

Organized Crime and Firms: Evidence from Italy

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This Version: November 2018

Abstract

We exploit staggered municipality-level anti-mafia enforcement actions over the 1995-2015 period to study the effect of organized crime on firms. At the municipality level, we find that as the influence of organized crime weakens, competition and innovative activity increase. At the firm level, existing firms that do not exit in response to enforcement actions shrink in size and experience reduced employee productivity and profitability. These results are more pronounced among firms that are treated repeatedly and firms founded during the heydays of the mafia. We also find our results to be stronger for firms in the non-tradable sector, where prices are more likely set locally. Our findings are consistent with accounts of organized crime acting as an enforcer of cartels and using legitimate business to launder money.

Keywords: Organized Crime, Corruption, Competition, Cartel enforcement, Collusion, Money laundering.

We are grateful to Francesco D’Acunto, Stefano Giglio, Holger Mueller, Cecilia Parlato, Paolo Pasquariello, Jacopo Ponticelli, Peter Reuter, Hannes Wagner, Moqi Xu, and Alminas Zaldokas, as well as seminar and conference participants at the Mitsui Symposium on Comparative Corporate Governance and Globalization, the University of Maryland, and the University of Michigan.

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Organized crime is a global phenomenon. The Italian mafia has, over more than 150 years, affected the lives of millions across most if not all Southern municipalities through extortion, racketeering, gambling, prostitution, drug trafficking, money laundering, murder, and political influence, and it has also acquired strong economic interests in the U.S..¹ Other organized crime groups influence economic activity in Japan (Yakuza), Hong Kong (Triads), Russia (Russian mafia), South and Latin America (various drug cartels), and low-income areas such as São Paulo, Rio de Janeiro, Soweto, and Durban (Skaperdas 2001; Bandiera 2003). Though hard to measure in extent, global revenues generated by organized crime groups are estimated at \$870 billion (1.5% of global GDP; UN Office on Drugs and Crime, 2012), and former Secretary of State John Kerry suspects the five most influential mafia organizations to represent the third largest business in the world (Kerry 1998).

Organized crime also likely affects firms. According to the Global Competitiveness Report published by the World Economic Forum in 2017, when asked to what extent organized crime imposes costs on businesses, firms in 122 out of 137 countries indicated that organized crime imposes some cost, and firms in one out of five countries indicated that it imposed medium to huge costs.² But despite its influence, relatively little is known about the effects of organized crime on firms. An important empirical challenge is that organized crime activities are largely unobserved.

In this paper, we examine whether and how organized crime affects firms. To this end, we employ a quasi-experimental design that allows us to study changes in firm outcomes in response to a plausibly exogenous weakening of mafia power. Specifically, we exploit municipality-level

¹ In this paper, we use the term ‘mafia’ to describe any active organized crime syndicate in Italy. The term is often used to refer to the Sicilian Mafia, at home in the region of Sicily. Other influential mafia groups in Italy include the Camorra in Campania, the ‘Ndrangheta in Calabria, and the Sacra Corona Unita in Apulia.

² Based on the World Economic Forum Global Competitiveness Report (2017-2018). Firms are asked ‘To what extent does organized crime (mafia-oriented racketeering, extortion) impose costs on businesses?’ where 1 indicates huge costs and 7 indicates no costs. 122 out of 137 countries scored below 6, and 27 countries scored below 4.

confiscations of mafia assets in Italy over the 1995-2015 sample period. Important for our identification strategy, in Italy mafia cells tend to be small. They typically operate within no more than one municipality and with the exception of larger cities, no more than one mafia cell exerts power over a municipality (Gambetta and Reuter 1995, Polo 1995, Gambetta 1996). Hence, confiscations of mafia assets in a specific municipality likely affect firms in a municipality by weakening the economic resources and reputation of a specific mafia cell. Importantly, asset confiscations, regardless of their size, always challenge mafia families' most valuable asset, their reputation as a guarantor of protection and effective intimidator (Reuter, 1995, p. 90).³

Firms may be affected by organized crime in at least two ways.⁴ First, organized crime enforces cartels, which includes protecting incumbent firms from new entrants and allocating customers to existing firms. For protected firms, this comes at the cost of direct protection payments or the indirect cost associated with being forced to use specific mafia-protected suppliers, which are potentially inefficient or charge a price that includes the protection payment. In this function, the presence of organized crime is likely associated with reduced competition, leading to artificially large and inefficient firms (Gambetta & Reuter 1995; Gambetta 1996; Alexander 1997; Franchetti 2000; Bandiera 2003; Dimico *et al.* 2017; Alesina *et al.* 2016). Reduced competition in turn potentially affects innovation. On the one hand, since firms do not compete on price or quality, organized crime might reduce incentives to innovate. On the other hand, firms might have more incentives to engage in high-risk innovative projects, since by limiting entrance and competition organized crime reduces the cost in case of failure. Anti-mafia

³ As an example of a larger asset confiscation, the government seized assets worth EUR 1.6bn from a Sicilian family on July 8th 2015.

⁴ The literature on organized crime is extremely vast. Here, we derive major themes on the influence of organized crime on firms from books by Fiorentini and Peltzman 1997, Gambetta 1993, and Dickie 2004. Section 1 provides further institutional detail.

enforcement actions should unwind some of these effects. Second, organized crime has a substantial stake in illegal activities such as drug trafficking, gambling, and prostitution.⁵ In an effort to turn the proceeds from such activities into legitimate money, organized crime funnels money through legitimate stores, e.g. through fake invoicing. Money laundering thus likely inflates firms' revenues and profits, and helps otherwise inefficient firms to survive. Again, anti-mafia enforcement actions should unwind some of these effects.

To empirically test whether organized crime indeed affects municipalities and firms, we exploit anti-mafia enforcement actions in the form of asset confiscations. Using difference-in-difference techniques, we study competition at the municipality level and firm-level outcomes around asset confiscations, where we define municipalities as treated when they first experience an asset confiscation. Importantly, confiscations are staggered over the sample period, which alleviates concerns that other events may drive our results. Moreover, there are two characteristics of the confiscations procedure that mitigate endogeneity concerns. First, confiscations can follow cases initiated by non-local authorities such as the national revenue agency or custom and tax authorities, alleviating the concern that an omitted variable such as a push for development can drive both the confiscation and the effects we observe.⁶ Second, a key characteristic of the Italian judiciary system is that enforcement actions are determined by law courts at the province level. Since there are many municipalities per province (74 municipalities on average), we can study changes in municipalities affected by confiscations after controlling for common time-series

⁵ Official estimates of mafia revenues from illegal activity range from 6.6%-8% of Italy's GDP. Official estimates of mafia revenues from licit businesses with mafia ties are estimated at 12% of Italian GDP (Ruffolo *et al.* 2010; Dimico *et al.* 2012; Calderoni 2014).

⁶ Illicit Assets Recovery in Italy - Enhancing Integrity and Effectiveness of Illegal Asset Confiscation. Transparency International project report, December 2013.

shocks at the province level.⁷ Alleviating concerns that treated municipalities and firms in such municipalities are different from non-treated ones, at the law court level, municipalities affected by anti-mafia enforcement actions differ from unaffected ones only in that they have a larger population and a higher density of touristic establishments. In light of this, in robustness tests, we match municipalities on these characteristics and find that our results are robust.

We obtain data on 834,016 mainly private Italian firms from Orbis and define firms as treated through being located in a municipality that has been affected by an asset confiscation. Roughly 80,000 firms (9.6% of all sample firms) were treated gradually over the sample period, and these are headquartered in 414 municipalities (10.3% of all municipalities with at least one sample firm). Since all Italian Limited Liability Companies have to report annually, our data allows us to construct representative measures of competition at the municipality level by looking at entry and exit of firms and individual outcomes such as size, employee productivity, and profitability at the firm level.

We first analyze whether anti-mafia enforcement actions had an effect on competition and find that they do. More specifically, after a municipality faces its first anti-mafia enforcement action, 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 1.1 percentage points, or 11.6% of its mean. This result is driven by both increased exit of incumbents and increased entry of new firms, and becomes economically stronger as a municipality is affected by additional asset seizures. Overall, these results support the notion that the mafia acts as a barrier to entry. In our second set of results, and supporting the idea that firms have lower incentives to innovate when competition

⁷ The Italian judiciary system is divided into *Tribunali*, or law courts, each one with power over a circuit that in most instances coincides with a province. Italy has three levels of administrative divisions. There are 20 regions, which are divided into a total of 107 provinces. Each province consists of municipalities (7,954 as of March 2018).

is weak (Vives 2008), we find that anti-mafia enforcement actions are followed by increased innovative activity at the municipality level. Moreover, competition for procurement contracts increases after the weakening of the mafia.

Using the granularity of our data, we then turn to firm-level outcomes. We find that treated firms that do not exit after an asset seizure experience a 4.2% decline in revenues and a 1.4% decline in assets. Economically, this constitutes an EUR 355,800 (EUR 24,200) decline in revenues for the mean (median) firm. We also find firms' employees' productivity—as measured by revenue per employee—to decline by 1.6%. Profitability also declines but the effect is statistically insignificant. Overall, these results support the idea that firms under protection of the mafia may charge oligopolistic prices. From the perspective of incumbent firms, the benefits of obtaining mafia protection appear to outweigh the costs.

To further support the idea that it is the crackdown on organized crime that drives our results, we study its effect on different sectors. Firms in the non-tradable sector pay protection money but they benefit from the enforcement of cartels, since they can charge oligopolistic prices. In contrast, prices for firms in the tradable sector are not set locally, therefore firms in this sector do not benefit from the protection of the mafia. Following this logic, we expect firms in the tradable sector to perform better after the crackdown on mafia and the opposite result for firms in the non-tradable. Using industry classifications, we find this to be the case. In addition, we study whether the effect is stronger for firms with stronger ties to the mafia. While we cannot directly observe these ties, we use historical homicide data to proxy for the strength of organized crime around firms' incorporation years. Arguably, firms incorporated in years in which the mafia was stronger had to establish a relationship with the mafia to enter the market. Using homicides data, we show that our results are stronger among firms incorporated during times of stronger mafia presence.

Last, to rule out that changes in the political arena drive the results, we control for these changes and find similar results. These three additional results suggest that our results are indeed driven by the crackdown on organized crime.

Our paper contributes to several strands of the literature. First, it contributes to the literature on collusion, where recent papers have studied the presence and effects of explicit and tacit collusion agreements (Dasgupta & Zaldokas 2017; Bourveau *et al.* 2018). Due to the development of new tools such as leniency programs for cartel whistleblowers, these cartels are hard to sustain, therefore they die naturally. In our setting, organized crime serves as the external enforcement mechanism to enforce collusion among firms (Gambetta 1996); anti-mafia enforcement actions weaken enforcement of collusion.⁸

Second, we contribute to the literature on organized crime. Papers in this literature usually fall within two categories. On the one hand, papers such as (Skaperdas 2001; Bandiera 2003; Buonanno & Pazzona 2014; Buonanno *et al.* 2015; Acemoglu *et al.* 2017) study the historical drivers of mafia presence. On the other hand, papers such as (Daniele & Marani 2011; Dimico *et al.* 2017; Pope & Pope 2012; Pinotti 2015b, a; Pinotti & Stanig 2016; Bianchi *et al.* 2017; Le Moglie & Sorrenti 2017; Ganau & Rodríguez-Pose 2018; Scognamiglio 2018), study the effect of organized crime on development, productivity, and economic growth.⁹ Our contribution to the latter strand of this literature is twofold. First, we study how organized crime –and the crackdown on it- affects individual firms, both incumbents and entrants, and whether the tradeoff firms face when protected by the mafia –protection vs. grant payments- is economically beneficial. Second, we shed light on the mechanism by which the crackdown affects aggregate economic growth; it

⁸ See Levenstein and Suslow (2012) for a literature review on cartels and collusion.

