CHICAGO BOOTH

Anti-Mafia Police Actions, Criminal Firms, and Peer Firm Tax Avoidance

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ABSTRACT

Mafia firms introduce distortions in the markets in which they operate, increasing the cost of doing business for peer firms. We investigate whether peers respond by increasing their tax avoidance and thus increasing funds available to compete with the Mafia firms. Using a sample of Italian anti-Mafia police actions that resulted in the removal of Mafia firms and a difference-in-differences approach, we find that peers reduce their tax avoidance following these actions. We further show that, following anti-Mafia police actions, peer firms improve their performance and increase capital investment while enjoying a reduction in the cost of raw materials. Overall, our results highlight the microlevel channels through which Mafia can affect firm outcomes and local economies.

1. Introduction

Mafia organizations[1] suppress economic development in the geographic areas in which they operate, and governments worldwide invest massive amounts in fighting them. Europol reports that, in the European Union (EU), approximately 5,000 Mafia-like organized criminal groups were investigated, and seven out of 10 of these groups operated in more than one country.[2] Savona and Ricciardi [2015] estimate that these groups comprise an illegal market that is worth almost €110 billion, amounting to 1% of EU GDP. This problem is not unique to the European Union, as the US Federal Bureau of Investigation (FBI) defines the presence of transnational organized criminal groups as "the greatest threat to the national and economic security of the United States."[3]

Studies show that Mafia-affiliated firms have real consequences in the regions in which they operate. These include reduced quality of political governance (Pinotti [2013], Daniele and Geys [2015]), reduced electoral competition (De Feo and De Luca [2013]), increased corruption and reduced government efficiency (Godson and Williams [1998], Allum and Siebert [2003]), the misallocation of public funds (Barone and Narciso [2015], Fenizia and Saggio [2021]), restricted access to credit (Bonaccorsi di Patti [2009]), and reduced economic growth (Pinotti [2015]).

However, the impact of the Mafia on firm outcomes remains largely unexplored, and Pinotti [2015] has called for further studies examining how organized crime influences economic outcomes. In this paper, we examine how the presence of Mafia-connected firms affects the tax avoidance of peer firms.

We focus on tax avoidance because the few accounting studies analyzing the Mafia (Ravenda et al. [2018], Bianchi et al. [2022]) suggest that firms connected to it are mainly involved in money laundering and tax

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[1] Broadly speaking, a criminal organization can be defined as a group of persons who commit crimes. This definition includes terrorists, gangs, syndicates, and the Mafia. Mafia organizations refer to those organizations that, besides being involved in crimes, provide legal protections (Gambetta [1993]). In this respect, Paoli [2020] clarifies that Mafia organizations (e.g., American Cosa Nostra, Italian Cosa Nostra and 'Ndrangheta, Chinese triads, and Japanese yakuza) often provide governance services. To facilitate exposition, we consider Mafia, Mafia organizations, criminal organizations, and Mafia-like organized crime as synonymous.

[2] https://www.ilfattoquotidiano.it/longform/mafia-and-organized-crime-in-europe/map/

[3] https://www.fbi.gov/investigate/organized-crime

avoidance.[4] We conjecture that the presence of Mafia firms spills over to the tax avoidance of *peer* firms.

The literature (e.g., Arlacchi [1983]) suggests that firms connected to the Mafia affect their peers' businesses in several ways. First, criminal firms[5] secure preferential treatment in the granting of orders, contracts, and commercial outlets (Arlacchi [1983]). By using violence and intimidation, they attract customers and win public auctions more easily and cheaply than peers. Second, criminal firms enjoy lower costs (Ravenda, Argilés Bosch, and Valencia Silva [2015a], Arlacchi [1983]). They procure goods and services at favorable prices. They pay less for labor through tax evasion, nonpayment of overtime, and denial of trade union rights. They have access to illicit funds, freeing them from having to bear the cost of credit. Third, Mafia firms impose higher procurement costs on peers. These market distortions reduce peer firms' marginal returns on capital and disadvantage them within their industry.

According to Cai and Liu [2009], the presence of criminal firms and the distortions they cause can affect peers' incentives to avoid taxes in two opposing ways. On the one hand, the authors posit that lower marginal returns on capital reduce firms' incentives to avoid taxes. When marginal returns are lower, one dollar of saved tax will generate lower future profits. Consequently, we expect the presence of criminal firms to *reduce* peer firms' incentives to avoid taxes. On the other hand, Cai and Liu [2009] also argue that disadvantaged firms have *stronger* incentives to avoid taxes to have more funds with which to compete. From this perspective, the presence of criminal firms could induce peers to avoid taxes more. An assumption in these arguments is that all incremental tax avoidance is costly, and hence, when the incentives to avoid taxes change, tax avoidance by firms changes accordingly.[6] Therefore, whether and to what extent Mafia firms influence peer firm tax avoidance is an empirical question.

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[4] In early 2021, more than 1,000 officers of the Italian Guardia di Finanza, Carabinieri, and military were deployed during an action to counter Mafia-like organized crime groups, which ran a fraud scheme that involved a string of shell companies to avoid paying taxes on fuel. Italian authorities estimate that this fraud was worth almost EUR 1 billion (https://www.eurojust. europa.eu/action-counteritalian-fuel-tax-fraud-worth-almost-eur-1-billion). Similar police actions against other types of Mafia organizations occurred in other countries. The European Union Agency for Criminal Investigation (EUROJUST) reports all the joint actions against criminal organizations, documenting that, in the first six months of 2018, there were 14 police actions in Europe. For instance, on May 4, 2018, 57 people were arrested for a VAT carousel fraud case. The national authorities of Belgium, Spain, and Germany initiated investigations into an organized crime group involved in a largescale VAT fraud case that targeted numerous individuals and companies across Europe.

[5] We refer to Mafia firms as criminal firms.

[6] In other words, we expect that—in equilibrium—a company undertakes an optimal level of tax avoidance. The incremental tax avoidance undertaken by firms due to the presence of a Mafia firm necessarily entails some risk for firms because these activities are often in a legally gray area. An example is considering as tax deductible expenses unrelated to the firms' business.

To investigate our research question, we must overcome three main challenges: (1) identifying firms connected to Mafia, (2) addressing endogeneity problems due to the criminal organizations' choice to infiltrate specific firms, and (3) disentangling the effect of Mafia firms on peers beyond the effect that their presence has on the institutional environment of a given region.

To identify firms connected to Mafia, we use Italy as our research setting, as it allows us to run a quasi-natural experiment by exploiting anti-Mafia police actions that identify and remove criminal firms.[7] It is the only country with a law-defining association with Mafia organizations (Art. 416*bis* of the Penal Code). This characteristic is significant as other countries define organized crime less explicitly. This would prevent us from unambiguously identifying convictions linked to the Mafia. We identify Mafia firms by examining 54 anti-Mafia police actions and subsequent trials in Italy in the period 2005−2016. Court documents are used to identify persons convicted for being part of the Mafia. We identify their name, place, and date of birth in the database of the Italian Chamber of Commerce (*Telemaco*), which contains data on all Italian registered firms. We classify as Mafia firms those firms having at least one board member or shareholder who has been convicted of being connected to the Mafia, according to Art. 416*bis* of the Italian Penal Code.

