dependent variable is the natural logarithm of the average number of offers made per tendered contract. In the regression for column (5), the dependent variable is the natural logarithm of the average number of admitted offers made per tendered contract. In the regression for column (6), the dependent variable is the natural logarithm of the work value tendered publicly. In the regression for column (7), the dependent variable is the average reduction from work value to contract value (discount). Procurement auction data are obtained from the Italian Ministry of Infrastructure and Transportation. All regressions include *municipality* fixed effects. *t*-statistics are given in parentheses; standard errors are clustered at the municipality level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

LHS	(1) Contracts (log)	(2) Applicants (log)	(3) Invitations (log)	(4) Offers (log)	(5) Admitted (log)	(6) Work Value (log)	(7) Percentage reduction
Confiscation Dummy	0.277***	0.119	0.360***	0.311*	0.342**	1.405*	3.932*
	(3.28)	(1.32)	(4.04)	(1.95)	(2.17)	(1.92)	(1.99)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	329	329	329	329	329	329	329
Adj. R-Squared	0.729	0.454	0.224	0.323	0.321	0.499	0.265

Table VIII: Organized crime and firms

This table provides results of the analysis of the relation between confiscations of assets and firm outcomes. The sample period is 1995-2015 and the unit of analysis is the firm-year level. The control of interest is *Confiscation Dummy*, a dummy set equal to one the year after the first confiscation and the years thereafter (Columns (1)-(3)) and *#Confiscations*, the natural logarithm of one plus the number of accumulated asset confiscations lagged by one year (Columns (4)-(6)). The dependent variables are the natural logarithm of revenues in columns (1) and (4), the natural logarithm of assets in columns (2) and (5), and return on assets in columns (3) and (6). Panel A is based on the full sample, Panel B on the set of firms headquartered in municipalities with fewer than half a million inhabitants (this removes Rome, Milan, Naples, Turin, Palermo, and Genoa), and Panel C on a matched sample. In Panel D, we employ exclusively confiscations initiated by higher-level courts, excluding those initiated by provincial courts. Firms are matched with replacement a year prior to the first treatment. For each treated firm, a set of control firms is formed by restricting the sample to firms that were never treated, operate in the same industry, are within 25% of asset size and are headquartered in a municipality within 25% of population of the treated firm's municipality. Among these potential control firms, the closest in geographic distance is chosen. All regressions include *firm* fixed effects and *province x year* fixed effects. All dependent variables are winsorized at the 1% and 99% levels. *t*-statistics are given in parentheses; standard errors are clustered at the municipality level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Full sample

LHS	(1) Revenue	(2) Assets	(3) ROA	(4) Revenue	(5) Assets	(6) ROA
Confiscation Dummy	-0.044***	-0.015*	-0.001	0.038	0.022**	0.002*
	(-2.76)	(-1.93)	(-1.44)	(1.50)	(2.02)	(1.96)
Log #Confiscations				-0.068***	-0.031***	-0.003***
				(-4.29)	(-4.49)	(-4.37)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	8,132,745	8,179,013	8,161,643	8,132,745	8,179,013	8,161,643
Adj. R-Squared	0.801	0.902	0.322	0.801	0.902	0.322

Panel B: Firms headquartered in municipalities with fewer than half a million inhabitants

LHS	(1) Revenue	(2) Assets	(3) ROA	(4) Revenue	(5) Assets	(6) ROA
Confiscation Dummy	-0.060***	-0.023***	-0.002**	-0.004	0.004	0.000
	(-4.02)	(-3.19)	(-2.30)	(-0.20)	(0.37)	(0.41)
Log #Confiscations				-0.045***	-0.021***	-0.002***
				(-3.50)	(-3.69)	(-2.90)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	6,032,675	6,068,345	6,054,946	6,032,675	6,068,345	6,054,946
Adj. R-Squared	0.804	0.903	0.324	0.804	0.903	0.324

Panel C: Matched sample

LHS	(1) Revenue	(2) Assets	(3) ROA	(4) Revenue	(5) Assets	(6) ROA
Confiscation Dummy	-0.068***	-0.018**	-0.004***	-0.011	0.006	-0.004**
	(-4.21)	(-2.20)	(-3.83)	(-0.33)	(0.37)	(-2.10)
Log #Confiscations				-0.045**	-0.019*	-0.000
				(-1.98)	(-1.66)	(-0.34)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1,005,090	1,010,394	1,008,954	1,005,090	1,010,394	1,008,954
Adj. R-Squared	0.791	0.897	0.308	0.791	0.897	0.308

Panel D: Higher-level courts cases

LHS	(1) Revenue	(2) Assets	(3) ROA	(4) Revenue	(5) Assets	(6) ROA
Confiscation Dummy	-0.053***	-0.023***	-0.002**	-0.003	0.004	0.001
	(-2.91)	(-2.66)	(-2.14)	(-0.14)	(0.36)	(0.93)
Log #Confiscations				-0.049***	-0.026***	-0.003***
				(-3.73)	(-4.13)	(-5.55)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	8,132,745	8,179,013	8,161,643	8,132,737	8,179,005	8,161,635
Adj. R-Squared	0.801	0.902	0.322	0.801	0.902	0.322

Table IX: Tradable and non-tradable goods

This table provides results of the analysis of the relation between confiscations of assets and firm characteristics by firms' sector. The analysis follows that for Table VII except that in the regressions, *Confiscation Dummy* is additionally interacted with an indicator variable for firms in the tradable sector, identified using Mano and Castillo's (2015) classification. Panel A is based on the full sample, Panel B on the set of firms headquartered in municipalities with fewer than half a million inhabitants (this removes Rome, Milan, Naples, Turin, Palermo, and Genoa), and Panel C on a matched sample. In Panel D, we employ exclusively confiscations initiated by higher-level courts, excluding those initiated by provincial courts. The regressions include *firm* fixed effects and *municipality x year* fixed effects. *t*-statistics are given in parentheses; standard errors are clustered at the municipality level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Full Sample

LHS	(1) Revenue	(2) Assets	(3) ROA
Confiscation Dummy x Tradable	0.116***	0.038***	-0.001
	(4.66)	(3.17)	(-0.35)
Firm FE	Yes	Yes	Yes
Municipality x Year FE	Yes	Yes	Yes
N	8,104,243	8,150,115	8,133,010
Adj. R-Squared	0.801	0.902	0.320

Panel B: Firms headquartered in municipalities with fewer than half a million inhabitants

LHS	(1) Revenue	(2) Assets	(3) ROA
Confiscation Dummy x Tradable	0.115***	0.038***	-0.001
	(4.61)	(3.11)	(-0.39)
Firm FE	Yes	Yes	Yes
Municipality x Year FE	Yes	Yes	Yes
N	6,013,004	6,048,366	6,035,184
Adj. R-Squared	0.803	0.903	0.321

Panel C: Matched sample

Criterion LHS	(1) Revenue	(2) Assets	(3) ROA
Confiscation Dummy x Tradable	0.115*** (4.58)	0.040*** (3.31)	0.000 (0.09)
Firm FE	Yes	Yes	Yes
Municipality x Year FE	Yes	Yes	Yes
N	1,001,690	1,006,992	1,005,556
Adj. R-Squared	0.792	0.898	0.308

Panel D: Higher-level courts cases

Criterion LHS	(1) Revenue	(2) Assets	(3) ROA
Confiscation Dummy x Tradable	0.078** (2.47)	0.025* (1.77)	-0.002 (-1.19)
Firm FE	Yes	Yes	Yes
Municipality x Year FE	Yes	Yes	Yes
N	8,104,243	8,150,115	8,133,010
Adj. R-Squared	0.801	0.902	0.320

Table X: Mafia strength

This table provides results of the analysis of the relation between confiscations of assets and firm characteristics by the presence of the mafia around incorporation. The analysis follows that for Table VII except that in the regressions, *Confiscation Dummy* is additionally interacted with a measure of mafia strength constructed from homicide rates (Pinotti 2015b). Panel A is based on the full sample, Panel B on the set of firms headquartered in municipalities with fewer than half a million inhabitants (this removes Rome, Milan, Naples, Turin, Palermo, and Genoa), and Panel C on a matched sample. In Panel D, we employ exclusively confiscations initiated by higher-level courts, excluding those initiated by provincial courts. The regressions include *firm* fixed effects and *municipality x year* fixed effects. *t*-statistics are given in parentheses; standard errors are clustered at the municipality level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Main results

	(1)	(2)	(3)
LHS	Revenue	Assets	ROA
Confiscation Dummy x Mafia Strength	-0.087***	-0.006	-0.004***
	(-4.99)	(-1.33)	(-3.60)
Firm FE	Yes	Yes	Yes
Municipality x Year FE	Yes	Yes	Yes
N	7,449,755	7,493,870	7,477,266
Adj. R-Squared	0.792	0.895	0.320