⁹ See (Ofria & Farinella 2011) for a review.

limits entry and provides a protection net to incumbents, preventing them from competing on prices or quality and therefore hindering innovation.

While we do not study welfare implications directly, our results highlight the role played by organized crime in reducing competition, dampening innovative activity, and helping the survival of inefficient, artificially large firms. As organized crime weakens, new innovative firms enter and presumably crowd out some existing firms. These findings are in line with the notion that organized crime is associated with adverse economic outcomes. Indeed, even though Italy features high levels of organized crime and is economically developed, the traditional mafia regions of the South are the least developed Italian regions. Anti-mafia enforcement actions have the potential of stimulating economic development in these regions.

1. Institutional setting

We provide an overview of the history and economic impact of the mafia, then summarize actions taken to fight the mafia and conclude with a description of organized crime's global reach.

1.1 Historical background and origins

The Italian mafia has existed and, at times, thrived over the last 150 years. Described most simply as a secret organization by (Dickie 2004) and (Gambetta 1996) in their seminal books, the mafia is traditionally at home in the regions of Sicily (Cosa Nostra), Campania (Camorra), Calabria ('Ndrangheta), and Puglia (Sacra Corona Unita), and its origins have been tracked to the time of the unification of Italy during the second half of the 19th century (Skaperdas 2001; Lupo 2004).

Early evidence on the Sicilian Mafia dates back to parliamentary inquiries into economic conditions and crime in Sicily conducted in the late 19th century (Dimico *et al.* 2017). During that time, the Mafia rose to provide enforcement of property rights and private land protection from

predatory attacks, both goods not provided by an Italian state that was distant, weak, and incapable of enforcing the law (Hess 1973; Arlacchi & Ryle 1986; Gambetta 1996; Bandiera 2003; Acemoglu *et al.* 2017). Moreover, it is argued that 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 grew more in some municipalities than in others, raising questions over its origins. Some authors have emphasized the role of 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, it has been shown that land fragmentation favored the development of the Mafia in certain areas of Sicily (Bandiera 2003).

Other authors have argued that the combination of weak institutions and resource abundance favored the emergence of mafia-type organizations (Gambetta 1996; Konrad & Skaperdas 2012). Researchers have linked the rise of the Mafia to the presence of sulphur, a commodity in high demand in parts of the 20th century (Buonanno *et al.* 2015), and citrus fruits, a produce in high demand and with high fixed costs of entry (Dimico *et al.* 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.

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 not only to enforce property rights but also by government and local politicians against political opponents (Mosca 1900; Benigno 2015; Acemoglu *et al.* 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. In the last half century, the mafia focused on other types of services. They enforce cartels, control entry of firms, intimidate competitors, infiltrate private and public construction works, and support politicians by means of voter intimidation. Last but not least, the mafia has entered the highly profitable but illicit drug trafficking business (Alesina *et al.* 2016; Acemoglu *et al.* 2017).

From its geographic origins, the mafia established strongholds in the regions of Basilicata and Puglia in the 1970s and 1980s.¹⁰ But mafia outlets have also spread across Italy, partly through *Soggiorno Obbligato*, the policy of mandatory resettlements of suspected mafia members to municipalities outside the traditional mafia areas in the 1960s and 1970s, originally aimed at cutting the links between a Mafioso and his network. This policy has led to increases in measures of organized crime in host municipalities (Pinotti & Stanig 2016).

Only in recent decades—in the aftermath of the Maxi trials against mafia leading members in the 1980s and after backlash over the assassination of anti-mafia judges Giovanni Falcone and

¹⁰ This geographical expansion was the response to two events that turned these formerly mafia-free regions into attractive terrains. First, changes in the tobacco smuggling routes put Puglia on the Mafia's map. Second, an earthquake in Basilicata resulted in very large public procurement contracts for reconstruction, contracts that in many cases were granted to mafia related companies (Pinotti 2015).

Paolo Borsellino in 1992—some argue that the mafia’s power has weakened. But mafia activities are still registered in many municipalities (Gambetta 1996; Pinotti 2015b; Acemoglu *et al.* 2017).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 over a municipality.¹² (Polo 1995) argues that the limited expansion of mafia families is a result of severe agency conflicts (members can easily entrench themselves) met by enforcement constraints. (Gambetta 1996) adds that the mafia business is labor intensive, since it relies on an intelligence network formed by spies 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 1996) points out, a Mafioso is better off “protecting *all* transactions over a small territory than *some* over a variety of territories” (page 37).

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 makes contracts between principals and agents 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 to its avail (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.

¹¹ More than 250 municipalities, for instance, were put under external administration to fight involvement of the Mafia in local government and public procurement.

¹² Gambetta and Reuter (1995) estimate the scale of the Sicilian mafia at 3,000 members over 100 families. This stands in stark contrast to the New York mafia families, where 5 families combine 5,000 members.

1.2 Economic impact of mafia activity

Within the regions of Sicily, Calabria, Campania, and Puglia alone, the different organized crime organizations operate in 610 towns and affects millions of lives through legal and illegal operations. Though its true economic impact is inherently hard to estimate, official estimates of mafia revenues from criminal activity range from 6.6%-8% of Italian GDP, while revenues from licit businesses with mafia ties are estimated to amount to 12% of Italian GDP (Calderoni 2014), (Ruffolo *et al.* 2010; Dimico *et al.* 2017)

There appears to be wide agreement that organized crime is a major obstacle to economic development (Daniele & Marani 2011; Pinotti 2015a, b; Scognamiglio 2018). Italy stands out as a developed country with a particularly high rate of organized crime compared to other OECD countries (with the exception of Mexico) and is a highly developed country vis-à-vis other countries infested with organized crime (see Figure 1).

-- Figure 1 about here --

But such country-level perspective hides significant regional variation in economic development across Italy. The traditional mafia regions in the South are, in fact, substantially less developed than the regions of the North (see Figure 2 Panel A). Though a causal link between economic development and organized crime is hard to establish, (Pinotti 2015b) studies the effect of organized crime on the economic development of Puglia and Basilicata, two regions that experienced a surge in organized crime in the 1970s and 1980s. The author estimates that the presence of the mafia lowered GDP per capita by 16% in these regions.

-- Figure 2 about here --

While the finding seems intuitive, a key question remains unanswered. How does the presence of the mafia affect economic development and individual firms' outcomes? Firms come under mafia control by paying protection money in the form of cash, by buying from mafia-related suppliers, or by having a Mafioso as partner. In return, the mafia uses its power to enforce cartels, which take the form of actively intimidating potential competitors to keep them out of the market, generating sales for firms under its protection by reducing competition or channeling sales to them, and mediating to settle disputes, providing reliable material flow, and mediating with locals (Gambetta 1996).

By enforcing cartels, the mafia essentially also acts as a barrier to 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 & Reuter 1995; Gambetta 1996; Alexander 1997; Franchetti 2000; Bandiera 2003; Dimico *et al.* 2017; Alesina *et al.* 2016). 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 1988) in exchange for a graft payment.

Typically, firms under protection of the same mafia family operate in different industries. The mafia harmonizes activities between these firms by putting all connections in touch, 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 & Lalli 1983). Besides the channeling of firms' purchases through protected suppliers in which a Mafioso is a partner, direct cash payments constitute another form of payment for protection. Evidence on the size of protection payments is scarce, but (Gambetta & Reuter 1995) estimate that in Sicily, these payments are around 5% of contract value in the construction industry. Ultimately, firms forced to

pay for protection face higher operational costs, invest less because they may have to share the upside with the local mafia, and may avoid investing in equipment that can be easily destroyed (Konrad & Skaperdas 1998). Overall, these opposing effects make it hard to anticipate the effect of organized crime on firms' outcomes.

In addition to its effect on firms, the effect of the mafia is also seen on the labor market. (Sanchez-Jankowski 1991) argues that the long-term effects can be even higher as the more able entrepreneurial youth can choose to become Mafioso. Even after the destruction 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 & Hoeffler 2002; Skaperdas 2002; Bandiera 2003). Besides actively managing competition, the mafia is oftentimes directly involved in the allocation of public procurement contracts and public investment funds, control of concessions, and granting of authorizations. This may lead to contract allocation to less efficient firms (Schelling 1971; Barone & Narciso 2015; Alesina *et al.* 2016).

While racketeering and the business of protection have always been part of the mafia's portfolio, through time 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 always been one of the mafia's most profitable businesses. Some authors have argued that legal businesses act as a tax cover for the illegal activities the mafia is involved in (Anderson 1995).

1.3 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 government's will to fight the mafia, and accounts

of the mafia increased in numbers from those charged under these regulations.¹³ Specifically, Article 416-bis of the Rognoni-La Torre Law (Law #646), introduced into the Italian Penal Code in 1982, 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’.

Most important for the fight against the mafia, Law #646 introduced a crucial procedure by which the government can seize assets belonging to individuals suspected of having ties with the mafia. Evidence needed to seize an asset under this law is relatively weak, amounting to proving that an individual’s lifestyle does not match the reported income.¹⁴ This procedure was intended to weaken the power of the mafia. In 1983 alone there were 207 asset confiscations, compared to a total of 46 confiscations over the 1965 to 1982 period. Over the next three decades, the fight against the mafia continued and heated up substantially after the killing of anti-mafia judges Falcone and Borsellino. As of 2013, 5,470 people were charged with this crime, 4,148 thereof in Sicily, Campania, and Calabria (Alesina *et al.* 2016).

As of January 2018, the Italian government had seized more than 30,000 mafia properties and more than 3,500 companies. Figure 2 Panel B shows the number of confiscations by province. As expected, given the presence of organized crime, the south of Italy experienced the largest number of seizures, but seizures affected almost every single province across Italy. This may partly

¹³ The first legal attempts at anti-mafia regulation date back to at least 1965. Under Law #431, the 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 mafia-type association was undefined, creating a legal loophole. Attempts at closing this loophole gained backing only after the assassination of anti-mafia general Carlo Alberto Dalla Chiesa, prefect of Palermo, in 1982.

¹⁴ Similar procedures have been used elsewhere. Former Trump campaign chairman Paul Manafort, for instance, faces questions over his luxurious lifestyle (clothing, real estate, and vehicles) supported using undisclosed foreign bank accounts.

reflect the mafia's active reach for the remainder of 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.

1.4 Global reach

Though we focus our study on the effect of the Italian organized crime on Italian firms' outcomes, our analysis is relevant in other settings and regions for several reasons. First, organized crime is a global phenomenon. There are numerous active syndicates such as the Yakuza in Japan, the Hong Kong-based Chinese Triads, the Russian mafia, MS-13 in the United States, and South and Latin American drug cartels, among others. Additionally, organized crime is just one of the many available mechanisms to enforce collusion. Other mechanisms frequently used include price-fixing agreements, political collusion, or market divisions.