Second, to mitigate endogeneity problems, we identify for each Mafia firm (1) the year in which it was targeted by the police, (2) its municipality, and (3) its industry. Then, to investigate the effect of the presence of criminal firms on the tax avoidance of peers, we employ a difference-in-differences approach. We compare, following an anti-Mafia police action, the change in tax avoidance of peers (i.e., companies in the same municipality and industry as the Mafia firm) with the change in tax avoidance of nonpeers (i.e., companies in the same municipality but in a different industry). The intuition is that peer firms (the treatment group) are affected by market distortions induced by the Mafia firm more than control firms. By comparing peers and nonpeers within the same municipality, our identification strategy allows us to identify the effect of the removal of a Mafia firm on peers' tax avoidance beyond the impact that the removal of the Mafia firm has on the institutional environment. Put differently, it allows us to wash out the effect of common confounding variables such as culture that research has found to be affected by the presence of the Mafia.

An example illustrates our research design. Imagine that company M is connected to Mafia because a shareholder has been convicted under Art. 416*bis* of the Italian Penal Code. Company M operates in industry Z and is headquartered in municipality X. Our research design compares the

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[7] Over five years, 2015–2019, in Italy—the birthplace of the Mafia—the police seized some €18 billion from Italy's three main Mafias ('Ndrangheta, Camorra, and Cosa Nostra), the equivalent to over 1% of Italian GDP (https://www.ansa.it/english/news/2019/12/23/18-bn-seized-from-mafia-in-5-yrs-1-of-italygdp_7a45672c-4a98-4e4b-9a98-0411f98f9a5b.html).

change in tax avoidance between all firms that operate in industry Z and municipality X (peers) and firms that operate in municipality X but in industries other than industry Z (nonpeers) before and after the police action. We use the year of the anti-Mafia action as the year of the shock. This is the year in which the connection to the Mafia organization is first disclosed to the public and when the connection to Mafia is removed because the Mafia firm is seized by the police.

Two characteristics of anti-Mafia police actions alleviate endogeneity concerns in our setting. First, actions against the Mafia are coordinated at the national level by the *Direzione Nazionale Antimafia e Antiterrorismo* (the national anti-Mafia prosecutors and judges pool) but initiated at the regional level by the *Direzione Distrettuale Antimafia e Antiterrorismo* (the regional anti-Mafia prosecutors and judges pool); therefore, it is unlikely that Mafia firms operating at the municipal level could foresee or influence an impending police action (Fraschini and Putaturo [2013]). Second, decisions on the curtailment of Mafia firms are made by regional courts.[8] As each region has many municipalities, it is unlikely that firms at the municipal level could influence regional courts.

Our Italian setting also brings challenges. In some areas of the country, the Mafia is so pervasive that it is difficult to distinguish non-Mafia firms from those classified as non-Mafia firms simply because they have not yet been identified by the police as Mafia firms. To overcome this challenge, we focus our analysis on Northern and Central Italy, where the presence of Mafia is far less pervasive (Gratteri and Nicaso [2007]). This research design choice is important because it would be difficult to learn something from the removal of a Mafia firm in a setting where many peer firms are likely to be connected to Mafia. Furthermore, the limited data available on Italian private firms do not allow us to compute measures of tax avoidance other than the GAAP effective tax rate (GAAP ETR). We acknowledge this as the main limitation of our study.[9]

Using this research design, we find an economically significant reduction in peer firms' tax avoidance following the removal of a Mafia firm. Specifically, following anti-Mafia police actions, peers' GAAP ETR increases by 1.02% relative to the control group. The total pre-tax income of Italian companies located in Central and Northern Italy in 2016 (the last year in our analysis) amounted to €353 billion. An increase in the effective tax rate of 1.02% implies that the Italian government would have been due €4.24 billion in additional taxes, equivalent to 0.23% of the 2016 Italian GDP.

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[8] The *Direzione Nazionale Antimafia e Antiterrorismo* comprises 26 local courts that have authority over Mafia-related crimes. There is one court per region, except for Sicily, Calabria, Campania, and Puglia.

[9] GAAP ETR is the ratio of tax expense to pre-tax income and reflects nonconforming tax avoidance. The tax literature (e.g., Dyreng et al. [2019]) often uses cash ETR as an alternative proxy for tax avoidance. As we do not have data on deferred tax liabilities and assets, we cannot follow this practice.

Our results are consistent with two nonmutually exclusive explanations. First, the presence of Mafia firms hurts other firms in the industry, and this increases peers' incentives to avoid taxes. As tax avoidance is costly and risky (Cai and Liu [2009], Wilson [2009], Rego and Wilson [2012]) when Mafia firms are removed, peers reduce their tax avoidance. Second, when a police action occurs in an industry, there is an increased perception of monitoring in that industry, which motivates firms to reduce activities that might be subject to regulatory penalties, such as tax avoidance.

To ascertain which of the above explanations dominates, we conduct two analyses. First, we examine whether the observed relation between anti-Mafia police actions and peer tax avoidance is stronger when the actions are undertaken by the *Guardia di Finanza* as opposed to other authorities. The *Guardia di Finanza* polices financial crimes. Hence, if an increased perception of enforcement drives our results, then we expect a stronger relation between anti-Mafia police actions and peer tax avoidance when the actions are undertaken by the *Guardia di Finanza*. The results from these tests show that there is no incremental reduction in peer firm tax avoidance following anti-Mafia police actions undertaken by *Guardia di Finanza* relative to actions undertaken by other authorities. This result suggests that it is unlikely that changes in peer firm perceptions of enforcement drive our results.

Second, we focus on police actions carried out by the *Guardia di Finanza* only and test for the differential effect on peer firm tax avoidance of police actions against Mafia firms versus those against non-Mafia firms. Specifically, if changes in peer firm perception of enforcement drive our results, then we do not expect the effect to be a function of the type of organization subject to the police action. Using a newly constructed, hand-collected database featuring information on actions carried out by the *Guardia di Finanza*, we document that the reduction in peer firm tax avoidance is present only when the police action targets Mafia firms, again suggesting that it is unlikely that changes in the perception of enforcement drive our results.

Finally, to further corroborate the idea that the reduction in peer firm tax avoidance is linked to the removal of a Mafia firm and the fact that peers are no longer disadvantaged, we document that, following such a removal, peers increase their operating profitability, reduce their costs of raw materials, and invest more in property, plant, and equipment.

Our study makes several contributions to the literature. First, we contribute to the emerging literature in accounting and finance investigating organized crime. Ravenda et al. [2018] and Bianchi et al. [2022] highlight the involvement of Mafia firms in tax avoidance, while Slutzky and Zeume [2020] focus on the effect of Mafia firms on peers and show that, following anti-Mafia enforcement actions, there is an increase in innovation and competition for public procurement contracts. Our paper, like the work of Ravenda et al. [2018] and Bianchi et al. [2022], focuses on tax avoidance but, in the spirit of Slutzky and Zeume [2020], investigates spillovers from

Mafia firms to peers' tax avoidance. We show how Mafia firms affect peers' economic outcomes: specifically, we highlight that Mafia money laundering represents just the tip of the iceberg of a much larger problem, as the tax spillovers we highlight have not been documented elsewhere.