Panel B: Firms headquartered in municipalities with fewer than half a million inhabitants

	(1)	(2)	(3)
LHS	Revenue	Assets	ROA
Confiscation Dummy x Mafia Strength	-0.087***	-0.005	-0.005***
	(-4.92)	(-1.29)	(-3.83)
Firm FE	Yes	Yes	Yes
Municipality x Year FE	Yes	Yes	Yes
N	5,547,369	5,581,486	5,568,655
Adj. R-Squared	0.795	0.897	0.322

Panel C: Matched Sample

LHS	(1) Revenue	(2) Assets	(3) ROA
Confiscation Dummy x Mafia Strength	-0.088***	-0.007*	-0.005***
	(-5.37)	(-1.78)	(-3.76)
Firm FE	Yes	Yes	Yes
Municipality x Year FE	Yes	Yes	Yes
N	893,588	898,580	897,209
Adj. R-Squared	0.786	0.892	0.311

Panel D: Higher-level courts cases

LHS	(1) Revenue	(2) Assets	(3) ROA
Confiscation Dummy x Mafia Strength	-0.085***	-0.008	-0.005***
	(-4.98)	(-1.03)	(-4.58)
Firm FE	Yes	Yes	Yes
Municipality x Year FE	Yes	Yes	Yes
N	7,449,755	7,493,870	7,477,266
Adj. R-Squared	0.792	0.895	0.320

Table XI: Weakening of Organized Crime or Strengthening of Law Enforcement?

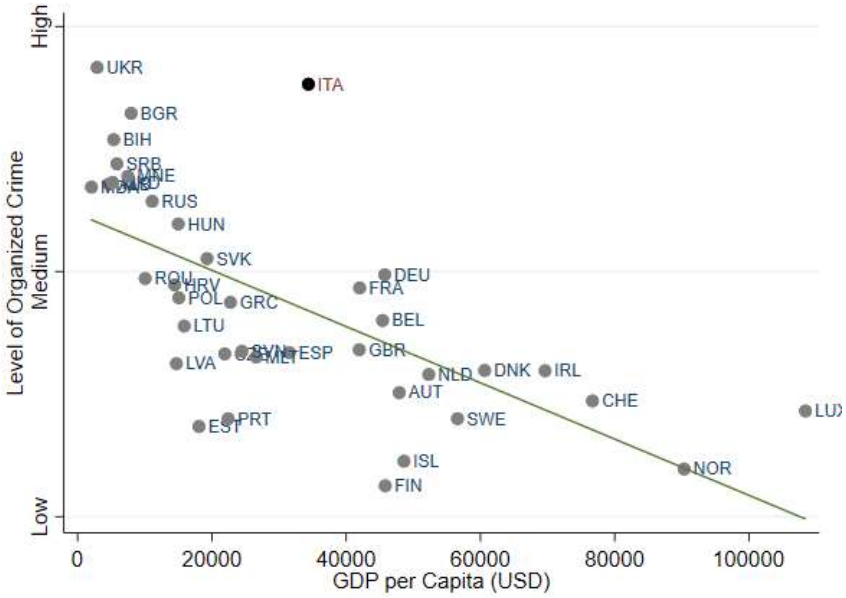
This table follows Table VII Panel A but additionally introduces *Redeployment Dummy*, a dummy set equal to one the year after a confiscated asset was redeployed and the years thereafter. The sample is that of municipalities with one or no confiscations over the sample period. All regressions include *firm* fixed effects and *province x year* fixed effects. All dependent variables are winsorized at the 1% and 99% levels. *t*-statistics are given in parentheses; standard errors are clustered at the municipality level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

LHS	(1) Revenue	(2) Assets	(3) ROA
Confiscation Dummy	-0.086***	-0.044***	-0.006***
	(-2.86)	(-3.09)	(-2.76)
Redeployment Dummy	-0.023	-0.012	-0.004*
	(-0.90)	(-0.87)	(-1.82)
Firm FE	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes
N	5,022,722	5,050,675	5,039,241
Adj. R-Squared	0.808	0.901	0.388

Figure 1: Organized crime and economic development

This figure shows economic development (x-axis) and level of organized crime for OECD countries (Panel A) and the 20 countries most infiltrated by organized crime (Panel B). *Economic development* is proxied with *GDP per capita* using World Bank data for 2016. *Level of organized crime* is measured using responses to the following question from the 2016 Executive Opinion Survey (EOS) by the World Economic Forum: "*In your country, to what extent does organized crime (mafia-oriented racketeering, extortion) impose costs on businesses? [1] To a great extent, imposes huge costs, [7] No costs at all.*" We average the answers of 14,000 executives across 148 countries and interpret answers closer to "1" as high levels of organized crime.

Panel A: OECD countries



Panel B: 20 countries that are most infiltrated by organized crime

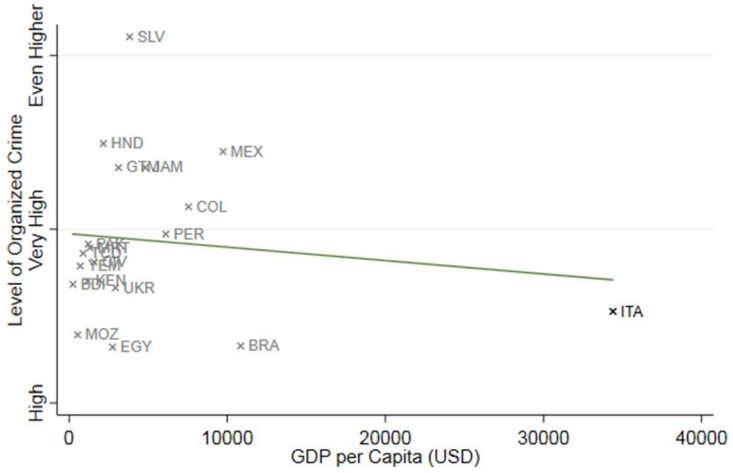


Figure 2: Italian province characteristics

This figure shows economic development (Panel A) and anti-mafia enforcement actions (Panel B) by Italian province. Economic development is measured using GDP per capita for the year 2000. Anti-mafia enforcement actions are measured using accumulated confiscations between 1995 and 2015. The data on GDP and Population are from the Italian National Institute of Statistics (*Istat*) and the data on asset confiscations are from the Italian National Agency for the administration and destination of assets seized and confiscated from organized crime (*ANBSC*).