Lastly, the Italian mafia has, over the last century, acquired strong economic interests throughout the world, particularly in the U.S.. Indeed, the American Mafia traces its origin to immigrants associated with the Sicilian Mafia. Its expansion was accelerated by the Prohibition (1920-1933) via the large profits from the illegal production and trafficking of liquor. When 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; Skaperdas 2001). Other examples of the reach of the Italian mafia include Germany, Slovenia, Canada, and Australia, among others.¹⁵

¹⁵ Giuseppe Governale—Italy's anti-mafia chief--warned in June 2018 during a meeting with the foreign press in Rome that Italian organized crime was becoming a global phenomenon. While the Sicilian mafia had always been present in countries such as the United States, Canada, and Australia, it has expanded to many European countries. (Source: Fox News)

There are also many commonalities between the Italian mafia and other organized crime groups. For instance, the Yakuza rose from the need to enforce property rights in post feudal Japan and is nowadays mainly involved in real estate, though less visibly so since 1992, when regulation made it more difficult for syndicates to operate openly and legally (Milhaupt & West 2000; Skaperdas 2001; Bandiera 2003). The Chinese Triads, whose origin goes back to the traditional Chinese secret societies and their political and war involvement, have their main base in Hong Kong and engage in heroin trafficking, prostitution, gambling, the forging of passports, and pirating software ((Martin 1996; Skaperdas 2001). In Russia, the mafia rose from ex-KGB and unemployed soldiers satisfying the demand for protection during the transition to capitalism (Frye & Zhuravskaya 2000; Bandiera 2003). Youth gangs provide protection in many low income areas in the US 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). Not surprisingly, former United States Secretary of State John Kerry (1997) stated that the five most influential mafia organizations represent the third largest business in the world, and are a huge threat to common market rules and democracy.

2. Data and methodology

2.1 Data

In order to study the effect of crackdown on organized crime in Italy on individual firms, we use multiple data sources to construct measures of anti-mafia enforcement, competition, firm characteristics, innovative activity, and efficiency of procurement contract auctions. Detailed variable definitions can be found in Appendix A.

2.1.1 Measures of anti-mafia enforcement actions

Measuring the strength of the mafia directly is intrinsically difficult. Thus, we exploit anti-mafia enforcement actions to proxy for the weakening of mafia families. More specifically, we use anti-mafia enforcement actions in the form of assets confiscations. As (Reuter 1995; Gambetta 1996) 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 Italian National Agency 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. The more than 34,000 confiscations that occurred between 1968 and 2018 are spread across every Italian region, though most occurred in the original mafia strongholds in the South (see Table 1). Indeed, provinces in Sicily, Campania, and Calabria saw larger numbers of confiscations, with some exceptions in the North (Figure 2 Panel B).

-- Table 1 about here --

Once Mafia assets are confiscated, the government's goal is to guarantee their effective social reuse.¹⁶ The ANBSC manages confiscated assets until they are redeployed. As of 2018, 14,000 assets had been redeployed, while 20,000 have. Our analysis focuses on assets that have been redeployed since for undisposed assets, confiscation dates are unavailable. However, it must be noted that the geographical distribution of the assets already redeployed and assets confiscated

¹⁶ In most cases where real estate is seized, 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 to social centers. An illustrating example is that of the Café de Paris, a bar on Via Veneto, Rome. This café was glorified by the Italian filmmaker Federico Fellini in the movie "La Dolce Vita". In 2009 the property was seized by the ANBSC and reopened two years later, selling products produced by Libera, an anti-mafia group that runs cooperative farms in land confiscated from the mafia.

but not yet redeployed is highly correlated ($\rho=0.96$), 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 asset confiscated is in general economically small compared to the assets of 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 Ch. 10).¹⁷

2.1.2 Competition and firm-level data

We obtain financial information for all Italian public and private firms reported in Bureau Van Dijk's Orbis database. As is standard in the literature, we download and combine information from multiple vintage DVD editions of the database over the 2005-2015 period to address survivorship bias concerns. Using the firm identifier provided by Orbis, we restrict our sample to firms with more than 4 yearly observations.¹⁸ A key advantage of Italian data is that all limited liability companies are obliged to disclose financial information, therefore when we restrict our sample to firms with non-missing assets, sample attrition is small. Overall, we start with an initial sample of

¹⁷ It could be argued that seizures 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 empirical problems with this approach. First, the value of the assets confiscated is only available for assets that were subsequently auctioned. Since most of the assets are redeployed for social uses, the information on assets' value is very limited. Second, the auction value does not accurately reflect the value of the asset at the time of the confiscation. In many cases, a number of years pass by between the confiscation and the auction of an asset, 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, 11-12 September 2014).

¹⁸ Our results are robust to alternative specifications.

834,016 firms, 9,340,460 firm-year observations, and 4,031 municipalities with at least one firm over the sample period.

Using incorporation years and information on firms' disappearance (by going bankrupt or being dissolved), we construct three measures of competition at the municipality-year level. 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 9.7%, composed of an entry rate of 9.3% and an exit rate of 0.4% (Table 2 Panel A).

-- Table 2 about here --

At the firm level, we use Revenue and Asset data to capture size. Employees' productivity is measured by *Revenues per employee* (Revenues divided by number of employees), and profitability by *Return on assets* (after-tax profit divided by assets). We winsorize these variables at the 1% and 99% level though this choice does not affect our results. The mean (median) firm in our sample has revenues of USD 8.472 (0.576) million and assets of USD 23.765 (0.870) million, reflecting the fact that Orbis contains many small firms (Panel B). Revenues per employee are USD 364,000 on average. Unsurprisingly, since our sample period includes the financial crisis and many small firms did particularly poorly, the mean ROA is negative (-2.0%). However, median ROA is positive (0.3%).¹⁹

¹⁹ To further confirm that the negative mean sample ROA is not an artefact of poor data, we calculate asset-weighted ROA which is positive (0.5%). Also, mean ROA for the full sample is negative predominantly during the crisis.

In addition, we retrieve the incorporation year for each firm, and using the Orbis industry classifier, we determine the sector in which it operates. A large fraction of Italian firms in the database (52.0%) operate in the secondary sector, followed by the tertiary sector (45.8%; Panel C).

2.1.3 Other data sources

We exploit other sources of information to run additional tests. In particular, we exploit time-series variation in the strength of the mafia at the time firms were incorporated. To this end, we proxy the intensity of mafia activity by looking at homicide rates, following (Pinotti 2015a), who finds a very strong correlation between homicide rates and organized crime across Italian regions. The data on homicide rates is obtained from Eurostat.

In order to measure innovation, we use patents 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.²⁰ 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 on each municipality that apply for a patent on a certain year. To avoid overweighting innovation due to the existence of multiple inventors on a patent, we assign to each inventor a weigh of $1/N$ for that patent, where N is the total number of inventors on a patent. Thus, our final measure of innovation is

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

²⁰ An application for a patent can be made simultaneously in different countries. Thus, to avoid double counting, we focus on applications made in Italy.

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 $N_{p,m,t}$ is the total number of inventors in the application for patent p made in municipality m at time t .²¹ Table 2 Panel D, summarizes the data. In total, we have information on 23,866 municipality-years, with a mean of 10 inventors and a median of 4.

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. Information for years 2006-2008 is incomplete, which is why we restrict our sample to 2009-2015. Where data on the municipality contracting a service is missing, we manually extract the municipality from the contract description. Table 2 Panel D summarizes the data.

2.2 Empirical strategy

We exploit 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 located in a municipality that has been affected. This choice of assigning asset seizures to municipalities is consistent with existing accounts of mafia families operating locally (Polo 1995) and not competing directly within the

²¹ For clarity, we provide an 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 $1 + 0.5 + 0.25 = 1.75$.

same territory (Gambetta & Reuter 1995).²²

Figure 3 shows that the number of anti-mafia enforcement actions varied significantly over our studied period, but there was a substantial number of confiscations during every year of our sample period (Panel A). Important to our analysis, the number of municipalities and firms treated for the first time varies considerably each year over the 1995-2015 period (Panels B-C). At the end of our sample period, about 80,000 firms (9.6% of all sample firms) and 414 municipalities (5.2% of all Italian municipalities and 10.3% of all municipalities with at least one sample firm) are treated. No more than 3% of sample firms and 1.25% of sample municipalities are treated for the first time in any given year. This time-series variation in the number of affected firms and municipalities is important for our identification strategy, as it helps rule out that one specific year drives our results.

--- Figure 3 about here ---

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

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

where $y_{m,t,p}$ is one of several outcome variables of interest (turnover, entry, exit) for municipality m in province p in year t . The data is aggregated at the municipality-year level using data on firms headquartered in that municipality. $TREATED_{m,p,t}$ identifies treated municipalities

²² Polo (1995) argues that mafia families act locally due to enforcement constraints rather than for technological reasons. Specifically, the nature of the mafia business makes contracts between principals and agents 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 to its avail (including those prohibited by law) but monitoring costs increase substantially—and hence families’ deterrence power decreases—with geographic distance.

and in a variation of (1), we additionally control for #Confiscations to measure the effect of the intensity of assets confiscations. We include municipality fixed effect (α_m) to account for time-invariant characteristics of each municipality and province-year fixed effects ($\alpha_{p,t}$) to control for regional economic and other shocks that might coincide with treatment of a municipality. $\varepsilon_{m,p,t}$ is the error term. Standard errors are clustered at the zip code level though the results are robust to alternative clustering specifications. In variations of equation (1), we study innovation and contract allocation data.

We estimate the effect of asset seizures on firm-level outcome variables using a similar approach. Specifically, we estimate

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

where $y_{i,p,t}$ is the one of several dependent variables of interest for firm i in municipality m , province p , at time t . $TREATED_{i,p,t}$ 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 region in that year.²³ $\varepsilon_{i,p,t}$ is the error term. Standard errors are clustered at the zip code level and again, all results are robust to alternative clustering specifications.

We also use Equation (2) to study how the anti-mafia enforcement actions affect firms in different industries. To this end, we run specification (2) on different industry subsamples. Last, we identify firms that were founded in years with high level of mafia activity and interact $TREATED_{i,p,t}$ with that measure.²⁴

²³ We estimate equations (1) and (2) using a Stata program for high-dimensional fixed effects provided by Guimaraes and Portugal (2010).

²⁴ We follow Pinotti (2015), who shows a strong correlation between homicide rates and organized crime activity.

It might be argued that our specification is subject to omitted variable bias. For instance, asset confiscations could be driven by geography-specific developments or prospects, such a greater push for economic development. Thus, our results could be driven by the push for economic development—unobservable to the econometrician—and not by the anti-mafia enforcement action itself. However, the structure of the judiciary system in Italy is such that it alleviates this concern. The system is divided into *Tribunali*, or law courts, each one with power over a circuit, a territory that in most instances coincides with a province. Thus, the inclusion of province-year fixed effects mitigates this concern allowing us to use variation in treatment within provinces.