Second, we add to the literature on corporate tax avoidance. Specifically, we show that market dislocations resulting from the presence of Mafia firms influence peers' tax avoidance. In doing so, we answer calls for further research on the determinants of corporate tax avoidance (Shackelford and Shevlin [2001], Hanlon and Heitzman [2010], Khan, Srinivasan, and Tan [2017]).

Third, we enrich the research on the consequences of organized crime. Similar to Colonnelli and Prem [2022], who find that crime and corruption hampers local economies, Pinotti [2015] shows that Mafia harms the economic development of the regions where it operates. Mirenda, Sauro, and Rizzica [2019] likewise find that Mafia infiltration damps local economic growth in the long run, and Moglie and Sorrenti [2020] examine the 2008 financial crisis and document the presence of investment by the Mafia in legitimate businesses. We add to this literature by investigating the microlevel channels through which crime affects the real economy, especially its impact on firm outcomes.

Fourth, we contribute to the literature on the impact of the fight against organized crime. Slutzky and Zeume [2020] and Calamunci and Drago [2020] study the impact of the judicial administration of Mafia firms, while Fenizia and Saggio [2021] focus on city council dismissals following Mafia infiltration. We show that police actions that target Mafia firms reduce the cost of doing business for peer firms. This reduction in costs reduces the incentives for peer firms to avoid taxes.

2. *Why do Mafia Firms Affect Peers' Tax Avoidance?*

The fundamental rule of investment is that the marginal benefits must exceed the marginal costs. The typical neoclassical theory of investment views the cost of investment as a function of the required return on capital and an adjustment for corporate taxes (Hall and Jorgenson [1967]). In this model, corporate taxes on profits increase the cost of investment, while tax credits and tax allowances reduce it. The benefits of tax avoidance are well-known: it increases after tax profit and cash flow while reducing tax liabilities (Rego and Wilson [2012]). However, tax avoidance attracts regulatory scrutiny, which is costly both in terms of resources and loss of reputation (Rego and Wilson [2012], Wilson [2009]). Therefore, we expect a company to choose the level of tax avoidance where the marginal benefits exceed the marginal costs. In this study, we conjecture that the presence of Mafia firms affects peers' marginal benefits of avoiding taxes and alters the amount of tax avoidance undertaken by peers.

Prior literature identifies several ways in which the presence of Mafia firms induces dislocations in markets, ultimately increasing the cost of

doing business for peer firms (Arlacchi [1983]). First, Mafia firms discourage competition by securing preferential treatment in the award of orders, contracts, and commercial outlets. In an anti-Mafia police operation carried out in 2015 against the 'Ndrangheta, Italian authorities discovered 29 people involved in a gambling business that, by using violence and intimidation, forced bars, restaurants and betting parlors to buy slot machines and services from a Mafia-connected firm. This connected company enjoyed higher revenues than its peers because customers were not free to choose their own supplier.

Second, Mafia firms enjoy a lower cost of inputs because they can procure goods and services at favorable prices and induce wage compression through the evasion of taxes, nonpayment of overtime, and denial of trade union rights (Ravenda, Argilés Bosch, and Valencia Silva [2015a]). Moreover, through usury, Mafia firms acquire property, plant, and equipment at a discount and have access to a large amount of illicit funds, freeing them from the usual costs of credit. Wiretaps from an anti-Mafia police action that occurred in Emilia Romagna (Northern Italy) in 2015 indicate that members of the 'Ndrangheta were colluding to transfer ceramic tile through Mafia firms, benefiting from low transportation costs and enabling Mafia firms to sell the end-product at a discount. In the same anti-Mafia police action, a construction firm connected to Mafia was found to have won many public contracts by quoting lower prices, thanks to its noncompliance with Italian labor laws. Finally, in Operazione Tibet, which took place in Lombardy (Northern Italy), it was discovered that a Mafia firm operating in the nautical sector acquired a yacht from a firm that could not repay a usury loan to another Mafia firm. The cost of the yacht was far below the market price.

Finally, Mafia firms can impose higher costs of inputs to peers, as demonstrated in an anti-Mafia action in Italy in 2018 that resulted in the imprisonment of 170 Mafiosi. Transcripts from the investigation reveal that a restaurant connected to the Mafia bought wine from a Mafia-owned winery located in Southern Italy. At a certain point, the restaurant started to force peers to buy wine from the same winery, and that winery charged them an above-market price.

The above examples highlight that Mafia firms reduce peer firms' expected returns on current and future investments and disadvantage peers within an industry. Cai and Liu [2009] posit that lower marginal returns on capital reduce firms' incentives to avoid taxes. This is because, in the presence of low marginal returns, one dollar of saved tax generates lower future profits, and this reduces the marginal benefit of tax avoidance. These arguments suggest that in the presence of the Mafia, peer firms are expected to adjust their equilibrium level of tax aggressiveness by *reducing* tax avoidance. Furthermore, as criminal firms seek rents from noncriminal firms through means such as extortion, firms manage their liquidity downward and increase their debt, shielding their assets to limit

their expropriation risk (Smith [2016]). From this perspective, we expect noncriminal peer firms to avoid income-increasing activities such as tax avoidance.

Conversely, Cai and Liu [2009] argue that disadvantaged firms within an industry have *stronger* incentives to avoid taxes because they require more investment to compete and survive. From this perspective, the presence of Mafia firms increases the marginal benefit of tax avoidance; hence, peers increase their tax aggressiveness in response to the presence of Mafia firms. Tax avoidance helps peer firms compensate for market dislocations arising from the presence of Mafia firms. As there are arguments for both an increase and a decrease in peer firms' tax avoidance in the presence of Mafia firms, we tackle this research question empirically.

3. Research Design, Data, and Sample

3.1 THE RESEARCH SETTING

In Italy, Mafia crime has been recognized and prosecuted by the judicial system since the early 1980s with the introduction of Penal Code Article 416*bis*. This article distinguishes Mafia organizations from other types of criminal organizations. It defines Mafia groups as criminal organizations that "exploit 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." After this law was enacted, the fight against the Mafia became more structured and systematic, prosecuting entire criminal organizations rather than single individuals. An interesting feature of the Italian judicial system is that it applies special treatment to the assets of subjects accused of involvement with Mafia organizations. Specifically, when a person is accused of Mafia involvement, a parallel investigation is undertaken to acquire information on the nature and amount of the subjects' assets suspected to be related to the Mafia activities. Assets, including firms owned and controlled by a subject accused of involvement with the Mafia, are sequestered as a preventive measure and may be confiscated after a court sentence is rendered.

Police operations against Mafia organizations have only recently been undertaken in Central and Northern Italy. Their frequency increased after 2009, when one of the largest actions against the 'Ndrangheta (Operazione Crimine-Infinito) unveiled a deeply rooted presence of the organization in Central and Northern Italy. This investigation marked a turning point in the prosecution of Mafias in traditionally uninfiltrated areas. Before then, Mafia crimes and infiltration in the legal economy were generally considered confined to Southern Italy. Following this police action, further police operations have targeted Mafia organizations in Central and Northern Italy.