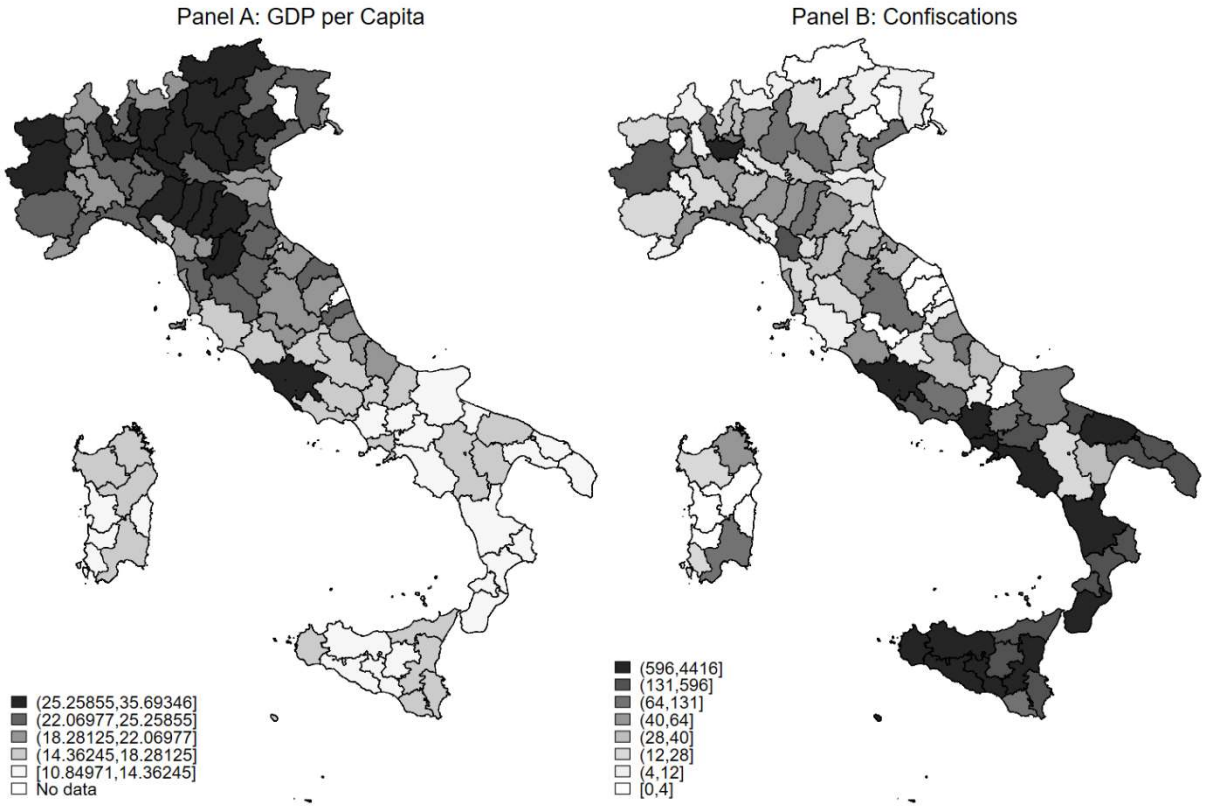
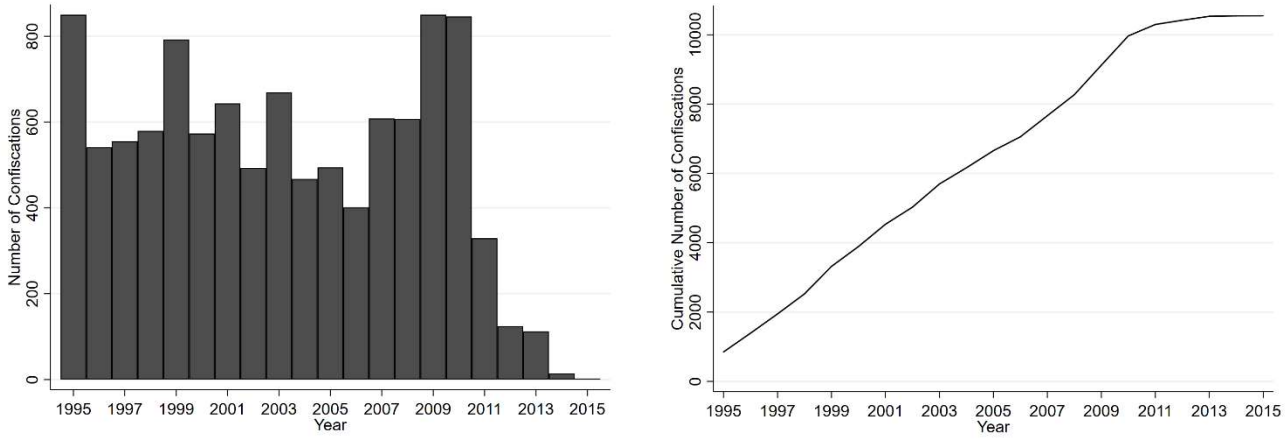


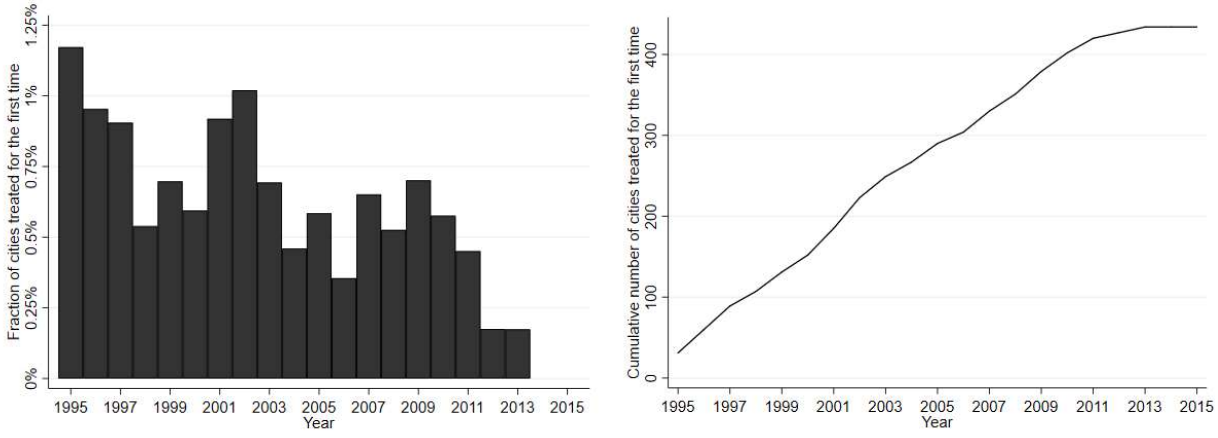
Figure 3: Asset confiscations, treated cities, and treated firms

This figure shows the number of asset confiscations (Panel A), treated municipalities (Panel B), and treated firms (Panel C) over time during our sample period. Panel A shows the number of confiscations per year (left) and the cumulative number of confiscations (right). Panels B and C show the number of municipalities/firms treated for the first time (left) and the cumulative number of treated municipalities/firms (right). The data on asset confiscations are from the Italian National Agency for the administration and destination of assets seized and confiscated from organized crime (*ANBSC*), and data on firms are from Bureau Van Dijk's Orbis database.

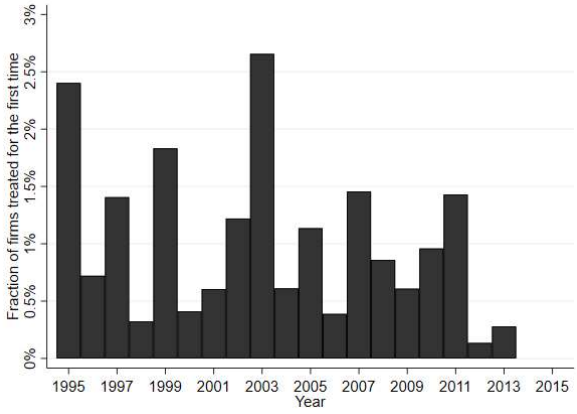
Panel A: Number of confiscations over time



Panel B: Municipalities treated for the first time



Panel C: Firms treated for the first time



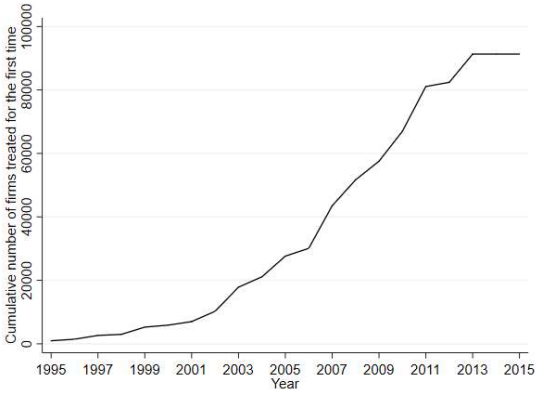
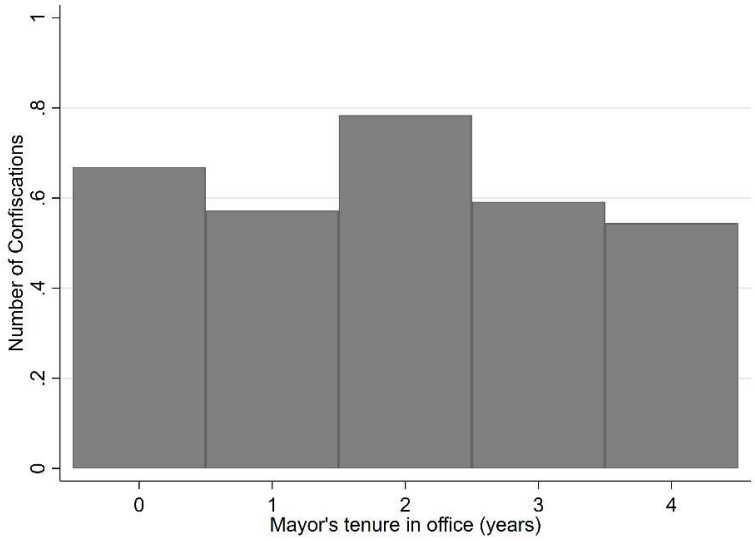


Figure 4: Mayor's tenure and confiscations

This figure shows the number of asset confiscations per year after a mayor is elected (Panel A), and the number of asset confiscations per year before a mayor's term ends. The sample is limited to municipalities with confiscations. The data on asset confiscations are from the Italian National Agency for the administration and destination of assets seized and confiscated from organized crime (*ANBSC*), and the data on political appointments is from the Italian Ministry of the Interior (*Ministero dell'Interno*).