In addition to the prior method, we mitigate this concern in two ways. First, in Table 3, Panel A, we compare municipalities that were affected by anti-mafia enforcement actions and those that were not and show that, at least on a series of observable dimensions, these municipalities are similar. Municipalities do not differ on proxies for economic and social development such as water usage per capita, social expenditure per capita or number of touristic establishments per capita. However, they do differ on the number of firms per capita, with a lower number for municipalities that were eventually affected by an anti-mafia enforcement action, consistent with the idea that the mafia limits the entry of firms.

Second, we formally test whether observable macro and firm-level data can predict enforcement actions. We use two types of observable variables: i) municipality-level variables, such as population, water usage, touristic establishments, among others, and ii) firm-level variables, such as revenues and profitability. We aggregate firm-level data as of 1995 and run a probit model where the dependent variable is an indicator on whether the municipality experiences an enforcement action between 1995 and 2015. In addition, due to the institutional setting and the

nature of the judiciary system, we include province fixed effects. In Table 3, Panel B, we present the marginal effects based on the probit model.²⁵ Our results show that larger cities in terms of population and cities with more touristic activity 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 cannot explain enforcement actions.

--- Table 3 about here ---

In additional unreported robustness tests, we also use various matching approaches. For instance, we repeat our analysis on the subset of (i) treated municipalities and same-province municipalities matched by population, and (ii) treated firms and firms matched by same industry, nearby municipality, and closest in size. Our results are robust to using these approaches.

3. Competition

We now study the implications of anti-mafia enforcement actions for firm turnover, entry, and exit. We implement a difference-in-difference specification as outlined in Equation (1). We then turn to innovation and competition for procurement contracts.

3.1 Turnover, entry, and exit

If the mafia acts as a barrier to entry for new firms and protects existing firms, anti-mafia enforcement actions should lead to an increase in competition. And indeed, this is what we find when we estimate Equation (1) for firms' turnover, entry, and exit (Table 4). Specifically, after a

²⁵ (Fernández-Val 2009) shows that estimates of marginal effects based on a probit fixed effects models exhibit no bias or negligible bias.

municipality faces its first anti-mafia enforcement action, the turnover rate increases by 1.15 percentage points, or 11.86% of the mean turnover rate (Panel A Column 1). This change in turnover rate is explained by both increased entry (1.09 percentage points or 11.77% of the mean, Column 2) and, to an economically smaller extent, increased exit (0.06 percentage points or 14.95% of the mean, Column 3). These results are economically and statistically similar when we focus on municipalities with at least 10 firms, which alleviates concerns that our results are driven by municipalities with very few firms (Columns 4-6).

--- Table 4 about here ---

In panel B, we include a measure of the intensity of the anti-mafia enforcement actions. Our analysis shows that for an increase of 1% in the number of confiscated assets, we should expect an increase in turnover rate of 0.646 percent. This result can be decomposed into entry and exit rates. The coefficients in Table 4 show that most of the effect comes from firms' entrance.

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 correlation (Appendix D).

Overall, these results are in line with a model in which organized crime acts as a barrier to entry that keeps new firms out and supports existing firms. The decline in the power of local organized crime associated with asset confiscations leads to increased competition in affected municipalities.

3.2. Innovation

Our results so far suggest that a weakening of the mafia in Italy may be associated with a change in the competitive landscape. New firms enter as some incumbent firms exit. While these

results are in line with the notion that organized crime acts as a barrier to entry, our empirical setting allows us to further study certain economic outcomes that are typically associated with imperfect competition and have implications for economic growth.

In particular, the effect of organized crime on innovation is twofold. First, by limiting entry organized crime reduces incentives for firms to innovate. Firms do not compete by improving the quality of goods or competitiveness of prices. In these markets, firms compete by enlisting in the protection of a Mafioso (Gambetta 1996). Second, graft payments reduce firms' liquidity and the availability of funds that could otherwise go towards R&D activities. Thus, we should expect an increase in innovative activity after anti-mafia enforcement actions.

Using the regression specified in Equation (1) but using our measure of innovation as dependent variable, we find that a municipality treated by a confiscation of mafia assets for the first time experiences an increase of innovative activity of approximately 6%. More specifically, results in Table 5 show that once a municipality is treated, the number of inventors increases by 5.71%. We find that this result is not driven by small municipalities with only a few firms (Columns 1 and 2). In Columns (3) and (4), we find that once we include the log of the number of confiscations, only the indicator for whether a municipality was affected survives.

--- Table 5 about here ---

3.3 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 study whether these actions make the allocation of public contracts more competitive. Results in Table 6 provide evidence that they do. In particular, we find that a municipality treated by a

confiscation of mafia assets for the first time experiences an increase of 28% in the number of contracts tendered publicly (Column 1), an increase of 12% in the number of applications to bid on each contract (Column 2), an increase of 36% in the number of firms invited to bid (Column 3), an increase of 31% in the number of offers per contract (Column 4), an increase of 34% in the number of offers admitted (Column 5), an increase in the value of the work of 140% (Column 6), and an increase of almost 400% in the price reduction obtained by the municipality over the estimated contract value (Column 7).

--- Table 6 about here ---

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

4. Firm-level evidence

We now turn to firm-level responses around anti-mafia enforcement actions. We first focus on firms' economic outcomes and then illuminate the role played by industry association and by the strength of mafia activity at the time of incorporation. We implement 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, i.e., our results are to be interpreted with respect to incumbent firms that survive despite a weakening of organized crime.

4.1 Main result

The mafia may act as a barrier to entry that reduces competition and may generate business for firms under its protection. If that is the case, we expect firms to experience a decline in revenues

and assets in response to anti-mafia enforcement actions. Using the *Confiscation Dummy* as our measure of anti-mafia enforcement action, we find exactly this (Table 7). Treated firms experience a 4.2% decline in revenues and a 1.4% decline in assets (Panel A Columns 1-2). Economically, this reflects a USD 355,800 ($4.2\% * 8.472\text{mn}$) decline in annual revenues for the average firm and a USD 24,200 ($4.2\% * 576,000$) decline for the median firm.

--- Table 7 about here ---

Next, we test whether anti-mafia actions affect revenues per employee. In line with the idea that firms under protection of the mafia may charge oligopolistic prices, and supporting the idea that the costs of protection outweigh its benefits, we find firms' employees' productivity to decline. Specifically, revenues per employee decline by 1.6%. ROA also declines by 0.1%, but this result is statistically insignificant (Columns 3-4).

These results also hold when we match firms in affected municipalities to same-industry similar-size firms in neighboring control municipalities that were unaffected by anti-mafia enforcement actions. Using the sample of treated firms and the constructed control firms, in Figure 4, we also show that the effects documented in Panel A of Table 7 are relatively instantaneous and not the result of a violation of the parallel trend assumption.

--- Figure 4 about here ---

So far, we have documented that firms headquartered in municipalities that experience an anti-mafia action for the first time experience a decline in their size and employees' productivity. In Panel B of Table 7, we take this analysis one step further and study whether additional anti-mafia enforcement actions come with additional effects on these variables. Using the (logged) number

of asset confiscations, we find that the intensity of anti-mafia enforcement actions leads to additional declines in size, revenues per employee, and profitability.

Overall, the results of this subsection highlight the role played by local mafia families in protecting existing firms. The benefits arising to these firms more than outweigh the potential costs associated with being under mafia protection. Anti-mafia enforcement actions destroy some of the benefits enjoyed by incumbent firms.

4.2 Tradable and non-tradable sectors

A potential concern is that an unobservable or omitted factor might be driving both the confiscation of assets from the mafia and the greater push for competition and innovation. To show that our results do respond to the crackdown on mafia, we analyze the differential effect of the confiscations on firms in the tradable sector. While firms in the non-tradable sector can charge oligopolistic prices, firms in the tradable sector cannot. Thus, these firms should benefit from the crackdown on mafia. We test this by including an indicator for firms in the tradable sector.

--- Table 8 about here ---

Results in Table 8 show that, while firms in the non-tradable sector experience a decline in revenues, assets, revenues per employee, and return on assets after a confiscation, firms in the tradable sector perform better in these four dimensions. This result is consistent with the idea that firms in the tradable sector were less competitive due to the fixed costs imposed by the extortion money and, in contrast to firms in the tradable sector, did not benefit from the cartel.

4.3 Political Connections

In addition to the previous test, and to rule out the alternative explanation that changes in the political environment of a municipality drive our results, we obtain the registry of elected

officials for local offices from the Ministry of the Interior. This database includes the identity of the mayor for each municipality and year, which allows us to rule out that changes in the political arena drive our results.

We expand our empirical specification by including mayor fixed effects. Thus, our results (Table 9) reflect the effect of confiscations on firms holding the politician fixed. We find that the results are robust to this specification.

--- Table 9 about here ---

4.4 Mafia strength

Lastly, to further support our interpretation, we test whether firms that have plausible stronger ties with organized crime are more affected by anti-mafia enforcement actions. To this end, we exploit one additional dimension, the strength of organized crime at the time of each firm's incorporation date. 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. Since the level of organized crime activity is hard to measure, we proxy it with homicide rates, following the literature.

Consistent with the idea that firms founded during the heydays of the mafia benefit more from mafia protection, we find that firms that were incorporated in times of above-median homicide levels experience a larger decline in revenue, assets, and revenue per employee after anti-mafia enforcement actions, while we find no effect on profitability (Table 10).

--- Table 10 about here ---

5. Conclusion

Organized crime in the form of the mafia is pervasive in Italy and has plagued the Southern regions of Sicily, Campania, and Calabria for well over a century. We study the effects of

organized crime on firms and find that as organized crime weakens, new firms enter and firms previously under mafia protection become more likely to exit. Firms that do not exit shrink in size and experience reduced revenues per employee as well as lower profitability. Our results are more pronounced among manufacturing firms and among firms founded during the heydays of the mafia. Further, the weakening of organized crime leads to increased innovative activity and competition for procurement contracts.

Our identification relies on difference-in-difference estimation based on staggered municipality-level confiscations of mafia assets across Italy over the 1995-2015 period. These confiscations weaken actual and, perhaps more importantly, perceived power of local mafia families. Overall, our results suggest that organized crime hinders competition among existing firms, which benefits inefficient incumbents but hinders entry of new innovative firms. In other words, we conclude that anti-mafia enforcement actions affect the competitive landscape of affected municipalities and industries.

To the best of our knowledge, ours is the first attempt to test the effect of organized crime on individual firms' outcomes. While our setting is specific to Italy, organized crime is pervasive across the globe. Testing whether or not our findings can be generalized to other countries will require additional data sources on organized crime, but provides promising avenues for future research.