3.2 THE IDENTIFICATION OF CRIMINAL FIRMS

We identify Mafia firms in our sample based on similar criteria to those used by Faccio [2006] to identify politically connected firms. Specifically, we define a firm as connected to Mafia if either a person convicted, because of Mafia connections, sits on the board of directors or is a shareholder of the firm. To retrieve such information, we rely on police operations and official court documents from trials conducted against the Mafia. We collect Mafia-related police and court filings in Central and Northern Italy from 2005 to 2016. We start in 2005 because this is the year when Mafia-related police operations and trials in Central and Northern Italy began to become more common. We use information on investigative and judicial operations from trusted sources, such as the reports of anti-Mafia commissions of the Italian Parliament, the Web sites of anti-Mafia organizations, the national press, and books addressing Mafia-related topics. Online appendix A lists the information sources used in this study, including the type of source, its name, and the relevant Web site (when available). These sources allow us to retrieve comprehensive information on 54 police operations carried out against the Mafia in Central and Northern Italy.[10] As we identify criminal firms as those companies connected to the Mafia through subjects who have been found guilty under Article 416*bis* in court trials, we omit police operations for which the first instance trial has not concluded.

Police operations are spread across our sample period, with 2012 and 2013 including the most police operations (12 each) and 2008 the fewest (one). We use information from these operations to gather data (full name, date and place of birth, address, and social security number) on all people convicted under Article 416*bis* of the Italian Penal Code. Individuals who were found innocent on appeal were excluded. Ultimately, our data set includes 1,567 individuals. Using the database *Telemaco*, which collects information on Italian firms from the Italian Chamber of Commerce, we identify all limited liability companies in which at least one convicted individual sits on the board of directors or is a shareholder. From this process, we identify 650 criminal firms.

3.3 THE RESEARCH DESIGN

To investigate the impact of Mafia firms on peers' tax avoidance, we exploit the dates on which police actions targeting Mafia firms happened. This allows us to employ a staggered difference-in-differences analysis. Specifically, these anti-Mafia police operations, which occurred at different points in time, unmasked and constrained the activities of firms connected to Mafia in different regions across Central and Northern Italy. For each Mafia firm detected by these operations, we identify the year in which it was targeted, the municipality, and the industry in which it operated. Next, we compare, within the same municipality and following the anti-Mafia action,

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[10] Online appendix B lists the names of the police operations examined in our analysis.

the change in tax avoidance of noncriminal firms in the same industry[11] (peers, the treatment group) to the change in tax avoidance of noncriminal firms in other industries (nonpeers, the control group). Thus, in our difference-in-differences design, the treatment group consists of peer firms operating in the same municipality and industry as the criminal firm, while the control group consists of firms operating in the same municipality but in a different industry. Our baseline model, suppressing year and firm subscripts, follows.

$$\text{Tax Avoidance} = \beta_0 + \beta_1 \text{Anti} - \text{Mafia Action} + \beta_2 \log(\text{Assets}) + \beta_3 \text{Debt/Equity} + \beta_4 \text{EBITDA/Assets} + \sum \beta_i \text{Fixed Effects} + \varepsilon. \quad (1)$$

The dependent variable, *Tax Avoidance*, measures tax avoidance using GAAP ETR, which is the ratio of tax expense to pre-tax income. This measure reflects nonconforming tax avoidance and captures the average rate of tax per euro of income. Observations with negative pre-tax income were dropped from the sample because, for these instances, GAAP ETR cannot be interpreted. To ensure a valid economic interpretation related to tax avoidance, such as Dyreng, Hanlon, and Maydew [2008] and Kubick et al. [2015], we constrain GAAP ETR to take a value between 0 and 1. Finally, to ease the interpretation of the results, we compute the dependent variable, *Tax Avoidance*, as GAAP ETR multiplied by minus one; thus, higher values indicate greater tax avoidance. *Anti-Mafia Action*, the variable of interest, is an indicator variable that takes the value of 1 following an anti-Mafia police action for peer firms (same industry and same municipality), and 0 otherwise.

Our identification strategy relies on a comprehensive set of fixed effects. We control for time-invariant firm characteristics by including firm fixed effects in equation (1). To ensure that β_1 does not capture time-varying shocks common to firms operating in a municipality (e.g., the dismissal of public elected officials; Fenizia [2018]) or in an industry, we interact year fixed effects with municipality and industry fixed effects and include them separately.[12] As firms are defined as peers and nonpeers with reference to their industry and both peers and nonpeers operate in the same municipality, we cannot use municipality by industry fixed effects in our specification.[13]

In addition to the previously discussed fixed-effect structure, we include three variables to control for time-varying factors: *log(Assets)*, defined as the natural logarithm of the firm's total assets, which controls for firm's size; *Debt/Equity*, computed as the ratio of total liabilities to equity, which

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[11] We define industries using the Italian industry two-digit classification code.

[12] As we want to control for time-varying shocks common to firms operating in the same industry within the same municipality, we define industry fixed effects at the level of the one-digit Ateco code, which macroclassifies Italian industries.

[13] We acknowledge that our fixed effect structure cannot control for industry–municipality time variant shocks that could differentially impact firms.

controls for firm's leverage; and *EBITDA/Assets*, defined as earnings before interest, taxes, depreciation and amortization standardized by total assets, which controls for firm's performance. All continuous variables are winsorized at the first and 99th percentiles, and standard errors are clustered at the municipality level. All data were sourced from the Aida database, available through the Bureau Van Dijk data platform. The appendix presents the definitions of the variables used.

Our research design seeks to address several challenges in identifying the effect of the presence of Mafia firms on peer firm tax avoidance. First, we ensure that variation in peer firm tax avoidance is not correlated with industry shocks, other than those created by the police operations that remove Mafia firms. The different timing, municipalities, and industries in which police operations occur mitigate this concern. For industry shocks other than those created by anti-Mafia police operations to drive our results, they must occur in the same years and municipalities as the anti-Mafia police operations—something that is unlikely. Second, our research design needs to address the possibility that peer groups are formed endogenously, which would impede distinguishing peer effects from selection effects (Feld and Zoltiz [2015]). In our setting, the peer group of an identified criminal firm is formed based on the industry and municipality in which the criminal firm operates. It is unlikely that a firm is established in a particular industry and municipality because of the presence of the criminal firm, as most firms in our peer group were established years before the actual criminal activity happened, and criminal firms do their utmost to mask their crimes to evade the police. Third, our research design needs to address the reflection problem, which suggests that it is impossible to distinguish the effect of peer firms on the criminal firm from the effect of the criminal firm on peer firms if both effects are determined simultaneously (Manski [1993], Angrist [2014]). Our setting allows us to address this problem for two reasons. First, the relation between the Mafia firm and peers affects these firms differently. While the Mafia firm commits multiple crimes, the peer firm merely avoids taxes, and our research design allows us to identify and measure these two distinct activities. Second, in our setting, the effect of peer firms on the Mafia firm cannot occur simultaneously (as suggested by the reflection problem) because the Mafia firm does not operate after the police operation. This is when changes in peer firm tax avoidance are observed. Finally, as we compare changes in tax avoidance between peer (treated) and nonpeer (control) firms that operate in the same municipality, we keep the institutional environment constant. Therefore, we document the effect of the presence of Mafia firms on peers' tax avoidance beyond the effect of Mafia firms on the institutional environment.[14]

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[14] To address the concern related to the presence of a potential sample selection bias in our sample where Mafia firms do not randomly pick an industry within a municipality, and the establishment of a noncriminal firm in an industry and municipality is dependent on the

Note that in our difference-in-differences analysis, we use the year in which the anti-Mafia police action led to a criminal charge for individuals accused of being connected to Mafia as the year of our shock. This is important because it implies that we use as a shock the year in which the information about the Mafia connection is publicly available for the first time. This is also the year in which assets (and firms) belonging to the Mafia are seized and therefore the year when the Mafia connection first ceases to provide benefits. Moreover, as for all 54 anti-Mafia actions used in this study, we have the official final judgment, we exclude from the analysis individuals found innocent on appeal. This reduces the possibility of identifying false positive criminal firms and results in a cleaner analysis. Online appendix D describes the structure of an anti-Mafia police action in Italy and notes the date of the shock used in this study.