Panel A: Time since elected



Panel B: Time to departure

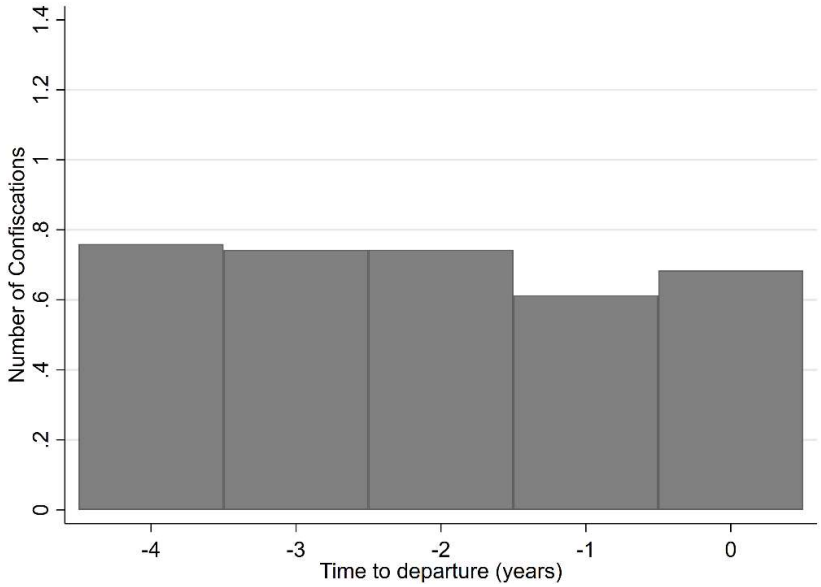
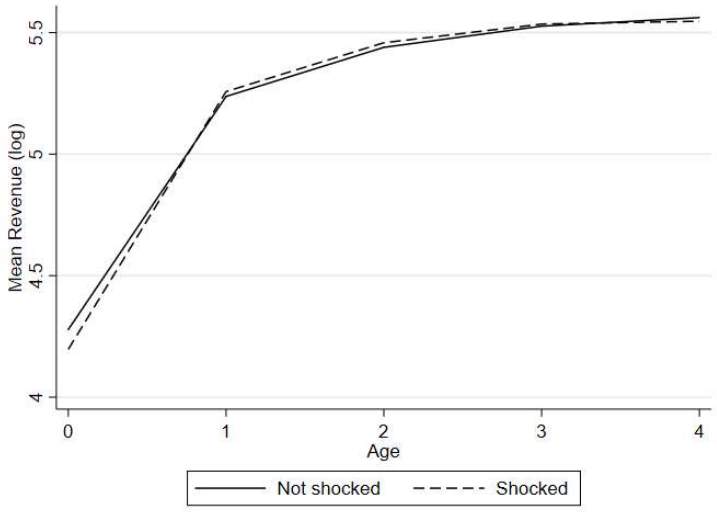


Figure 5: New firms and firms that exit

This figure shows the revenues of new firms and exiting firms through time. Panel A compares the revenue of firms entering municipalities that were treated with firms entering municipalities that were not treated. Panel B compares the revenues of firms exiting municipalities that were treated with those of firms exiting municipalities that were not treated. The data on asset confiscations are from the Italian National Agency for the administration and destination of assets seized and confiscated from organized crime (*ANBSC*), and data on firms are from Bureau Van Dijk's Orbis database.

Panel A: New firms



Panel B: Exiting firms

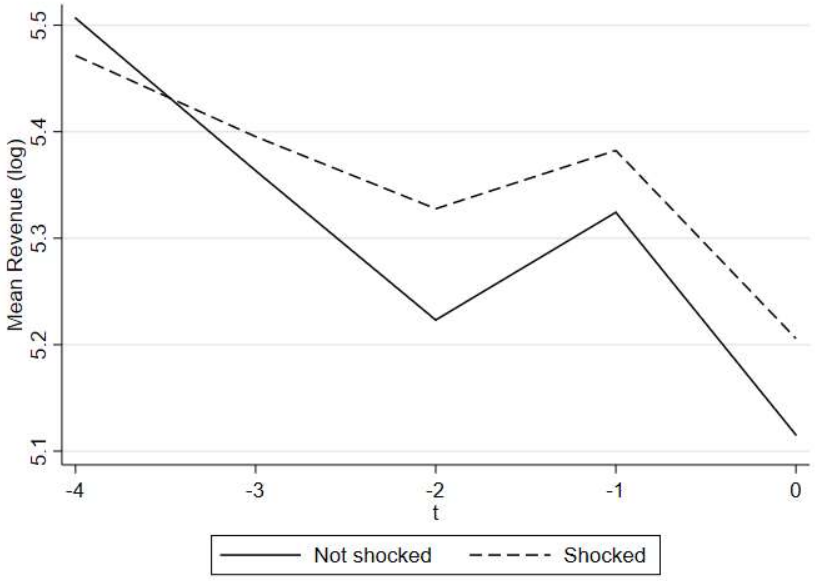


Figure 6: Revenues at the municipality level

This figure shows the evolution of municipality-level corporate revenues around anti-mafia enforcement actions for treated less control municipalities. Data on corporate revenues is obtained from Bureau van Dijk's Orbis database and aggregated at the municipality-year level. Control municipalities are matched by geographic distance and restricted to a population of no more than 25% more or less than their treated counterparts without replacement. Revenues of treated and control municipalities are normalized at time 0.

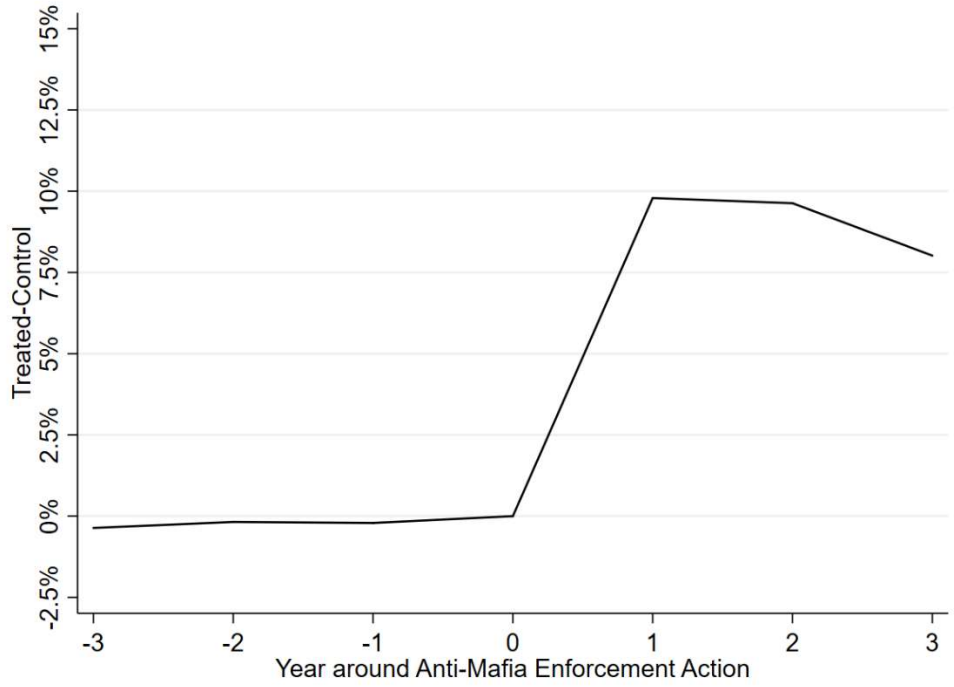


Figure 7: Confiscations around council dissolutions

This figure shows the evolution of municipality-level anti-mafia enforcement actions around dissolution of councils due to infiltration by the mafia. The data on asset confiscations are from the Italian National Agency for the administration and destination of assets seized and confiscated from organized crime (*ANBSC*), and data on council dissolutions is obtained from *avviso pubblico*.