References

- Acemoglu, D., De Feo, G., De Luca, G., 2017. Weak States: Causes and Consequences of the Sicilian Mafia. National Bureau of Economic Research
- Alesina, A., Piccolo, S., Pinotti, P., 2016. Organized crime, violence, and politics. National Bureau of Economic Research
- Alexander, B., 1997. The rational racketeer: pasta protection in Depression Era Chicago. *The Journal of Law and Economics* 40, 175-202
- Anderson, A., 1995. Organised crime, mafia and governments. *The economics of organised crime*, 33-53
- Arlacchi, P., Ryle, M., 1986. *Mafia business: the mafia ethic and the spirit of capitalism*. Verso London.
- Bandiera, O., 2003. Land reform, the market for protection, and the origins of the Sicilian mafia: theory and evidence. *Journal of Law, Economics, and Organization* 19, 218-244
- Barone, G., Narciso, G., 2015. Organized crime and business subsidies: Where does the money go? *Journal of Urban Economics* 86, 98-110
- Benigno, F., 2015. *La mala setta. Alle origini di mafia e camorra (1859-1878)*. Giulio Einaudi Editore spa.
- Bianchi, P.A., Marra, A., Masciandaro, D., Pecchiari, N., 2017. Is it worth having the Sopranos on board? Corporate governance pollution and organized crime: The case of Italy.
- Bonanno, J., Lalli, S., 1983. *A Man of Honour: the Autobiography of a Godfather*. Andre Deutsch.
- Bourveau, T., She, G., Zaldokas, A., 2018. Naughty Firms, Noisy Disclosure: The Effects of Cartel Enforcement on Corporate Disclosure.
- Buonanno, P., Durante, R., Prarolo, G., Vanin, P., 2015. Poor institutions, rich mines: Resource curse in the origins of the sicilian mafia. *The Economic Journal* 125, F175-F202
- Buonanno, P., Pazzona, M., 2014. Migrating mafias. *Regional Science and Urban Economics* 44, 75-81
- Calderoni, F., 2014. Mythical numbers and the proceeds of organised crime: estimating mafia proceeds in Italy. *Global Crime* 15, 138-163
- Catanzaro, R., 1988. *Il delitto come impresa: storia sociale della mafia*. Liviana.
- Collier, P., Hoeffler, A., 2002. On the incidence of civil war in Africa. *Journal of conflict resolution* 46, 13-28
- Daniele, V., Marani, U., 2011. Organized crime, the quality of local institutions and FDI in Italy: A panel data analysis. *European Journal of Political Economy* 27, 132-142
- Dasgupta, S., Zaldokas, A., 2017. Anti-collusion enforcement: Justice for consumers and equity for firms.
- Dickie, J., 2004. *Cosa Nostra: A History of the Sicilian Mafia*. Palgrave Macmillan Trade.
- Dimico, A., Isopi, A., Olsson, O., 2017. Origins of the sicilian mafia: The market for lemons. *The Journal of Economic History* 77.4 (2017): 1083-1115
- Fernández-Val, I., 2009. Fixed effects estimation of structural parameters and marginal effects in panel probit models. *Journal of Econometrics* 150, 71-85
- Franchetti, L., 2000. *Condizioni politiche e amministrative della Sicilia. La Sicilia nel 1876*
- Frye, T., Zhuravskaya, E., 2000. Rackets, regulation, and the rule of law. *Journal of Law, Economics, and Organization* 16, 478-502
- Gambetta, D., 1996. *The Sicilian Mafia: the business of private protection*. Harvard University Press.
- Gambetta, D., Reuter, P., 1995. Conspiracy among the many: the mafia in legitimate industries. In: *The Economic Dimensions of Crime*. Springer, pp. 99-120.
- Ganau, R., Rodríguez-Pose, A., 2018. Industrial clusters, organized crime, and productivity growth in Italian SMEs. *Journal of Regional Science* 58, 363-385
- Hess, H., 1973. *Mafia and Mafiosi: The structure of power*. Saxon House Farnborough, UK.
- Konrad, K.A., Skaperdas, S., 2012. The Market for Protection and the Origin of the State. *Economic Theory* 50, 417-443
- Konrad, K.I., Skaperdas, S., 1998. Extortion. *Economica* 65, 461-477

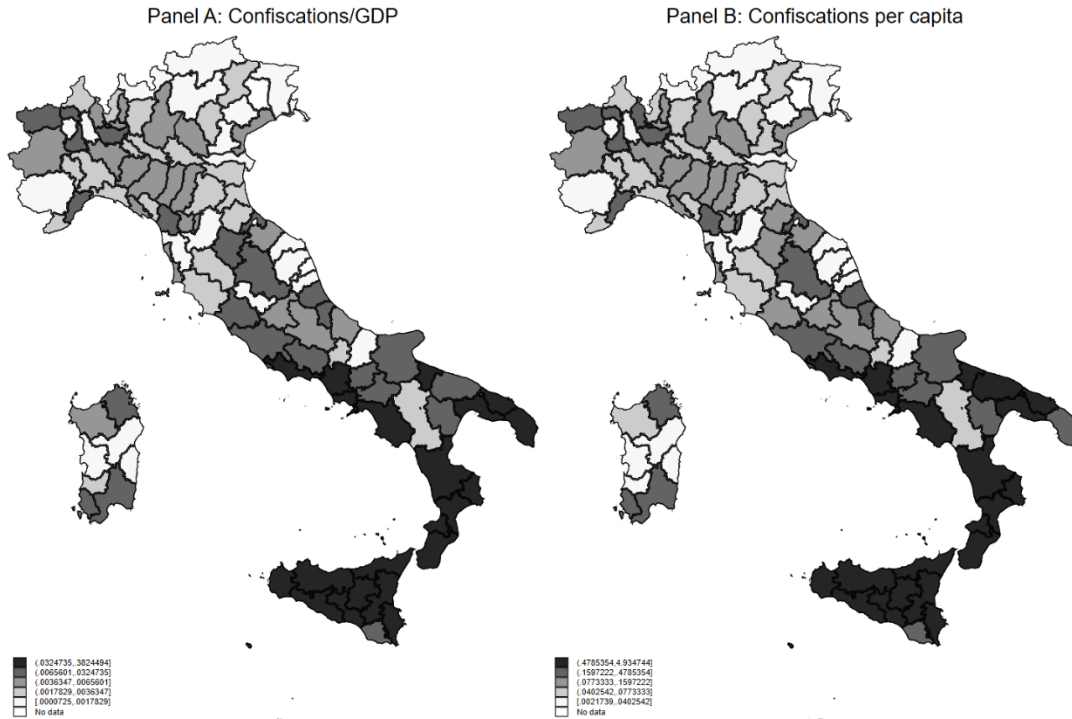
- Le Moglie, M., Sorrenti, G., 2017. 'Mafia Inc.': When Godfathers Become Entrepreneurs.
- Lupo, S., 2004. Storia della mafia: dalle origini ai giorni nostri. Donzelli editore.
- Martin, B.G., 1996. The Shanghai Green Gang: politics and organized crime, 1919-1937. Univ of California Press.
- Milhaupt, C.J., West, M.D., 2000. The dark side of private ordering: an institutional and empirical analysis of organized crime. *The University of Chicago Law Review*, 41-98
- Mosca, G., 1900. CHE COSA È LA MAFIA (Conferenza tenuta alla Cultura di Torino ed a Milano per invito della Vita Internazionale). *Giornale degli economisti*, 236-262
- Ofria, F., Farinella, D., 2011. The Impact of Criminality on the Productivity of the Southern Italian Economy: A Review of the Empirical Studies. *Mediterranean Journal of Human Rights* 15, 215-238
- Pezzino, P., 1985. Una certa reciprocità di favori: mafia e modernizzazione violenta nella Sicilia postunitaria. F. Angeli.
- Pezzino, P., 1987. Stato violenza società. Nascita e sviluppo del paradigma mafioso.
- Pinotti, P., 2015a. The causes and consequences of organised crime: Preliminary evidence across countries. *The Economic Journal* 125, F158-F174
- Pinotti, P., 2015b. The economic costs of organised crime: Evidence from Southern Italy. *The Economic Journal* 125, F203-F232
- Pinotti, P., Stanig, P., 2016. Sowing the mafia: A natural experiment.
- Polo, M., 1995. Internal Cohesion and Competition among Criminal Organizations, in *The Economics of Organized Crime*, edited by G., Fiorentini and S. Peltzman. Cambridge University Press, Cambridge, and CEPR, 87&109
- Pope, D.G., Pope, J.C., 2012. Crime and property values: Evidence from the 1990s crime drop. *Regional Science and Urban Economics* 42, 177-188
- Reuter, P., 1995. The decline of the American Mafia. *Public Interest*, 89
- Ruffolo, G., Veltri, E., Archibugi, F., Masneri, A., 2010. Rapporto sulla criminalità in Italia. Analisi, Prevenzione, Contrasto Ministero degli Interni con Stime Aggiornate dal Centro Studi di Confindustria per Ottobre 2010, Ministero Degli Interni.
- Sanchez-Jankowski, M., 1991. Islands in the street: Gangs and American urban society. Univ of California Press.
- Schelling, T.C., 1971. What is the business of organized crime? *The American Scholar*, 643-652
- Schelling, T.C., 1984. Choice and consequence. Harvard University Press.
- Scognamiglio, A., 2018. When the mafia comes to town. *European Journal of Political Economy*
- Skaperdas, S., 2001. The political economy of organized crime: providing protection when the state does not. *Economics of Governance* 2, 173-202
- Skaperdas, S., 2002. Warlord competition. *Journal of Peace Research* 39, 435-446
- Vives, X., 2008. Innovation and competitive pressure. *The Journal of Industrial Economics* 56, 419-469
- Worsnop, R.L., 1992. Mafia Crackdown. CQ Press.

Appendix A – Variable definitions

Variable	Definition	Source
Anti-mafia enforcement		
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	Orbis
Entry Rate	Number of new firms / Number of firms	Orbis
Exit Rate	Number of firms that cease to exist / Number of firms	Orbis
Firm characteristics		
Revenue	Revenue (logged in regressions).	Orbis
Assets	Total Assets (logged in regressions).	Orbis
Revenue per Employee	Revenues/Number of Employees (logged in regressions).	Orbis
ROA	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 (Italian 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
Other variables		
Agriculture (Dummy)	A dummy variable set equal to 1 if a firm operates in the primary sector, defined as Industry Code 13.	Orbis
Manufacturing (Dummy)	A dummy variable set equal to 1 if a firm operates in the primary sector, defined as Industry Codes 2, 3, 5, 9, 10, 16, 18, and 19.	Orbis
Service (Dummy)	A dummy variable set equal to 1 if a firm operates in the primary sector, defined as Industry Codes 7, 11, 15, 17.	Orbis

Appendix B

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. Sources: ANSBC and Eurostat.