3.4 DATA DESCRIPTION

To identify treated and control firms for Eq. (1), we start from the 650 Mafia firms identified as described in subsection 3.2. Next, to observe our sample for at least two years before and after the police operation, we consider only police operations undertaken from 2007 to 2014. All firms operating in municipalities affected by an anti-Mafia police operation from 2005 to 2006 and from 2015 to 2016 are excluded from the analysis. Finally, we omit companies operating in municipalities targeted by more than one operation over our sample period, as it is not possible to uniquely identify a pre- and postperiod in these instances.[15] These sample selection criteria, which are necessary to ensure a clean identification strategy, reduce our sample of criminal firms from 650 to 246.

Panel A of table 1 shows the geographic distribution of the 650 criminal firms initially identified. Most operate in Lombardy (38.0% of the sample), followed by Triveneto (17.1%) and Lazio (16.9%). Piedmont, Emilia-Romagna, and Tuscany also exhibit a nontrivial number of criminal firms, demonstrating the pervasiveness of organized crime in Central and Northern Italy. Panel B reports the geographical distribution for the 246 criminal firms that satisfy the above selection criteria and were used to implement the difference-in-differences analysis. Comparing the two panels indicates that while applying the above criteria significantly reduces our sample, the geographic distribution of criminal firms is maintained.

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presence of a criminal firm, we undertake a Heckman two-stage regression. In the first stage we draw on Bianchi et al. [2022] and run a binary selection model where the dependent variable is the presence of Mafia-connected firms, and the explanatory variables are firm-level characteristics correlated with the presence of Mafia-connected firms. We use the Inverse Mills Ratio from this regression in our baseline regression to check for the validity of the design. The results shown in online appendix C confirm the validity of the research design.

[15] In robustness tests, we examine whether our results are sensitive to these selection criteria. We obtain similar inferences to our baseline results when we include in our sample firms operating in municipalities targeted by multiple police actions during our sample period.

TABLE 1

Geographic and Industry Distribution of Criminal Firms

Panel A: Geographic distribution of criminal firms before sample selection

Region	N	%
Lombardy	247	38.0
Emilia-Romagna	39	6.0
Triveneto	111	17.1
Lazio	110	16.9
Tuscany	29	4.5
Abruzzo	8	1.2
Marche	1	0.2
Umbria	2	0.3
Piedmont	86	13.2
Liguria	17	2.6
	650	100

Panel B: Geographic distribution of criminal firms after sample selection criteria

Region	N	%
Lombardy	94	38.2
Emilia-Romagna	32	13.0
Triveneto	43	17.5
Lazio	11	4.5
Tuscany	24	9.8
Abruzzo	4	1.6
Marche	1	0.4
Umbria	2	0.8
Piedmont	26	10.6
Liguria	9	3.7
	246	100

Panel C: Industry distribution of criminal firms before sample selection criteria

Industry	N	%
Agriculture	5	0.8
Manufacturing	53	8.2
Electricity and Gas	7	1.1
Water and Waste Management	37	5.7
Construction	149	22.9
Wholesale and Retail	75	11.5
Transportation	34	5.2
Hospitality	24	3.7
IT firms	14	2.2
Financial firms	15	2.3
Real Estate	120	18.5
Professional activities	45	6.9
Leasing, Traveling and Service	34	5.2
Education	3	0.5
Healthcare	6	0.9
Sport and entertainment	24	3.7
Other services	5	0.8
	650	100

(*Continued*)

T A B L E 1—*(Continued)*

Panel D: Industry distribution of criminal firms after sample selection criteria

Industry	N	%
Agriculture	2	0.8
Manufacturing	25	10.2
Electricity and Gas	1	0.4
Water and Waste Management	5	2.0
Construction	66	26.8
Wholesale and Retail	37	15.0
Transportation	19	7.7
Hospitality	7	2.8
IT firms	2	0.8
Financial firms	1	0.4
Real Estate	45	18.3
Professional activities	14	5.7
Leasing, Traveling and Service	14	5.7
Healthcare	2	0.8
Sport and entertainment	5	2.0
Other services	1	0.4
	246	100

Panel A reports the geographic distribution of all firms connected to Mafia organizations identified in this study. Panel B reports the geographic distribution of firms connected to Mafia organizations used to identify peers and implement the difference-in-differences research design. Panel C reports the industry distribution of all firms connected to Mafia organizations identified in this study. Panel D reports the industry distribution of firms connected to Mafia organizations used to identify peers and implement the difference-in-differences research design.

Panel C shows the industry distribution of the initial sample of 650 criminal firms. As expected, the presence of firms connected to organized crime is more pronounced in certain industries, such as construction (22.9% of the sample) and real estate (18.5%); however, as the table shows, virtually all industries are infiltrated by the Mafia. Panel D reports the industry classification for the final sample of 246 criminal firms. As is evident from panel D, the distribution of criminal firms across industries is generally maintained in the final sample.

As previously discussed, our empirical analysis does not focus on the sample of criminal firms but uses this sample to identify municipalities and industries affected by anti-Mafia police actions. We define our treatment group as consisting of firms operating in the same municipality and industry as the criminal firm and our control group as consisting of firms operating in the same municipality but a different industry. Over the period 2005−2016, we identify 59,440 treated firm-year observations for 8,789 unique firms that operate in the same industry and same municipality as a criminal firm. The control group consists of 488,050 firm-year observations for 69,842 unique firms that operate in the same municipality but in different industries than the criminal firm. The treatment and control group observations add up to 547,490 observations for which we can estimate all variables in the baseline model[16], with the most (least) ob-

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[16] In constructing our sample, we drop 2,585 singleton observations.