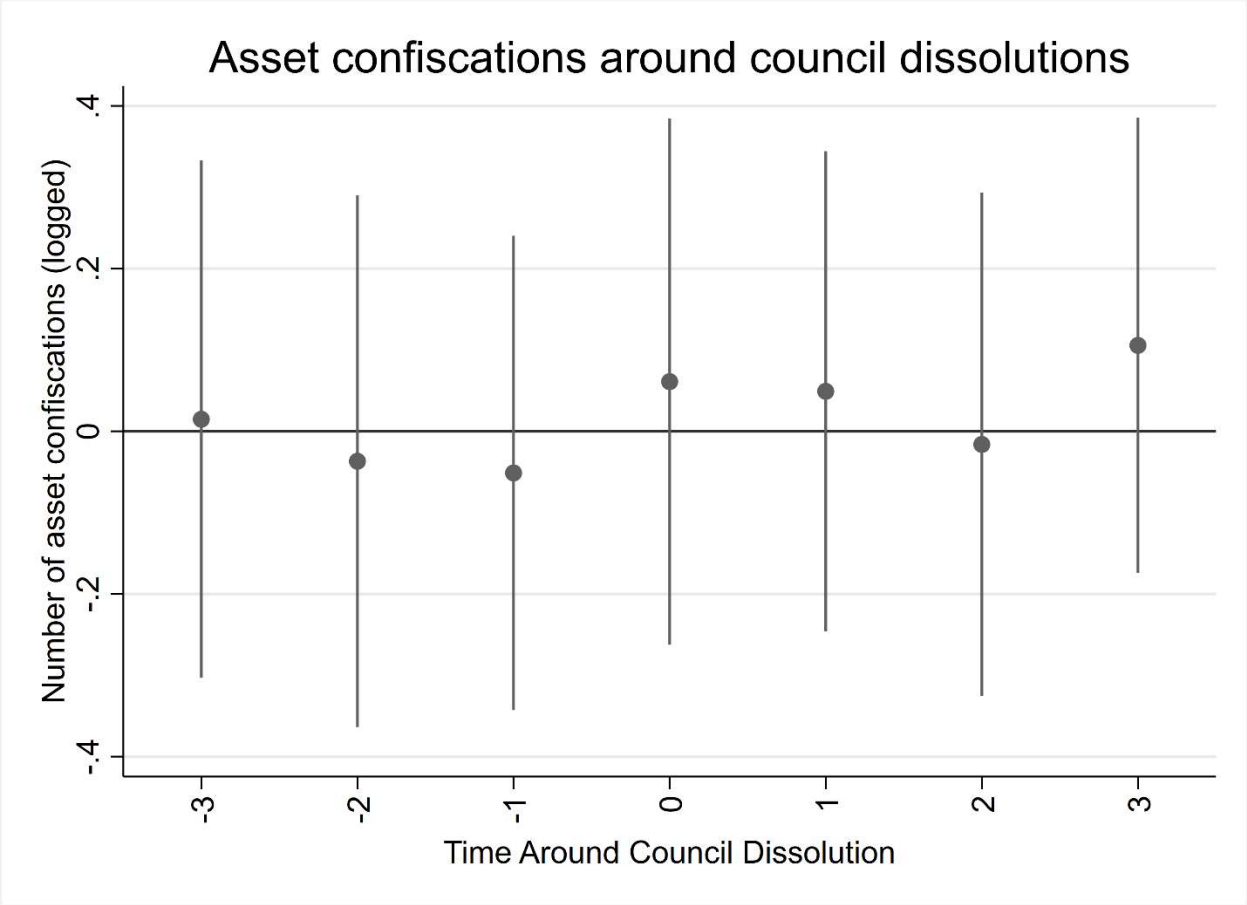
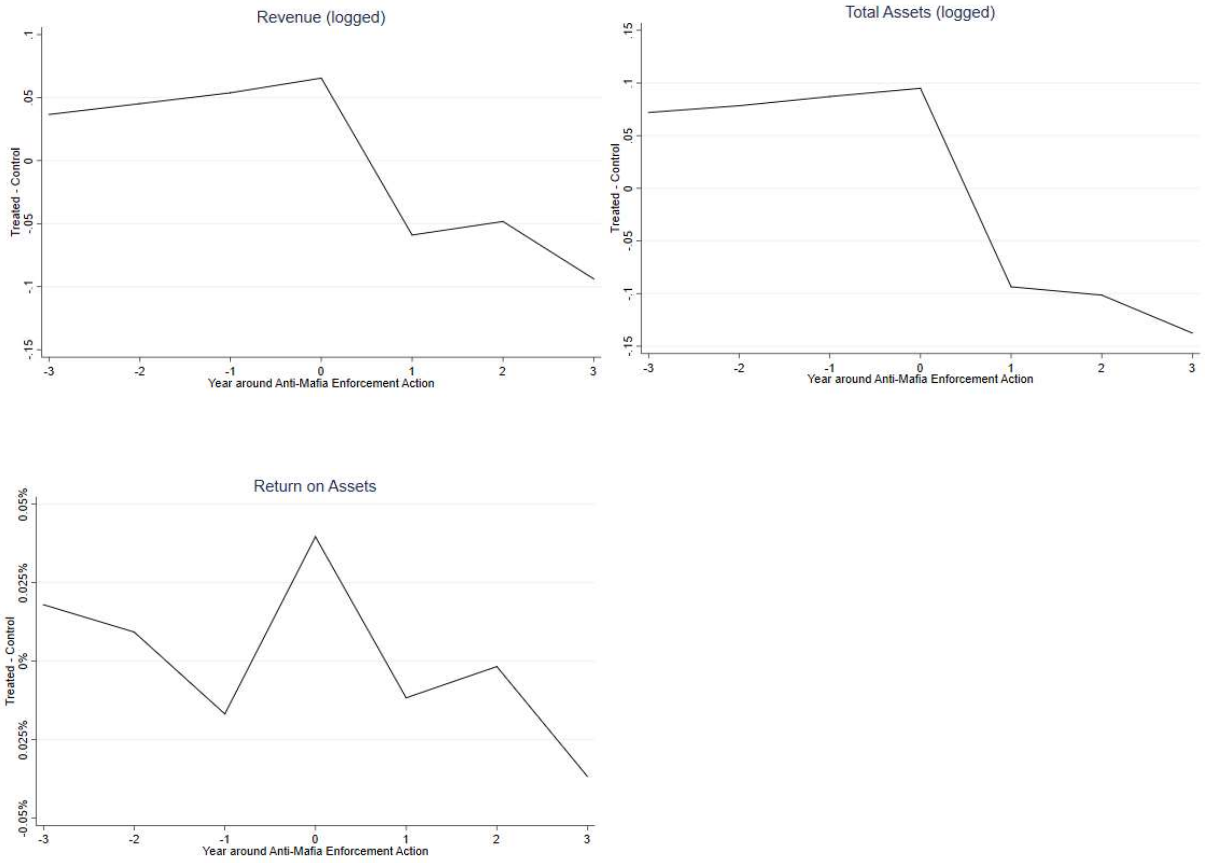


Figure 8: Key firm-level outcomes around treatment

This figure shows the evolution of the key firm-level variables around anti-mafia enforcement actions. Variables of interest are *Revenue* (top), *Total Assets* (mid), and *Return on Assets* (bottom). Each graph plots the difference in these variables between a portfolio of firms in treated municipalities and a portfolio of matched firms in non-treated municipalities. For each treated firm, the matching is performed with replacement using a same-industry requirement and such that the control firm is the closest in geographic distance and total assets a year prior to treatment. The data on asset confiscations are from the Italian National Agency for the administration and destination of assets seized and confiscated from organized crime (*ANBSC*), and data on firms are from Bureau Van Dijk's Orbis database.



Appendix A: Organized Crime in Italy and around the world

I. Organized Crime in Italy

Early evidence on the Sicilian Mafia dates back to parliamentary inquiries into economic conditions and crime in Sicily in the late nineteenth century (Dimico, Isopi, and Olsson 2017 2017). During that time, the Mafia rose to provide enforcement of property rights and private land protection from predatory attacks, as both services were not provided by an Italian state that was distant, weak, and incapable of enforcing the law (Hess 1973; Arlacchi and Ryle 1986; Gambetta 1993; Bandiera 2003; Acemoglu, De Feo, and De Luca 2017). Moreover, the Italian government relied on the Sicilian Mafia to capture delinquents and enforce the law, in exchange for "looking the other way."

But even within Sicily, the Mafia had a greater presence in some municipalities than in others, raising questions over its origins. Some authors have emphasized the role of the abolition of feudal land relations for the rise of the Mafia in rural areas: landowners, managers, and public administrators used criminal methods to capture land that should have gone to peasants (Romano 1966; Mack Smith 1968; Brancato 1976), and peasants turned to banditry in the face of growing poverty, leading landowners to hire the Mafia to protect properties from predatory attacks (Bandiera 2003). Indeed, land fragmentation has been shown to favor the development of the Mafia in certain areas of Sicily (Bandiera 2003).

Others have argued that the combination of weak institutions and resource abundance favored the emergence of mafia-type organizations (Gambetta 1993; Konrad and Skaperdas 2012). Researchers have linked the rise of the Sicilian Mafia to the presence of sulphur, a commodity in high demand during the twentieth century (Buonanno et al. 2015), and citrus fruits, a produce in high demand and with high fixed costs of entry (Dimico, Isopi, and Olsson 2017). Yet, others associate the growth of the Mafia with more urban, richer, and export-oriented areas around Palermo (Pezzino 1985, 1987; Catanzaro 1988; Lupo 2004), where the vacuum of law enforcement created demand for private protection.

The evidence on mafia-type groups in other regions is scarcer, partly due to greater secrecy and later discovery. The hierarchically less organized Calabrian 'Ndrangheta developed as a defense mechanism of impoverished peasants against oppressive landlords (Nicaso and Lamothe

1995), while the Camorra originated in Naples (Skaperdas 2001). This latter organization, just like its Sicilian counterpart, was used to enforce property rights, and by government and local politicians against their political opponents (Mosca 1900; Benigno, 2015; Acemoglu, De Feo, and De Luca 2017).