Appendix C: Changes in the competitive landscape around anti-mafia enforcement

This table provides results of the analysis of the relation between confiscations of assets and measures of competition by industry. The sample period is 1995-2015 and the unit of analysis is the municipality-year level. Table C.1 summarizes key measures of competition by industry (see Table 3 for detailed definitions). *Turnover Rate* is (Number of new firms that enter + Number of old firms that cease to exist) / Number of firms. *Entry Rate* is the Number of new firms / Number of firms. *Exit Rate* is the Number of firms that cease to exist / Number of firms. In Table C.2 and C.3, the control of interest is *Confiscation Dummy*, a dummy set equal to one the year of the first confiscation at the municipality level and the years thereafter (Table C.2) and *#Confiscations*, the natural logarithm of one plus the number of asset confiscations at the municipality level at any point in time (Table C.3). The first three columns consider all municipalities and the remaining columns municipalities with at least 10 firms in the year analyzed. The *Finance* industry and *Other* industries are omitted from this analysis for lack of observations. All regressions include municipality and province * 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 zip code level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

C.1: Summary Statistics by Industry

	Turnover Rate	Entry Rate	Exit Rate
Agriculture	9.74	9.52	0.18
Finance	3.15	2.76	0.09
Manufacture	9.43	8.90	0.49
Others	11.84	11.22	0.27
Service	9.81	9.35	0.41
Total	9.64	9.19	0.33

C.2: Extensive margin

Agriculture

	(1) Turnover Rate	(2) Entry Rate	(3) Exit Rate	(4) Turnover Rate	(5) Entry Rate	(6) Exit Rate
Confiscation Dummy	0.568*	0.536*	0.0499***	0.461**	0.429**	0.0296
	(1.94)	(1.82)	(2.73)	(2.16)	(2.03)	(1.50)
N	81157	81157	81157	62173	62173	62173
R2	0.786	0.792	0.449	0.927	0.929	0.521
Sample	All	All	All	>10 firms	>10 firms	>10 firms
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	ZipCode	ZipCode	ZipCode	ZipCode	ZipCode	ZipCode

Manufacturing

	(1) Turnover Rate	(2) Entry Rate	(3) Exit Rate	(4) Turnover Rate	(5) Entry Rate	(6) Exit Rate
Confiscation Dummy	0.373***	0.365***	0.0379**	0.309***	0.300***	0.0234
	(3.28)	(3.29)	(2.20)	(3.01)	(3.00)	(1.39)
N	84451	84451	84451	77097	77097	77097
R2	0.235	0.228	0.616	0.342	0.330	0.650
Sample	All	All	All	>10 firms	>10 firms	>10 firms
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	ZipCode	ZipCode	ZipCode	ZipCode	ZipCode	ZipCode

Service

	(1) Turnover Rate	(2) Entry Rate	(3) Exit Rate	(4) Turnover Rate	(5) Entry Rate	(6) Exit Rate
Confiscation Dummy	0.319**	0.251	0.0869***	0.129	0.101	0.0421**
	(2.00)	(1.62)	(4.87)	(1.04)	(0.83)	(2.56)
N	83554	83554	83554	68938	68938	68938
R2	0.192	0.181	0.543	0.302	0.278	0.592
Sample	All	All	All	>10 firms	>10 firms	>10 firms
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	ZipCode	ZipCode	ZipCode	ZipCode	ZipCode	ZipCode

C.3: Intensive margin

Agriculture

	(1) Turnover Rate	(2) Entry Rate	(3) Exit Rate	(4) Turnover Rate	(5) Entry Rate	(6) Exit Rate
Confiscation Dummy	-0.0998 (-0.27)	-0.0848 (-0.23)	-0.00627 (-0.29)	-0.135 (-0.49)	-0.118 (-0.43)	-0.0181 (-0.79)
#Confiscations	0.196 (0.93)	0.158 (0.75)	0.0470*** (3.86)	0.466*** (2.79)	0.424** (2.56)	0.0404*** (3.17)
N	77305	77305	77305	61392	61392	61392
R2	0.810	0.817	0.450	0.925	0.928	0.521
Sample	All	All	All	>10 firms	>10 firms	>10 firms
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	ZipCode	ZipCode	ZipCode	ZipCode	ZipCode	ZipCode

Manufacturing

	(1) Turnover Rate	(2) Entry Rate	(3) Exit Rate	(4) Turnover Rate	(5) Entry Rate	(6) Exit Rate
Confiscation Dummy	0.0456 (0.31)	0.0802 (0.56)	-0.00679 (-0.34)	0.116 (0.85)	0.145 (1.08)	-0.0167 (-0.85)
#Confiscations	0.135* (1.74)	0.103 (1.36)	0.0361*** (3.55)	0.125* (1.73)	0.0946 (1.35)	0.0327*** (3.25)
N	80406	80406	80406	73799	73799	73799
R2	0.254	0.248	0.615	0.348	0.339	0.648
Sample	All	All	All	>10 firms	>10 firms	>10 firms
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	ZipCode	ZipCode	ZipCode	ZipCode	ZipCode	ZipCode

Service

	(1) Turnover Rate	(2) Entry Rate	(3) Exit Rate	(4) Turnover Rate	(5) Entry Rate	(6) Exit Rate
Confiscation Dummy	0.283 (1.56)	0.272 (1.54)	0.0216 (0.98)	0.145 (0.94)	0.170 (1.11)	-0.0155 (-0.76)
#Confiscations	-0.0808 (-0.90)	-0.129 (-1.42)	0.0549*** (4.36)	-0.0282 (-0.35)	-0.0709 (-0.89)	0.0480*** (3.87)
N	79537	79537	79537	66248	66248	66248
R2	0.195	0.182	0.542	0.304	0.282	0.590
Sample	All	All	All	>10 firms	>10 firms	>10 firms
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	ZipCode	ZipCode	ZipCode	ZipCode	ZipCode	ZipCode

Appendix D

Robustness tests

This figure plots the t-stats obtained in our placebo test aimed at ruling out spurious correlation. In those test, we randomize shocks to municipalities and run our baseline regressions one hundred times for each one of the variables of interest: Turnover rate, Number of Active Firms, Entry Rate, and Exit Rate. Each time we collect the t-stats of the main coefficients of interest. The following Figures plot the distribution of the t-stats collected.

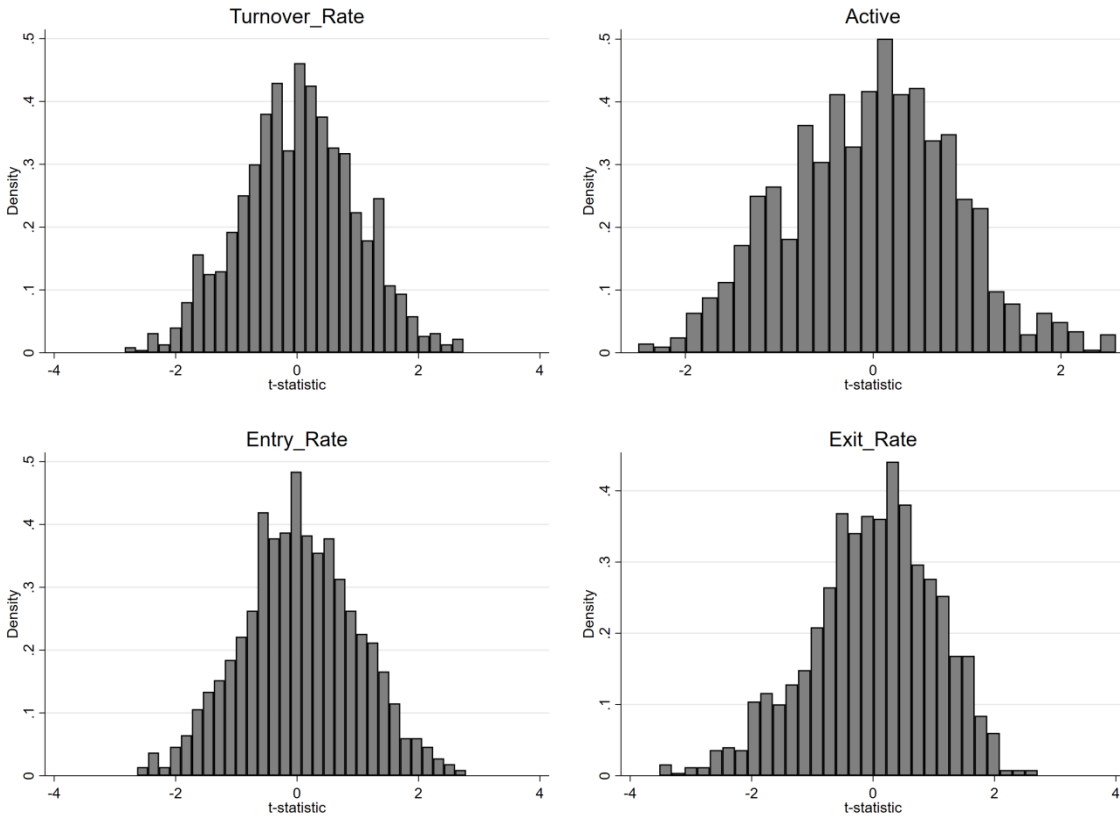


Table 1
Confiscations

This table shows the number of confiscations of mafia properties and other characteristics by region (Panel A). Data on asset confiscations comes from Agenzia Nazionale per l'amministrazione e la destinazione dei beni sequestrati e confiscati alla criminalità organizzata (ANBSC).

Panel A: Confiscations by region

Region	Number of Confiscations	Redeployed Confiscations	GRP (EUR mn)	Population (000s)
Abruzzo	346	64	28,867	1,262
Basilicata	57	12	11,147	598
Calabria	4857	2349	32,419	2,011
Campania	5177	1997	101,682	5,702
Emilia-Romagna	650	135	134,164	3,983
Friuli Venezia Giulia	52	15	34,679	1,184
Lazio	2236	590	177,058	5,112
Liguria	270	77	45,695	1,572
Lombardia	3104	1154	319,728	9,033
Marche	53	19	39,467	1,471
Molise	10	3	6,643	321
Piemonte	918	178	124,739	4,215
Puglia	2471	1557	69,479	4,021
Sardegna	283	102	31,950	1,632
Sicilia	12558	5433	88,154	4,969
Toscana	499	71	100,696	3,498
Trentino-Alto Adige	21	16	33,584	940
Umbria	111	44	21,858	826
Valle D'aosta	31	0	4,227	120
Veneto	372	102	141,078	4,528
Total	34,076	13,918	1,547,314	56,996

Table 2: Summary stats

This table shows summary statistics for the variables required for our analysis. Detailed variable definitions can be found in Appendix A.

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

	N	Mean	SD	P25	P50	P75
Confiscation Dummy	84,929	0.11	0.31	0.00	0.00	0.00
#Confiscations	84,919	1.33	14.59	0.00	0.00	0.00
#Active firms	84,929	454.25	2366.78	64.00	160.00	388.00
Turnover Rate	84,890	9.72	7.30	6.25	8.68	11.19
Entry Rate	84,890	9.28	7.25	5.97	8.22	10.54
Exit Rate	84,890	0.41	1.03	0.00	0.00	0.26

Panel B: Firms (firm-year level)

	N	Mean	SD	P25	P50	P75
Confiscation Dummy	9,340,460	14.5%	35.2%	0.0%	0.0%	0.0%
#Confiscations	9,340,460	58	149	-	-	22
Revenue	9,291,191	8,472	1,040,392	120	576	2,108
Total Assets	9,340,327	23,765	2,401,098	273	870	2,670
Revenue per Employee	4,801,445	364	472	102	199	410
ROA	9,319,787	-2.0%	17.5%	-1.7%	0.3%	2.8%

Panel C: Industries (firm level in 2010)

Variable	Agriculture	Manufacturing	Service
#Firms	18,858	432,961	382,197
Confiscation Dummy	17.0	15.5	15.9
#Confiscations	33	52	75
Revenue	10,251	5,794	3,547
Total Assets	14,658	6,046	8,204
Revenue per Employee	412	436	286
ROA	-4.3%	-2.4%	-2.9%

Panel D: Innovation and Procurement data

	N	Mean	SD	P25	P50	P75
N Inventors	23,866	10.02	39.65	2	4	8
N Contracts	329	4.0	8.6	0.0	1.0	4.0
N Applicants	329	1.3	7.2	0.0	0.0	0.0
N Invitations	329	1.1	3.5	0.0	0.0	0.0
N Offers	329	11.6	26.7	0.0	2.3	10.0
N 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 3: Confiscations within a Province

This table provides results of the comparison between municipalities that experienced an enforcement action and those that didn't. Panel A presents the univariate comparison. Panel B presents the analysis of the relation between observable variables at the municipality level and an indicator on whether the municipality experiences an anti-mafia enforcement action. The dependent variable is an indicator set to 1 for municipalities that experience an enforcement action between 1995 and 2015. We report marginal effects based on a probit model. Firm level data as of 1995 is aggregated at the municipality level. The sample includes municipalities for which there is firm-level data available for 1995. Robust standard errors; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Macro data comes from Istituto Nazionale di Statistica, National Statistics Institute.