TABLE 2

Sample Description

Panel A: Industry distribution of observations

Industry	N	%
Agriculture	4,463	0.82
Mining and Extraction	864	0.16
Manufacturing	90,791	16.58
Electricity and Gas	2,254	0.41
Water and Waste Management	2,998	0.55
Construction	60,840	11.11
Wholesale and Retail	112,585	20.56
Transportation	17,932	3.28
Hospitality	17,741	3.24
IT firms	32,891	6.01
Financial firms	9,054	1.65
Real Estate	90,905	16.60
Professional activities	51,825	9.47
Leasing, Traveling and Service	23,429	4.28
Public Administration	30	0.01
Education	5,388	0.98
Healthcare	11,029	2.01
Sport and entertainment	7,245	1.32
Other services	5,226	0.95
	547,490	100

Panel B: Descriptive statistics

	N	Mean	SD	25th	Median	75th
Tax Avoidance (ETR*−1)	547,490	−0.522	0.291	−0.757	−0.471	−0.333
Log(Assets)	547,490	6.629	1.544	5.556	6.549	7.617
Assets(/€000)	547,490	2,781	7,079	259	699	2,032
Debt/Equity	547,490	8.351	22.449	0.793	2.513	7.341
EBITDA/Assets	547,490	0.114	0.117	0.045	0.084	0.150

Panel C: Pearson correlation

	Tax Avoidance (ETR*−1)	Log(Assets)	Debt/Equity
Tax Avoidance (ETR*−1)	1		
Log(Assets)	−0.045***	1	
Debt/Equity	−0.189***	0.117***	1
EBITDA/Assets	0.166***	−0.273***	−0.159***

Panel A reports the distribution of firm-year observations used in the main analysis across industries (peer firms and nonpeer firms). Panel B reports the descriptive statistics for the main variables used in the analysis, while panel C reports Pearson correlation coefficients among the main variables. We provide a detailed description of the variables in the appendix. *** denote significance at the 1% level.

servations in 2015 (2005), representing 10.3% (5.7%) of the total sample. Table 2, panel A, shows the distribution of observations by industry. The industry with the most (least) observations is wholesale and retail (public administration), with 112,585 (30) observations, representing 20.56% (0.01%) of the sample.

Table 2, panel B, reports summary statistics for the variables used in Eq. (1). The average effective tax rate for the sampled companies is 52.2% (median 47.1%), which is consistent with Italian companies' relatively high tax burden (Chiarini, Marzano, and Schneider [2013]).[17] These values are consistent with the findings of Ravenda, Argilés Bosch, and Valencia Silva [2015b], who, for a sample period (2003−2012) that partially overlaps with ours, report a median ETR for lawful firms of 51.53%.[18] The mean (median) total assets for our sample is €2.8 million (€699,000). These values are consistent with the Italian setting, which is dominated by many small private companies. The average firm in our sample has a debt-to-equity ratio of 8.35 (median 2.51) and EBITDA scaled by assets of 11.4% (median 8.4%). The high leverage reported by sample firms is aligned with the typical capital structure of Italian firms, which is highly tilted toward the use of debt. Panel C presents the Pearson correlation matrix for the variables used in Eq. (1). The reported correlation coefficients do not suggest potential multicollinearity problems. We find that the correlation between firm size and tax avoidance is negative and significant, suggesting that larger firms pay relatively more tax, while the correlation between operating performance and tax avoidance is positive and significant, suggesting that better performing firms pay relatively less tax. Nonetheless, the correlation between operating performance and tax avoidance is spurious because GAAP ETR includes pre-tax income as the denominator, thus introducing a mechanical relation between the two variables.

4. Results

4.1 THE REMOVAL OF MAFIA FIRMS AND PEERS' TAX AVOIDANCE

Table 3 reports the results for the baseline specification, where we estimate the average effect of anti-Mafia actions on peer firm tax avoidance.[19] Column 1 shows the results obtained when only the variable *Anti-Mafia Action* and the fixed-effect structure are included in the regression model. In columns 2–4, we include one by one the control variables for the time-varying characteristics. Regardless of the model specification used, the coefficient on *Anti-Mafia Action* is always negative and statistically significant. Specifically, when we include all time-varying characteristics in our

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[17] Firms in Italy generally pay two types of taxes on their profits: corporate income tax (*Imposta sul reddito delle società* or IRES) and regional production tax (*Imposta regionale sulle attività produttive* or—IRAP). The former is set at the national level, while the latter is set at the regional level. Unlike IRES, IRAP is not charged on net income but is charged on the value of net production pursued within a specific region (OECD [2020]).

[18] Vide table 8 (variable *ETR*) of Ravenda et al. [2015b].

[19] As we restrict our analysis to those municipalities that have been hit only once by an anti-Mafia police action, and we define control and treated firms within each municipality, our research design implies that control observations are never treated throughout the sample period. Considering our fixed-effect structure, we are de facto implementing a clean stacked cohort design in the spirit of Baker et al. [2022] and Barrios [2021].

T A B L E 3

The Effect of the Removal of Criminal Firms on Peers' Tax Avoidance

	Tax Avoidance (ETR*−1)			
	(1)	(2)	(3)	(4)
Anti-Mafia Action	−0.0076**	−0.0080**	−0.0092***	−0.0102***
	[−2.426]	[−2.480]	[−2.835]	[−2.916]
Log(Assets)		−0.0401***	−0.0306***	−0.0222***
		[−21.843]	[−16.519]	[−10.838]
Debt/Equity			−0.0016***	−0.0015***
			[−37.012]	[−36.635]
EBITDA/Assets				0.4835***
				[36.227]
Firm fixed effects	Yes	Yes	Yes	Yes
Year × Municipality fixed effects	Yes	Yes	Yes	Yes
Year × Industry fixed effects	Yes	Yes	Yes	Yes
N	547,490	547,490	547,490	547,490
Adjusted R^2	0.526	0.529	0.535	0.550

This table reports the regression results for the effect of the removal of a criminal firm after an anti-Mafia police action on peer firms' tax avoidance. The dependent variable is *Tax Avoidance*, measured as minus 1 the firm's GAAP ETR. The variable *Anti-Mafia Action* takes the value of 1 for peer firms after an anti-Mafia police action, and 0 otherwise. Peer firms (treated group) are defined as those that operate in the same municipality and same two-digit industry as the criminal firm removed by the anti-Mafia police action. The control group is represented by all firms that operate in the *same* municipality as the criminal firm but in *different* two-digit industries than the criminal firm. We provide a detailed description of the variables in the appendix. We cluster standard errors at the municipality level and report *t*-statistics in brackets. *** and ** denote significance at the 1%, 5%, and 10% levels, respectively.

specification (column 4), the coefficient on *Anti-Mafia Action* is −0.0102 and significant at the 1% level. These results suggest that peer companies reduce their tax avoidance following anti-Mafia police actions. This result is not only statistically significant, but also economically relevant, as it implies that, following anti-Mafia police actions, peers' GAAP ETR increases by 1.02% relative to the control group. The total pre-tax income of Italian companies located in Central and Northern Italy in 2016 (the last year in our analysis) amounted to €353 billion. An additional 1.02% of effective tax rate implies that the Italian government would have been due €4.24 billion in additional taxes, equivalent to the 0.23% of the 2016 Italian GDP.