After the early involvement of the mafia in the enforcement of property rights and support of the government in catching criminals, local mafia families now shape the competitive landscape of their municipalities. Starting in the 1960s, the mafia shifted its focus to providing other types of services, such as enforcing cartels, controlling the entry of firms, intimidating competitors, infiltrating private and public construction works, and supporting particular politicians through voter intimidation. In addition, the mafia entered the highly profitable but illicit drug trafficking business as well as the business of human trafficking and transportation of illegal immigrants (Acemoglu, De Feo, and De Luca 2017; Alesina, Piccolo, and Pinotti 2018).

From its geographic origins, the mafia established strongholds in the regions of Basilicata and Puglia in the 1970s and 1980s.[33] But mafia outlets have also spread across Italy, partly through *Soggiorno Obbligato*, the policy in the 1960s and 1970s of mandatory resettlements of suspected mafia members to municipalities outside the traditional mafia areas, originally aimed at cutting the links between a mafioso and his network. This policy led to an increased presence of organized crime in host municipalities (Pinotti and Stanig 2016). Some argue that the mafia's power weakened following the Maxi Trial of members of the Sicilian Mafia in the 1980s and after backlash over the assassination of anti-mafia judges Giovanni Falcone and Paolo Borsellino in 1992. However, mafia activities still occur in many municipalities (Gambetta 1993; Pinotti 2015b; Acemoglu, De Feo, and De Luca 2017).[34]

II. Organized Crime around the world

There are numerous criminal syndicates, such as the Yakuza in Japan, the Hong Kong-based Chinese Triads, the Russian mafia, and South and Latin American drug cartels, among others. Some of these syndicates have been influenced by the Italian mafia. For instance, the

[33] This geographical expansion was the response to two events that turned these formerly mafia-free regions into attractive territories. First, changes in the tobacco smuggling routes during the 1970s put Puglia on the Mafia's radar. Second, an earthquake in Basilicata on November of 1980 resulted in very large public procurement contracts for reconstruction, contracts that in many cases were granted to mafia-related companies (Pinotti 2015b).

[34] More than 250 municipalities, for instance, were put under external administration to combat mafia involvement in local government and contract procurement.

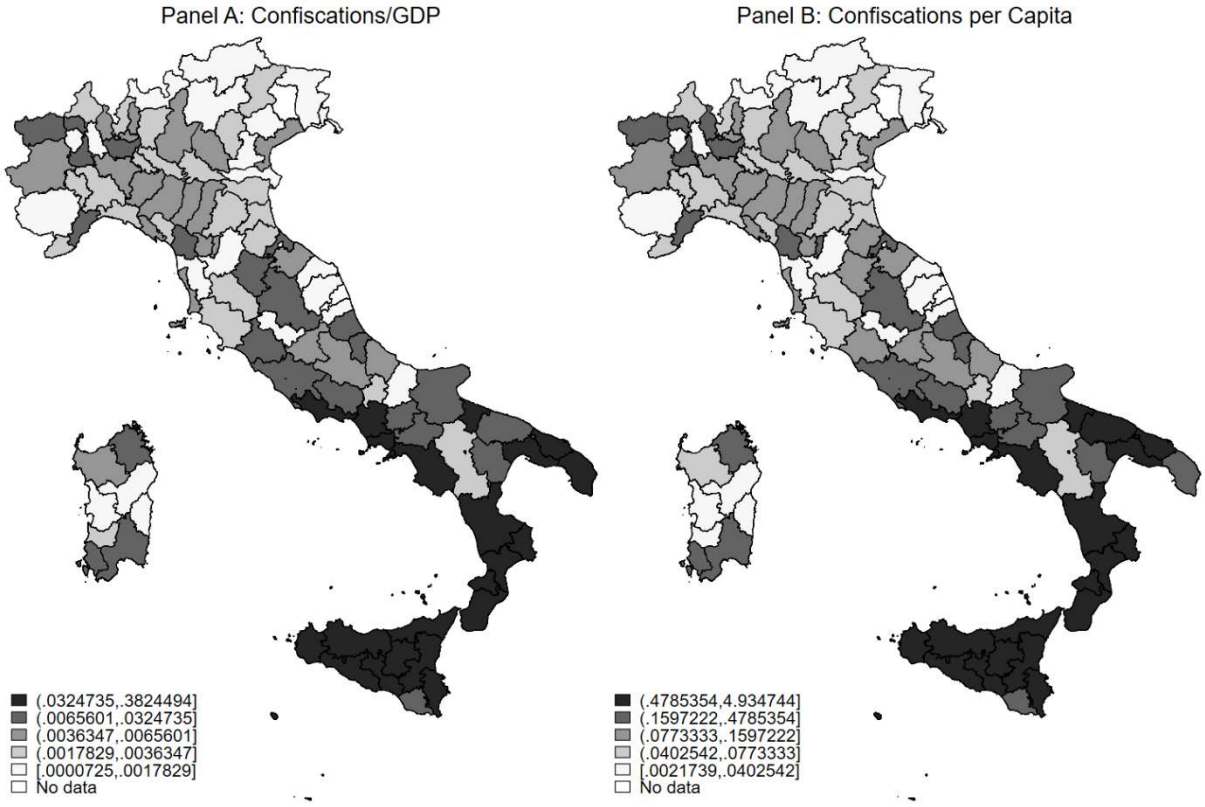
American Mafia traces its origin to immigrants associated with the Sicilian Mafia. Its expansion was accelerated by Prohibition (1920-1933) via the large profits from the illegal production and trafficking of the then banned alcohol. By the time prohibition was repealed, the mafia had control over labor unions, allowing them to get into different types of businesses (Schelling 1984; Worsnop 1992; Reuter 1995; Alexander 1997; Skaperdas 2001). Other examples of the reach of the Italian mafia include Germany, Slovenia, Canada, and Australia, among others.[35]

In addition, there are several commonalities between the Italian mafia and other organized crime groups. For instance, the Yakuza arose from the need to enforce property rights in post-feudal Japan as early as in the 17th century and is today mainly involved in real estate, although less visibly so since 1992, when regulations made it more difficult for syndicates to operate openly and legally (Milhaupt and West 2000; Skaperdas 2001; Bandiera 2003). The Chinese Triads, whose origin goes back to the traditional 18th and 19th century Chinese secret societies and their political and war involvement, have their main base in Hong Kong. They mainly engage in heroin trafficking, prostitution, gambling, passport foraging, and pirating software (Martin 1996; Skaperdas 2001). In Russia, the mafia evolved from ex-KGB and unemployed soldiers satisfying the demand for protection during the transition to capitalism (Frye and Zhuravskaya 2000; Bandiera 2003). In addition, youth gangs provide protection in many low-income areas in the U.S. and elsewhere (Sao Paolo, Rio, Soweto, and Durban; Skaperdas, 2001). And the fragmentation of Colombian drug cartels, once the most dynamic and violent organized crime gangs in the world, has led to the development of powerful drug-trafficking groups in other countries, particularly in Mexico (Skaperdas 2001).

[35] Giuseppe Governale, an anti-mafia investigator, warned in June 2018 during a meeting with the foreign press in Rome that Italian organized crime was becoming a global phenomenon. According to him, while the Sicilian mafia has been present in countries such as the U.S., Canada, and Australia for a long time, it has expanded to many European countries. (Source: Sky News, https://news.sky.com/story/italian-mafia-going-global-as-influence-spreads-warns-countrys-anti-mafia-chief-11396031, accessed on January 18th 2019).

Appendix B: Asset confiscations scaled by Province Characteristics

This figure shows the number of confiscations of mafia assets scaled by GDP (Panel A) and by population, in thousands (Panel B) by Italian province. The data on asset confiscations are from the Italian National Agency for the administration and destination of assets seized and confiscated from organized crime (*ANBSC*), and the data on GDP and Population are from the Italian National Institute of Statistics (*Istat*).