Panel A: Municipality characteristics

	Not shocked		Shocked		Difference
	Mean	N	Mean	N	
Population (log)	7.712	7196	9.613	414	-1.901***
Water usage per capita (thousand cubic meters)	0.089	7163	0.086	414	0.002
Number of firms per capita	0.071	7163	0.077	414	-0.006***
Number of touristic establishments per capita	0.006	7168	0.007	414	-0.001
Number of foreigners per capita	0.067	7168	0.073	414	-0.005*
Social Expenditure per capita	88.205	211	111.014	7	-22.808
Profit Margin	0.022	2117	0.013	540	0.009***
Revenue per employee	319.203	2105	371.033	537	-51.830***
Revenue (logged)	10.427	2124	10.865	543	-0.438***
Active firms (Orbis, logged)	1.513	2124	1.851	543	-0.338***

Panel B: Probit regression

	(1)	(2)
Population (log)	0.107*** (14.29)	0.106*** (11.10)
Water usage per capita	-0.0855 (-0.30)	-0.0661 (-0.24)
Firms per capita	0.119 (0.24)	0.200 (0.39)
Touristic establishments per capita	4.398** (2.30)	4.267** (2.18)
Foreigners per capita	0.316 (1.42)	0.272 (1.22)
Profit Margin		-0.107 (-0.83)
Revenue per employee		0.0001 (0.26)
Total Revenue (log)		0.00289 (0.34)
Number of Firms (log)		-0.00217 (-0.15)
Pseudo R2	0.4092	0.4167
N	1,908	1,890

Table 4: Organized crime and competition

This table provides results of the analysis of the relation between confiscations of assets and measures of competition. 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 of the first confiscation at the municipality level and the years thereafter (Panel A) and *#Confiscations*, the natural logarithm of one plus the number of asset confiscations at the municipality level at any point in time (Panel B). The dependent variables are the Turnover Rate ((Number of new firms that enter + Number of old firms that cease to exist) / Number of firms) in Columns 1 and 2, the Entry Rate (=Number of new firms / Number of firms) in Columns 3 and 4, and Exit Rate (= Number of firms that cease to exist / Number of firms) in Columns 5 and 6. The first three columns consider all municipalities and the remaining columns municipalities with at least 10 firms in the year analyzed. All regressions include municipality and province * 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 zip code level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Extensive margin

LHS	(1) Turnover All	(2) Entry All	(3) Exit All	(4) Turnover >10 firms	(5) Entry >10 firms	(6) Exit >10 firms
Confiscation Dummy	1.153*** (7.16)	1.093*** (6.96)	0.0613*** (4.68)	1.161*** (7.41)	1.116*** (7.28)	0.0528*** (4.07)
N	80822	80822	80822	78272	78272	78272
R2	0.591	0.604	0.753	0.647	0.656	0.774
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Intensive margin

LHS	(1) Turnover All	(2) Entry All	(3) Exit All	(4) Turnover >10 firms	(5) Entry >10 firms	(6) Exit >10 firms
Confiscation Dummy	0.389* (2.01)	0.395* (2.08)	0.00244 (0.17)	0.412* (2.14)	0.423* (2.24)	-0.00315 (-0.22)
#Confiscations	0.646*** (5.42)	0.590*** (5.08)	0.0498*** (7.08)	0.634*** (5.39)	0.586*** (5.10)	0.0474*** (6.85)
N	80822	80822	80822	78272	78272	78272
R2	0.591	0.605	0.753	0.647	0.657	0.774
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 5: Organized crime and innovative activity

This table provides results of the analysis of the relation between confiscations of mafia assets and innovation. the tendering of procurement contracts. The sample period is 1995 -2015 and the unit of analysis is the municipality-year level. The control of interest is *Shock*, a dummy set equal to one the year of the first confiscation at the municipality level and the years thereafter (Columns (1) and (2)), and the natural logarithm of one plus the number of asset confiscations at the municipality level at any point in time (Columns (3) and (4)). The dependent variable is the natural logarithm of one plus the number of inventors that contribute to a patent in a municipality-year. All regressions include municipality fixed effects and province times 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.

	(1)	(2)	(3)	(4)
	#Inventors	#Inventors	#Inventors	#Inventors
Confiscation Dummy	0.0571*** (2.76)	0.0571*** (2.74)	0.0510** (2.17)	0.0509** (2.15)
#Confiscations			0.00514 (0.41)	0.00521 (0.41)
N	80855	78272	80855	78272
R2	0.726	0.725	0.726	0.725
Sample	All	>10 Firms	All	>10 Firms
Municipality FE	Yes	Yes	Yes	Yes
Province x Year FE	Yes	Yes	Yes	Yes

Table 6: Organized crime and competition for procurement contracts

This table provides results of the analysis of the relation between confiscations of mafia assets and the tendering of procurement contracts. 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. *After Shock* denotes years after a municipality experienced a confiscation for the first time. In Column (1), the dependent variable is the natural logarithm of the number of contracts tendered publicly. In Column (2), the dependent variable is the natural logarithm of the average number of applicants per tendered contract. In Column (3), the dependent variable is the natural logarithm of the average number of invitations per tendered contract. In Column (4), the dependent variable is the natural logarithm of the average number of offers made per tendered contract. In Column (5), the dependent variable is the natural logarithm of the average number of admitted offers made per tendered contract. In Column (6), the dependent variable is the natural logarithm of the work value tendered publicly. In Column (7), the dependent variable is the average reduction from work value to contract value (discount). All regressions include municipality fixed effects. *t*-statistics are given in parentheses; standard errors are clustered at the level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

LHS	(1) LN #Contracts	(2) LN #Applicants	(3) LN #Invitations	(4) LN #Offers	(5) LN #Admitted	(6) LN Work Value	(7) Percentage Reduction
Confiscation Dummy	0.277*** (3.28)	0.119 (1.32)	0.360*** (4.04)	0.311* (1.95)	0.342** (2.17)	1.405* (1.92)	3.932* (1.99)
N	329	329	329	329	329	329	329
R2	0.729	0.454	0.224	0.323	0.321	0.499	0.265
Muni FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 7: Organized crime and firms

This table provides results of the analysis of the relation between confiscations of assets and firm characteristics. The sample period is 1995-2015 and the unit of analysis is the firm-year level. Firms are included if they have at least 4 observations over the sample period. The control of interest is *Shock*, the natural logarithm of one plus the number of asset confiscations at the municipality level at any point in time (Panel A) and a dummy set equal to one the year of the first confiscation at the municipality level and the years thereafter (Panel B). The dependent variables are the natural logarithm of revenues in Column 1, the natural logarithm of assets in Column 2, the natural logarithm of the revenue per employee in Column 3, and return on assets in Column 5. All regressions include firm fixed effects and province times 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 zip code level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Extensive margin

LHS	(1) Revenue	(2) Assets	(3) Revenue per employee	(4) ROA
Confiscation Dummy	-0.042*** (-2.64)	-0.014* (-1.93)	-0.016*** (-2.64)	-0.001 (-1.52)
N	9287935	9336706	4799734	9316457
R2	0.805	0.900	0.796	0.371
Firm FE	Yes	Yes	Yes	Yes
Prov x Year FE	Yes	Yes	Yes	Yes
ZIP Cluster	Yes	Yes	Yes	Yes

Panel B: Intensive margin

LHS	(1) Revenue	(2) Assets	(3) Revenue per employee	(4) ROA
Confiscation Dummy	0.033 (1.50)	0.020** (1.99)	-0.004 (-0.59)	0.002* (1.72)
#Confiscations	-0.062*** (-5.17)	-0.029*** (-5.30)	-0.010*** (-2.85)	-0.003*** (-4.73)
N	9287935	9336706	4799734	9316457
R2	0.805	0.900	0.796	0.371
Firm FE	Yes	Yes	Yes	Yes
Prov x Year FE	Yes	Yes	Yes	Yes
ZIP Cluster	Yes	Yes	Yes	Yes

Table 8: Organized crime and firms: Evidence by sector

This table provides results of the analysis of the relation between confiscations of assets and firm characteristics by firms' sector. The analysis follows Table 4 Panel A but additionally interacts *Shock* with an indicator for firms in the tradable sector. Accounting data is for the period 1995-2015 and the unit of analysis is the firm-year level. Firms are included if they have at least 4 observations over the sample period. The dependent variables in each Panel are the ones used in Table 4 and defined in Appendix A. All regressions include firm fixed effects and province times 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 zip code level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

LHS	(1) Revenue	(2) Assets	(3) Revenue per employee	(4) ROA
Confiscation Dummy	-0.086*** (-5.44)	-0.024*** (-3.27)	-0.052*** (-8.40)	-0.002* (-1.82)
Confiscation Dummy x Tradable	0.184*** (8.32)	0.040*** (3.72)	0.115*** (12.45)	0.002 (1.29)
N	9256844	9305271	4782241	9285298
R2	0.805	0.900	0.796	0.388
Firm FE	Yes	Yes	Yes	Yes
Prov x Year FE	Yes	Yes	Yes	Yes
ZIP Cluster	Yes	Yes	Yes	Yes

Table 9: Organized crime and firms: Political Arena

This table provides results of the analysis of the relation between confiscations of assets and firm characteristics controlling for changes in the political arena. The analysis follows Table 4 Panel A but additionally includes municipality-mayor fixed effects. Accounting data is for the period 1995-2015 and the unit of analysis is the firm-year level. Firms are included if they have at least 4 observations over the sample period. The dependent variables in each Panel are the ones used in Table 4 and defined in Appendix A. All regressions include firm fixed effects and province times 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 zip code level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

LHS	(1) Revenue	(2) Assets	(3) Revenue per employee	(4) ROA
Confiscation Dummy	-0.024* (-1.79)	-0.008 (-1.31)	-0.010* (-1.84)	-0.000 (-0.29)
N	9003605	9051809	4573139	9031377
R2	0.807	0.901	0.791	0.390
Firm FE	Yes	Yes	Yes	Yes
Prov x Year FE	Yes	Yes	Yes	Yes
ZIP Cluster	Yes	Yes	Yes	Yes
Mayor FE	Yes	Yes	Yes	Yes

Table 10: Organized crime and firms: Evidence by mafia strength around incorporation