4.2 ASSESSING IDENTIFICATION ASSUMPTIONS

In this section, we assess the validity of the parallel-trends assumption underlying our identification strategy. A key assumption of our analysis is that peer and nonpeer firms would have had parallel trends of tax avoidance without anti-Mafia actions. The inclusion of firm-level fixed effects in our analyses precludes any time invariant differences across peers and nonpeers from affecting our results. However, concerns that changes in correlated omitted variables around anti-Mafia police actions affect peers and nonpeers differently remain. To address these concerns and check whether the parallel-trends assumption is reasonably valid in our setting, we undertake two analyses.
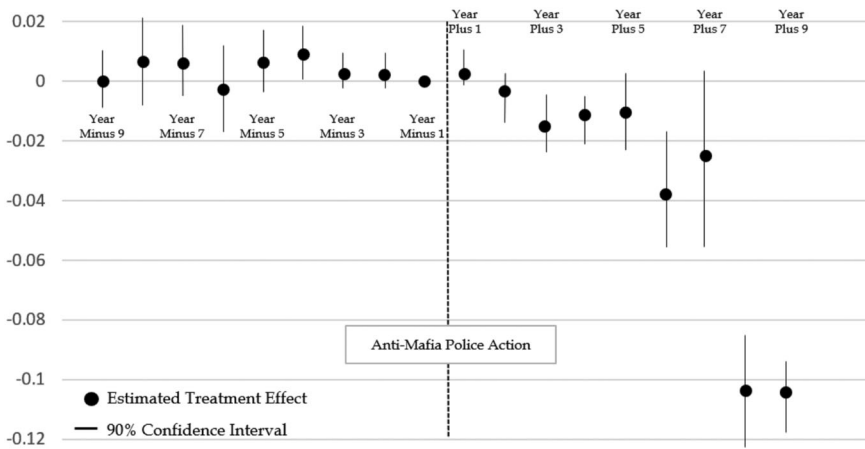
Fig 1.—Counterfactual treatment effect. This figure displays OLS regression coefficient estimates and two-tailed 90% confidence intervals based on standard errors clustered at the municipality level. The dependent variable is *Tax Avoidance*, and to map out the pattern in the counterfactual treatment effects, we include, in one regression, indicators for every year in the sample, except the year before the anti-Mafia police action that is used as the benchmark (i.e., the coefficient is constrained to equal 0). We provide a detailed description of the variables in the appendix

First, in the spirit of Bertrand, Duflo, and Mullainathan [2004], we compute the pre- and posttreatment average tax avoidance for each firm individually. Next, we compute the pre- versus post-difference in tax avoidance for each firm, and we classify observations between treatment and control firms. Finally, we run a two-sample t-test on those differences. The coefficient on the difference between the treated and control groups is negative, equal to -0.0147, and statistically significant (two-tailed t-test) at the 5% level. These findings are consistent with the parallel trends assumption, hence providing support for the results reported in table 3.

Second, we follow Christensen et al. [2017] and examine differences in the pre-police-action trends on our outcome variable across treated and control firms by mapping out counterfactual treatment effects over our sample period. Using OLS regressions, we map out these effects by replacing the single *Anti-Mafia Action* indicator variable with separate interactions between the *Anti-Mafia Action* indicator and indicators for each of the sample periods. Similar to Christensen et al. [2017], we exclude the indicator for the year immediately before the anti-Mafia police action, making it the benchmark period. We present these results in figure 1. As shown, the counterfactual treatment effects in the period before the anti-Mafia police action are small and largely indistinguishable from the benchmark period, which is consistent with the parallel trend assumption. The results in figure 1 also indicate that (as expected) the treatment effects do not occur

immediately, as the benefits of the removal of the criminal firm manifest themselves a few years after the anti-Mafia police action.[20]

5. Additional Analyses

5.1 INCREASED COST OF DOING BUSINESS VS. PERCEPTION OF INCREASED ENFORCEMENT

The results documented in table 3 are consistent with two nonmutually exclusive explanations. First, the presence of firms connected to the Mafia disadvantages peer firms, and this increases peers' incentives to avoid taxes to free up funds to better compete (Cai and Liu [2009]). The removal of the criminal firm reduces the incentives for peer firms to avoid taxes, which explains the reduction in GAAP ETR documented in the main analysis. Second, when a police action occurs, peer firms perceive enforcement to be more pervasive, and this motivates them to reduce activities, such as tax avoidance, that might be subject to scrutiny. In this section, we explore which of the two explanations dominates.

To disentangle these two channels, we exploit the specific responsibility of Guardia di Finanza to deal with financial crime, mainly tax evasion and smuggling. The Guardia di Finanza hosts the *Polizia Tributaria Investigativa* (Investigative Tax Police) and is part of the Italian Ministry of Economy and Finance. We run two sets of tests. First, we examine whether the observed relation between anti-Mafia police actions and peer firm tax avoidance is stronger when anti-Mafia police actions are undertaken by the *Guardia di Finanza* as opposed to other authorities. If the increased perception of enforcement drives our results, then we expect a stronger relation between anti-Mafia police actions and peer firm tax avoidance when the actions are undertaken by the *Guardia di Finanza*, as this authority is specifically responsible for financial crime.

To undertake this test, we determine whether the anti-Mafia police actions in our sample were undertaken by the *Guardia di Finanza* or another police authority. We create an indicator variable, *TaxAuthority*, which takes the value of 1 when the anti-Mafia police action is undertaken by the *Guardia di Finanza*, and 0 otherwise. We introduce this indicator variable in Eq. (1) and interact it with the variable *Anti-Mafia Action*. The interaction *Anti-Mafia Action * TaxAuthority* captures the incremental effect of anti-Mafia police actions undertaken by *Guardia di Finanza* on peer firm tax avoidance relative to anti-Mafia actions undertaken by other authorities.

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[20] Figure 1 suggests that the magnitude of our results mainly comes from later years. To investigate this, we estimate our main model by dropping the two anti-Mafia police actions that have a post-period of at least eight years and that therefore contribute to estimating the effect in the last years of our sample. Untabulated results show that when we drop these observations, we continue to find a statistically significant effect and the magnitude of the coefficient of interest moves from –0.0102 to –0.0103.

TABLE 4
Partitioning Based on the Type of Anti-Mafia Police Action

		Tax Avoidance (ETR*−1)
α_1	Anti-Mafia Action	−0.0097**
		[−2.528]
α_2	Anti-Mafia Action*TaxAuthority	−0.0040
		[−0.533]
F-test ($\alpha_{1+} \alpha_2 = 0$)		Coeff.: −0.0138
		p-Value = 0.038
Log(Assets)		−0.0222***
		[−10.835]
Debt/Equity		−0.0015***
		[−36.640]
EBITDA/Assets		0.4835***
		[36.229]
Firm fixed effects		Yes
Year × Municipality fixed effects		Yes
Year × Industry fixed effects		Yes
N		547,490
Adjusted R^2		0.550

This table reports the regression results for the effect of the removal of a criminal firm after an anti-Mafia police action on peer firms' tax avoidance, depending on whether the police action has been undertaken by the Italian tax authority (*Guardia di Finanza*). The dependent variable is *Tax Avoidance*, measured as minus 1 the firm's GAAP ETR. The variable *Anti-Mafia Action* takes the value of 1 for peer firms after an anti-Mafia police action, and 0 otherwise. The variable *TaxAuthority* takes the value of 1 if the police action has been undertaken by the *Guardia di Finanza*, and 0 otherwise. Peer firms (treated group) are defined as those firms that operate in the same municipality and same two-digit industry as the criminal firm removed by the anti-Mafia police action. The control group is represented by all firms that operate in the *same* municipality as the removed criminal firms but in two-digit industries other than that of the criminal firm. We provide a detailed description of the variables in the appendix. We cluster standard errors at the municipality level and report *t*-statistics in brackets. *** and ** denote significance at the 1%, 5%, and 10% levels, respectively.