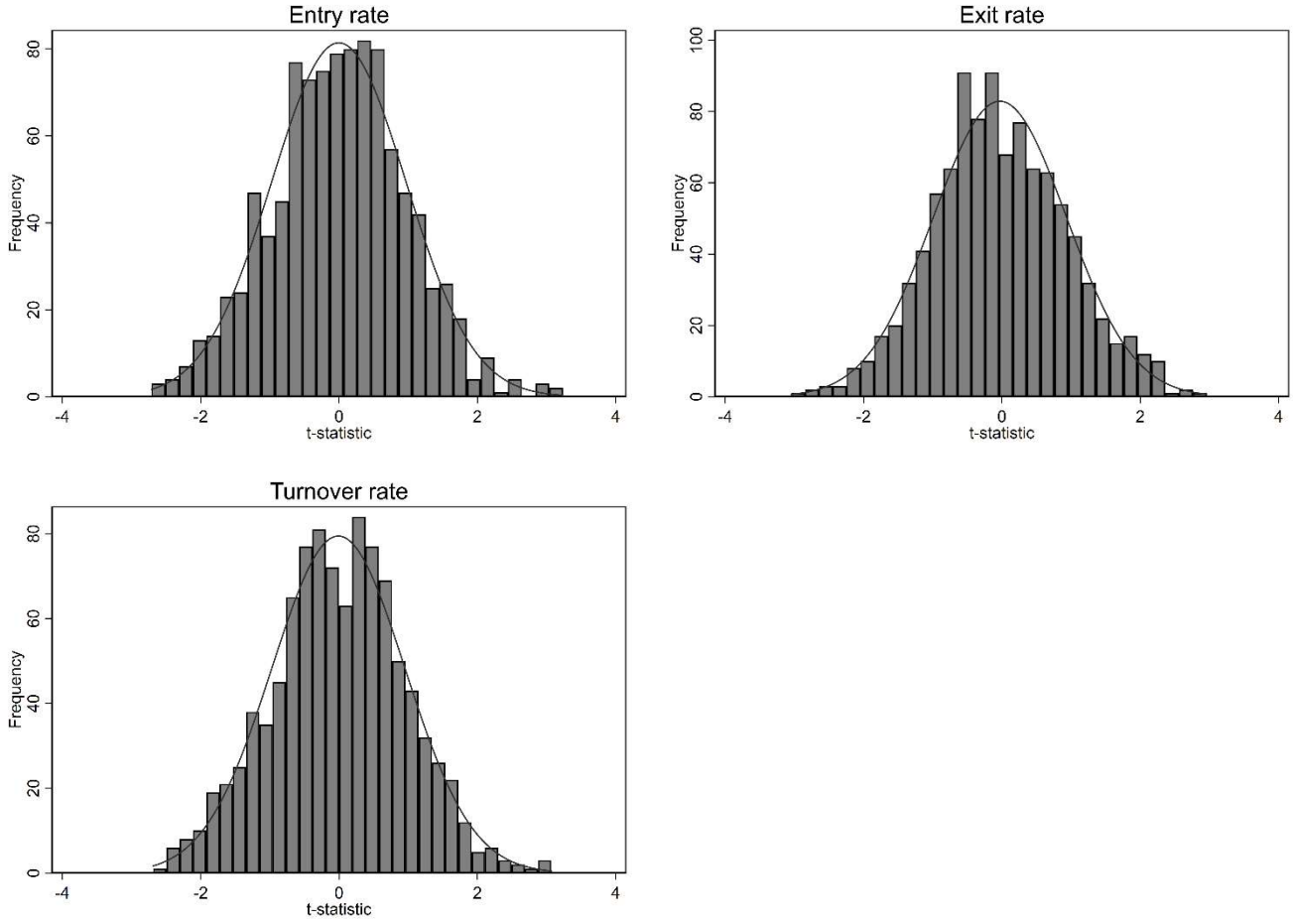


Appendix C: Variable definitions

Variable	Definition	Source
Enforcement Actions		
Confiscation (Dummy)	A dummy variable set equal to one if a municipality experiences or has experienced an asset confiscations at any point in time.	ANBSC
#Confiscations	The number of asset confiscations that have occurred in a municipality at a point in time (logged).	ANBSC
Competition		
Turnover Rate	(Number of new firms that enter + Number of old firms that cease to exist) / Number of firms at the beginning of the period	Orbis
Entry Rate	Number of new firms / Number of firms at the beginning of the period	Orbis
Exit Rate	Number of firms that cease to exist / Number of firms at the beginning of the period	Orbis
Firm characteristics		
Revenue	Revenue (USD, logged in regressions).	Orbis
Assets	Total Assets (USD, logged in regressions).	Orbis
ROA	After-tax Profit/Total Assets.	Orbis
Innovation		
#Inventors	Number of inventors that contribute to a patent in a municipality-year.	European Patent Office (EPO)
Procurement contracts		
N Contracts	Number of tendered contracts.	IMIT (Ministry of Infrastructure and Transportation.)
N Applicants	Number of auction applicants.	IMIT
N Invitations	Number of companies invited to bid	IMIT
N Offers	Number of offers submitted to an auction.	IMIT
N Admitted	Number of admitted offers.	IMIT
Value	Value of contract.	IMIT
% Reduction	Percentage reduction of the winning bidder's bid.	IMIT
Macroeconomic		
Population	Number of inhabitants	Istat
Water usage per capita	Cubic meters of water consumed (000s)/population	Istat
#Firms per capita	Number of active firms / population	Istat
#Touristic establishments p.c.	Number of touristic establishments / population	Istat
#Foreigners per capita	Number of foreign born inhabitants / population	Istat
Social Expenditure p.c.	Social Expenditure / population	Istat
Profit Margin (%)	Aggregate after-tax profits / Aggregate revenues	Orbis
Revenue	Aggregate revenues of firms within a municipality	Orbis
#Active firms	Number of active firms within a municipality	Orbis
Other		
Tradable	An indicator variable for firms in the tradable sector, identified using Mano and Castillo (2015).	Orbis
Mafia strength	The homicide rate in a given year, defined as homicides per capita (Pinotti 2015b).	Istat
Intimidation	Number of intimidatory events	Avviso Pubblico

Appendix D: Placebo tests

This figure provides the *t*-stats obtained in our placebo test aimed at ruling out spurious correlation. In those tests, we randomize shocks to municipalities and run our baseline regression (Equation (1)) 1,000 times for each one of the variables of interest: Turnover Rate, Entry Rate, and Exit Rate. Each time we collect the *t*-stats of the main coefficients of interest.



Appendix E: Robustness test - Municipalities shocked before 1995

This table provides the results of the analysis of the relation between confiscations of assets and measures of competition at the municipality level and firm outcomes. The sample period is 1995-2015 and the unit of analysis is the municipality-year level. We exclude municipalities that experienced shocks before 1995, the beginning of our sample period. The controls of interest are *Confiscation Dummy*, a dummy set equal to one the year after the first confiscation and the years thereafter and *#Confiscations*, the natural logarithm of one plus the number of accumulated asset confiscations lagged by one year. In Panel A we analyze outcomes at the municipality level, where the dependent variables are the *Turnover Rate* ((Number of new firms that enter + Number of old firms that cease to exist) / Number of firms at the beginning of the period) in Columns 1 and 4, the *Entry Rate* (=Number of new firms / Number of firms at the beginning of the period) in Columns 2 and 5, and the *Exit Rate* (= Number of firms that cease to exist / Number of firms at the beginning of the period) in Columns 3 and 6. In Panel B we analyze outcomes at the firm level, where the dependent variables are *Revenue* in Columns 1 and 4, *Assets* in Columns 2 and 5, and Return on Assets in Columns 3 and 6. In Panel A we include *municipality* and *province x year* fixed effects and in Panel B we include *firm* and *province x year* fixed effects. In Panel C we include *firm* and *municipality x year* fixed effects and exploit heterogeneity across sectors (tradable vs non-tradable). All dependent variables are winsorized at the 1% and 99% level. *t*-statistics are given in parentheses; standard errors are clustered at the municipality level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Municipality-level outcomes

	(1) Turnover	(2) Entry	(3) Exit	(4) Turnover	(5) Entry	(6) Exit
Confiscation Dummy	1.278***	1.205***	0.0739***	0.914***	0.914***	0.0149
	(7.71)	(7.47)	(5.07)	(4.41)	(4.49)	(0.93)
#Confiscations				0.316**	0.252**	0.0510***
				(2.41)	(1.99)	(5.65)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	75,997	75,997	75,997	75,997	75,997	75,997
Adj. R-Squared	0.559	0.574	0.727	0.559	0.574	0.727

Panel B: Firm-level outcomes

	(1) Revenue	(2) Assets	(3) ROA	(4) Revenue	(5) Assets	(6) ROA
Confiscation Dummy	-0.059***	-0.023***	-0.002***	0.017	0.008	0.001
	(-3.95)	(-3.13)	(-2.58)	(0.58)	(0.51)	(0.83)
#Confiscations				-0.058***	-0.023**	-0.002**
				(-2.60)	(-2.04)	(-2.50)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	5,306,543	5,337,984	5,326,789	5,306,543	5,337,984	5,326,789
Adj. R-Squared	0.805	0.903	0.324	0.805	0.903	0.324

Panel C: Firm-level outcomes by sector and mafia strength around incorporation date

	(1) Revenue	(2) Assets	(3) ROA	(4) Revenue	(5) Assets	(6) ROA
Confiscation Dummy	0.117***	0.038***	-0.001			
x Tradable	(4.68)	(3.17)	(-0.35)			
Confiscation Dummy				-0.087***	-0.005	-0.004***
x Mafia Strength				(-4.99)	(-1.30)	(-3.60)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	5,289,189	5,320,395	5,309,379	4,865,904	4,895,931	4,885,211
Adj. R-Squared	0.804	0.904	0.322	0.796	0.897	0.323