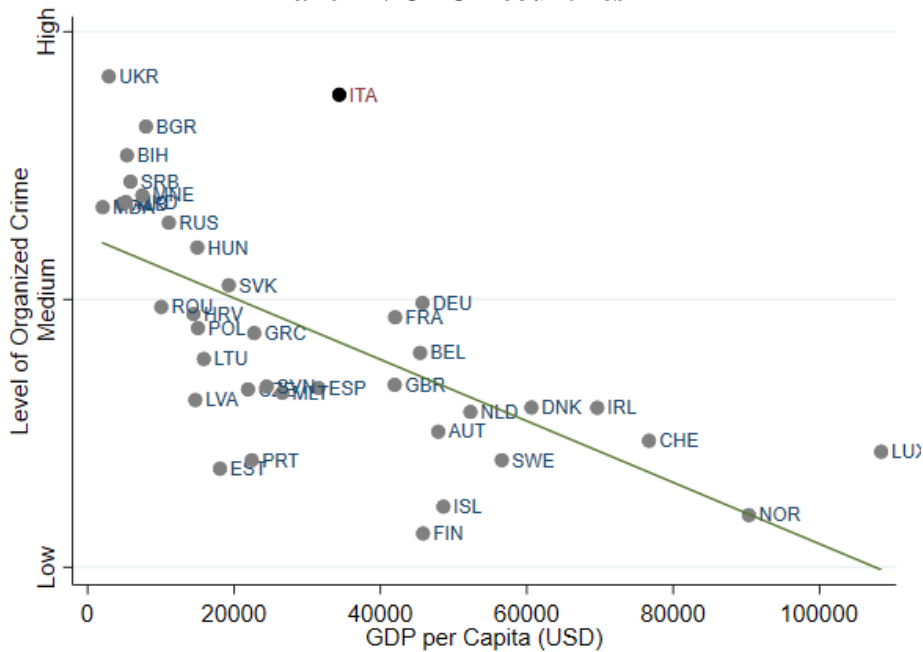
This table provides results of the analysis of the relation between confiscations of assets and firm characteristics by the presence of the mafia around incorporation. The analysis follows Table 4 Panel A but additionally interacts *Shock* with the mafia strength in a firm's incorporation year. Mafia strength is the number of homicides per capita in that year. Accounting data is for the period 1995-2015 and the unit of analysis is the firm-year level. Firms are included if they have at least 4 observations over the sample period. The dependent variables in each Panel are the ones used in Table 4 and defined in Appendix A. All regressions include firm fixed effects and province times 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 zip code level; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

LHS	(1) Revenue	(2) Assets	(3) Revenue per employee	(4) ROA
Confiscation Dummy	-0.044*** (-4.56)	0.016*** (3.13)	-0.001 (-0.38)	-0.006*** (-8.28)
Confiscation Dummy x Above Median Mafia Strength	-0.050*** (-4.99)	-0.049*** (-9.04)	-0.016*** (-4.59)	0.001 (1.34)
N	8545147	8591712	4313972	8572292
R2	0.797	0.893	0.799	0.373
Firm FE	Yes	Yes	Yes	Yes
Prov x Year FE	Yes	Yes	Yes	Yes
ZIP Cluster	Yes	Yes	Yes	Yes

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 20 countries infiltrated most by organized crime (Panel B). Economic development is GDP per capita using World Bank data for 2016. 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 using data obtained from Eurostat and ANBSC.

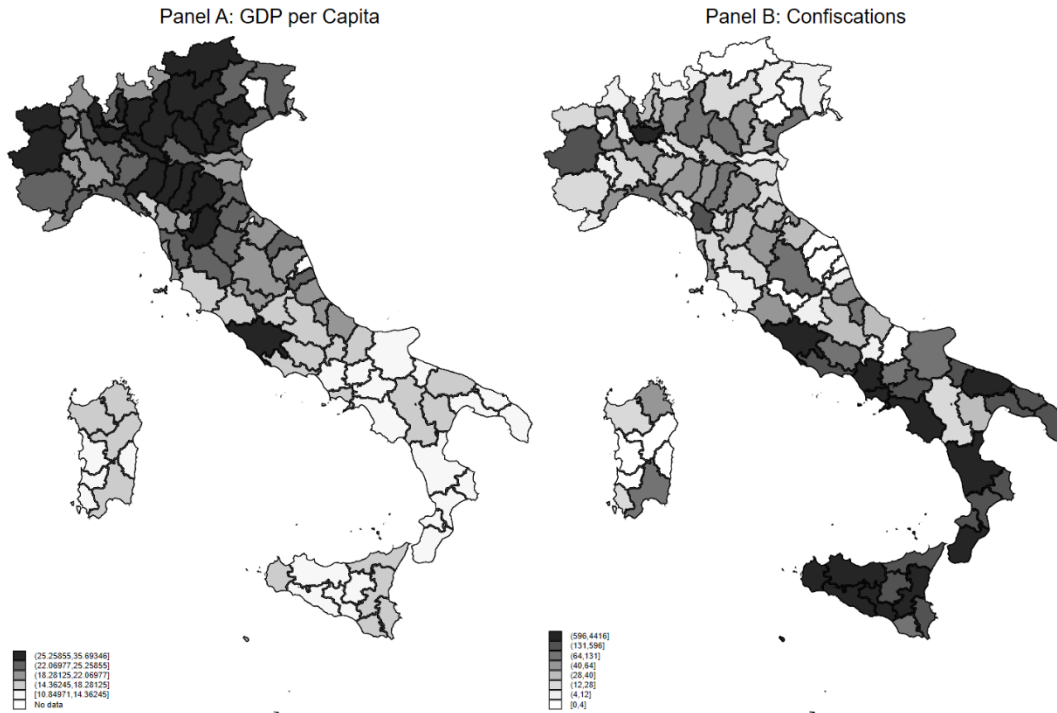
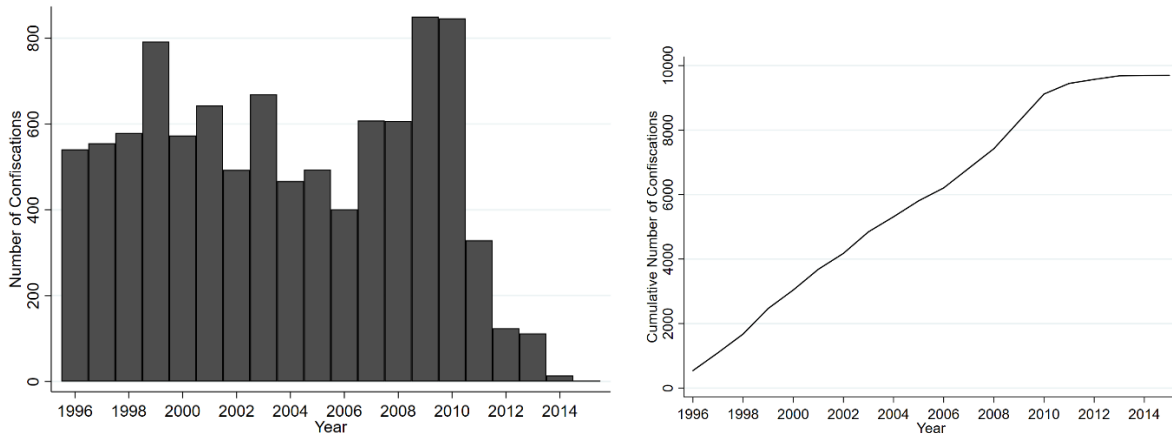


Figure 3

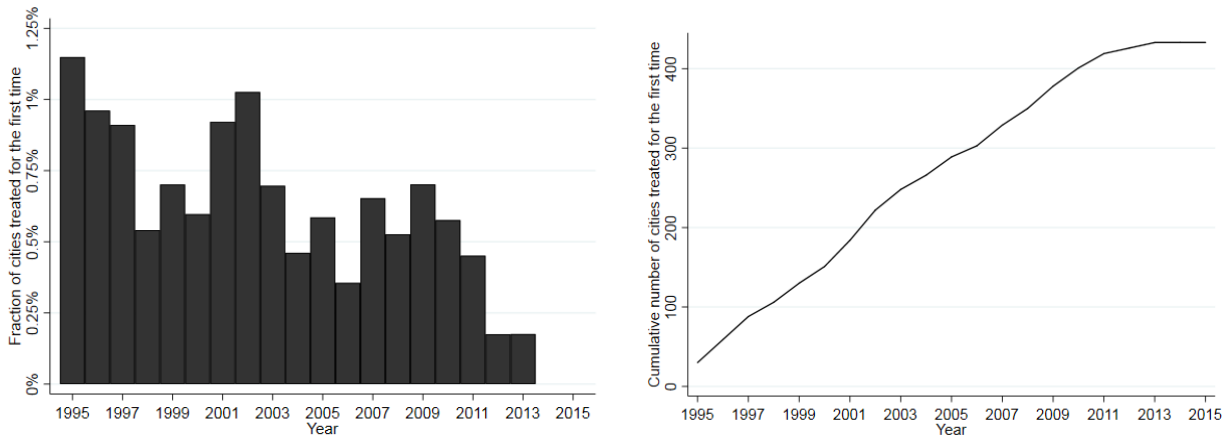
Asset confiscations, treated cities, and treated firms

This figure shows the number asset confiscations (Panel A), treated municipalities (Panel B), and treated firms (Panel C) over time. Panel A shows the number of confiscations per year (left) and the cumulative number of confiscations (right). Panels B and C show fraction of municipalities/firms treated for the first time (left) and the cumulative number of treated municipalities/firms (right). Data is obtained from ANBSC and 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

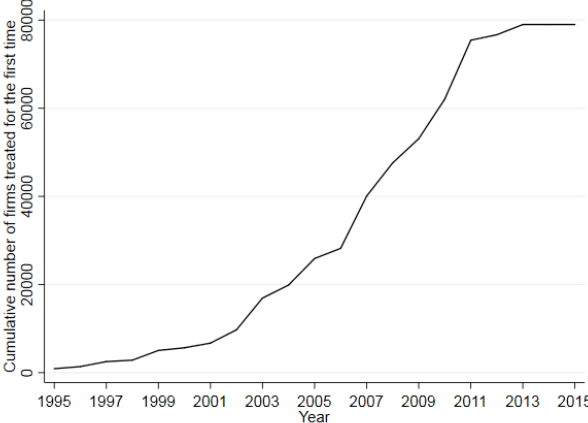
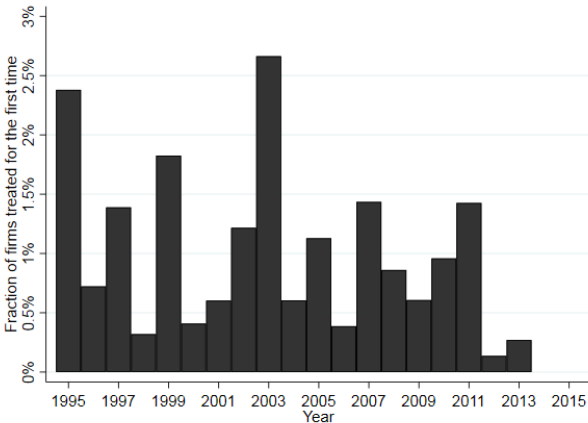


Figure 4

Key Dependent Variables around Anti-Mafia Enforcement Actions

This figure shows the evolution of the key left-hand side variables around anti-mafia enforcement actions. Variables of interest are *Revenue* (top left), *Total Assets* (top right), *Revenue per Employee* (bottom left), and *Return on Assets* (bottom right). Shown is 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.