Appendix F: Robustness test – Redeployment rates

This table provides the results of the analysis of the relation between confiscations of assets and measures of competition at the municipality level and firm outcomes. The sample period is 1995-2015 and the unit of analysis is the municipality-year level. The controls of interest are *Confiscation Dummy*, a dummy set equal to one the year after the first confiscation and the years thereafter and *#Confiscations*, the natural logarithm of one plus the number of accumulated asset confiscations lagged by one year. In addition, we include interaction terms with *High Redeployment*, a dummy set to one for regions with high redeployment rates. In Panel A we analyze outcomes at the municipality level, where the dependent variables are the *Turnover Rate* ((Number of new firms that enter + Number of old firms that cease to exist) / Number of firms at the beginning of the period) in Columns 1 and 4, the *Entry Rate* (=Number of new firms / Number of firms at the beginning of the period) in Columns 2 and 5, and the *Exit Rate* (= Number of firms that cease to exist / Number of firms at the beginning of the period) in Columns 3 and 6. In Panel B we analyze outcomes at the firm level, where the dependent variables are *Revenue* in Columns 1 and 4, *Assets* in Columns 2 and 5, and Return on Assets in Columns 3 and 6. In Panel A we include *municipality* and *province x year* fixed effects and in Panel B we include *firm* and *province x year* fixed effects. In Panel C we include *firm* and *municipality x year* fixed effects and exploit heterogeneity across sectors (tradable vs non-tradable). All dependent variables are winsorized at the 1% and 99% level. *t*-statistics are given in parentheses; standard errors are clustered at the municipality level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Municipality-level outcomes

	(1) Turnover	(2) Entry	(3) Exit	(4) Turnover	(5) Entry	(6) Exit
Confiscation Dummy	1.288***	1.238***	0.0707***	0.416	0.418	0.0136
	(5.60)	(5.46)	(4.44)	(1.51)	(1.54)	(0.76)
Confiscation Dummy x High Redeployment	-0.245	-0.263	-0.0171	-0.0350	-0.0259	-0.0206
	(-0.78)	(-0.86)	(-0.69)	(-0.09)	(-0.07)	(-0.75)
#Confiscations				0.773***	0.726***	0.0507***
				(4.36)	(4.21)	(4.94)
#Confiscations x High Redeployment				-0.233	-0.251	-0.00117
				(-0.99)	(-1.10)	(-0.08)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	80,800	80,800	80,800	80,800	80,800	80,800
Adj. R-Squared	0.557	0.571	0.733	0.557	0.572	0.733

Panel B: Firm-level outcomes

	(1) Revenue	(2) Assets	(3) ROA	(4) Revenue	(5) Assets	(6) ROA
Confiscation Dummy	-0.055**	-0.027**	-0.001	0.023	0.004	0.002
	(-2.53)	(-2.44)	(-1.25)	(0.69)	(0.24)	(1.12)
Confiscation Dummy x High Redeployment	0.022	0.025*	0.001	0.027	0.032	0.000
	(0.69)	(1.68)	(0.43)	(0.55)	(1.44)	(0.20)
#Confiscations				-0.063***	-0.025**	-0.003***
				(-2.67)	(-2.12)	(-2.71)
#Confiscations x High Redeployment				-0.007	-0.008	0.000
				(-0.23)	(-0.51)	(0.04)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	8,132,745	8,179,013	8,161,643	8,132,745	8,179,013	8,161,643
Adj. R-Squared	0.801	0.902	0.322	0.801	0.902	0.322

Panel C: Firm-level outcomes by sector and mafia strength around incorporation date

	(1) Revenue	(2) Assets	(3) ROA	(4) Revenue	(5) Assets	(6) ROA
Confiscation Dummy x Tradable	0.134***	0.056***	-0.001			
	(3.98)	(3.27)	(-0.47)			
Confiscation Dummy x Tradable x High Redeployment	-0.036	-0.036	0.001			
	(-0.74)	(-1.54)	(0.34)			
Confiscation Dummy x Mafia Strength				-0.070***	-0.002	-0.004**
				(-4.65)	(-0.36)	(-2.19)
Confiscation Dummy x Mafia Strength x High Redeployment				-0.036	-0.008	-0.001
				(-1.04)	(-1.02)	(-0.52)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	8,104,243	8,150,115	8,133,010	7,449,755	7,493,870	7,477,266
Adj. R-Squared	0.801	0.902	0.320	0.792	0.895	0.320

Appendix G: Robustness test – Infiltrated municipalities

This table provides the results of the analysis of the relation between confiscations of assets and measures of competition at the municipality level and firm outcomes. The sample period is 1995-2015 and the unit of analysis is the municipality-year level. The controls of interest are *Confiscation Dummy*, a dummy set equal to one the year after the first confiscation and the years thereafter and *#Confiscations*, the natural logarithm of one plus the number of accumulated asset confiscations lagged by one year. In addition, we include interaction terms with *Infiltrated*, a dummy set to one for municipalities in which the council was eventually dissolved due to infiltration by the mafia. In Panel A we analyze outcomes at the municipality level, where the dependent variables are the *Turnover Rate* ((Number of new firms that enter + Number of old firms that cease to exist) / Number of firms at the beginning of the period) in Columns 1 and 4, the *Entry Rate* (=Number of new firms / Number of firms at the beginning of the period) in Columns 2 and 5, and the *Exit Rate* (= Number of firms that cease to exist / Number of firms at the beginning of the period) in Columns 3 and 6. In Panel B we analyze outcomes at the firm level, where the dependent variables are *Revenue* in Columns 1 and 4, *Assets* in Columns 2 and 5, and Return on Assets in Columns 3 and 6. In Panel A we include *municipality* and *province x year* fixed effects and in Panel B we include *firm* and *province x year* fixed effects. In Panel C we include *firm* and *municipality x year* fixed effects and exploit heterogeneity across sectors (tradable vs non-tradable). All dependent variables are winsorized at the 1% and 99% level. *t*-statistics are given in parentheses; standard errors are clustered at the municipality level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Municipality-level outcomes

	(1) Turnover	(2) Entry	(3) Exit	(4) Turnover	(5) Entry	(6) Exit
Confiscation Dummy	1.126***	1.071***	0.0598***	0.348*	0.358*	-0.000
	(7.09)	(6.91)	(4.58)	(1.79)	(1.88)	(-0.03)
Confiscation Dummy x Dissolved	0.429	0.352	0.0243	0.588	0.532	0.0416
	(1.11)	(0.94)	(0.92)	(0.96)	(0.87)	(1.20)
#Confiscations				0.654***	0.599***	0.0506***
				(5.46)	(5.12)	(7.00)
#Confiscations x Dissolved				-0.0482	-0.0634	-0.0065
				(-0.19)	(-0.25)	(-0.44)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	80,800	80,800	80,800	80,800	80,800	80,800
Adj. R-Squared	0.557	0.571	0.733	0.557	0.572	0.733

Panel B: Firm-level outcomes

	(1) Revenue	(2) Assets	(3) ROA	(4) Revenue	(5) Assets	(6) ROA
Confiscation Dummy	-0.043***	-0.014*	-0.001	0.039	0.023**	0.002**
	(-2.72)	(-1.89)	(-1.40)	(1.55)	(2.07)	(2.01)
Confiscation Dummy x Dissolved	-0.031	-0.017	-0.002	-0.071	-0.031	-0.003
	(-0.65)	(-0.84)	(-1.18)	(-0.91)	(-0.96)	(-1.29)
#Confiscations				-0.068***	-0.031***	-0.003***
				(-4.30)	(-4.52)	(-4.39)
#Confiscations x Dissolved				0.018	0.007	0.001
				(0.75)	(0.62)	(0.55)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	8,132,745	8,179,013	8,161,643	8,132,745	8,179,013	8,161,643
Adj. R-Squared	0.801	0.902	0.322	0.801	0.902	0.322

Panel C: Firm-level outcomes by sector and mafia strength around incorporation date

	(1) Revenue	(2) Assets	(3) ROA	(4) Revenue	(5) Assets	(6) ROA
Confiscation Dummy x Tradable	0.116***	0.038***	-0.001			
	(4.66)	(3.18)	(-0.32)			
Confiscation Dummy x Tradable x Dissolved	-0.002	-0.016	-0.004			
	(-0.03)	(-0.42)	(-0.64)			
Confiscation Dummy x Mafia Strength				-0.088***	-0.006	-0.004***
				(-4.99)	(-1.35)	(-3.56)
Confiscation Dummy x Mafia Strength x Dissolved				0.028	0.003	-0.001
				(0.61)	(0.12)	(-0.24)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	8,104,243	8,150,115	8,133,010	7,449,755	7,493,870	7,477,266
Adj. R-Squared	0.801	0.902	0.320	0.792	0.895	0.320