Table 4 shows the results for this test. In line with our baseline results, the coefficient on *Anti-Mafia Action* (coeff.: −0.0097; *t*-stat.: −2.528) is negative and significant at the 5% level, suggesting a reduction in peer firm tax avoidance following anti-Mafia police actions. The coefficient on the interaction term *Anti-Mafia Action * TaxAuthority* is negative, albeit insignificant (coeff.: −0.0040; *t*-stat.: −0.533), suggesting no incremental effect on peer firm tax avoidance when anti-Mafia police actions are undertaken by *Guardia di Finanza*. An *F*-test on the joint significance of the coefficients on the main and the interaction terms suggests that the joint effect is negative and significant at the 5% level. Taken together, these results suggest that there is no incremental reduction in peer firm tax avoidance following anti-Mafia police actions undertaken by the tax authorities (*Guardia di Finanza*) relative to anti-Mafia police actions undertaken by other police authorities. This result indicates that it is unlikely that changes in peer firm perceptions of enforcement are driving our results.[21]

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[21] Notwithstanding the insignificant coefficient on the interaction term, this coefficient is approximately 40% of the coefficient on the main effect, hence care should be taken in interpreting this result.

Second, we test for the differential effect on peer firm tax avoidance between police actions carried out by the *Guardia di Finanza* against Mafia organizations and police actions carried out against non-Mafia criminals. Specifically, if changes in peer firms' perception of enforcement drive our results, then we do not expect the effect of police actions carried out by the *Guardia di Finanza* on peer firm tax avoidance to be a function of the type of organization subject to the action. Conversely, if the reduction in tax avoidance incentives following the removal of the criminal firm drives the decline in peer firm tax avoidance, then we expect a stronger effect for anti-Mafia police actions than for actions targeting non-Mafia firms. This test exploits new disclosures about police actions undertaken by *Guardia di Finanza.* Specifically, in recent years, the *Guardia di Finanza* started publishing news items on its web site[22] about each major action it undertakes. The earliest news items available are for 2015, so for this analysis, we collect information on police actions undertaken by the *Guardia di Finanza* for the period 2015−2017. We stop in 2017 to observe firms in the post-period. We manually collect news items from this period, examine them, and classify police actions into two groups. The first group consists of police actions undertaken by the *Guardia di Finanza* against Mafia organizations, while the second group consists of police actions undertaken by the *Guardia di Finanza* against non-Mafia organizations. Using this sample, we identify treated and control firms as explained in the main analysis and run Eq. (1) for the two types of police actions and compare the results. Given that the sample for this test includes police actions against both Mafia and non-Mafia firms, we replace the variable *Anti-Mafia Action* with the variable *Police Action.* The variable *Police Action* is defined similarly to *Anti-Mafia Action* but also accounts for police actions against non-Mafia organizations.[23]

Table 5 shows the results. Column 1 shows the results for police actions undertaken by the *Guardia di Finanza* against non-Mafia organizations, while column 2 shows the results for actions undertaken by the *Guardia di Finanza* against Mafia organizations. The coefficient on *Police Action* in both specifications is negative, although it is only significant in column 2, that is, for police actions undertaken by the *Guardia di Finanza* against Mafia organizations. The difference in coefficients between the two specifications is significant at the 10% level[24].

These results buttress those presented in table 4 and further support the reduction in tax avoidance incentives as the main driver for the

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[22] http://www.gdf.gov.it/stampa/ultime-notizie

[23] An assumption implicit in this test is that tax avoidance of Mafia peer firms is similar to the tax avoidance of non-Mafia peer firms. Untabulated results suggest that this assumption holds for our sample.

[24] The magnitude of the coefficient on the variable *Police Action* in table 5 is higher than the corresponding coefficient on variable *Anti-Mafia Action* in table 3. Nonetheless, the two results are not directly comparable because the sample period is different.

TABLE 5
Police Actions (Guardia di Finanza) Related and Unrelated to Mafia Organizations

	Tax Avoidance (ETR*−1)	
	(1)	(2)
	Police Actions Against Non-Mafia Organizations	Police Actions Against Mafia Organizations
Police Action	−0.0009	−0.0183**
	[−0.180]	[−2.718]
Log(Assets)	−0.0033***	−0.0027
	[−4.095]	[−0.881]
Debt/Equity	−0.0014***	−0.0014***
	[−26.188]	[−15.259]
EBITDA/Assets	0.4659***	0.4913***
	[17.366]	[26.557]
Firm fixed effects	Yes	Yes
Year × Municipality fixed effects	Yes	Yes
Year × Industry fixed effects	Yes	Yes
N	461,433	143,061
Adjusted R^2	0.632	0.634

This table presents the results for a test examining whether the relation between police actions and peer firm tax avoidance is a function of the type of firm targeted in the police action. For this analysis, we collect news items about police actions carried out by the *Guardia di Finanza* for the period 2015−2017 and classify police actions based on the type of firm subject to the police action. Column 1 shows the results for police actions in which the target firm is *unrelated* to Mafia, while column 2 shows the results for police actions in which the target firm is connected to a Mafia organization. In both columns, the dependent variable is *Tax Avoidance*, measured as minus 1 the firm's GAAP ETR. The variable *Police Action* takes the value of 1 for peer firms after the police action carried out by the *Guardia di Finanza*, and 0 otherwise. Peer firms (treated group) are defined as those firms that operate in the same municipality and same two-digit industry as the firm targeted by the police action. The control group is represented by all firms that operate in the *same* municipality as the targeted firm but in two-digit industries other than the industry of the targeted firm. We provide a detailed description of the variables in the appendix. We cluster standard errors at the municipality level and report *t*-statistics in brackets. *** and ** denote significance at the 1%, 5%, and 10% levels, respectively.

reduction in peer firm tax avoidance. Taken together, the results presented in tables 4 and 5 suggest that only police actions that target Mafia organizations prompt peer firms to reduce their tax avoidance.

5.2 ANTI-MAFIA POLICE ACTIONS AND PEER FIRM OPERATIONS

The results reported in subsections 4.1 and 5.1 are consistent with the intuition that the presence of Mafia firms disadvantages peers, increasing their incentives to avoid taxes. This suggests that Mafia firms impact the ability of peer firms to compete, either because it is more difficult for them to gain revenues or because their costs increase. To dig deeper into our results, in this section, we test the extent to which the removal of a Mafia firm affects peer firms' performance, costs, and investments. Indeed, to the extent that Mafia firms disadvantage peers, we expect that when the Mafia firm is removed, peers enjoy higher performance and increase their investments.

To this end, we substitute the dependent variable in Eq. (1), with (1) *Operating Performance*, measured as the firm's net income before depreciation,

T A B L E 6
Anti-Mafia Police Actions and Peer Firm Operations

	Operating Profit (1)	Raw Materials (2)	PPE Investments (3)
Anti-Mafia Action	0.0134**	−0.0091***	0.0650***
	[2.019]	[−2.873]	[2.829]
Log(Assets)	−0.0015	0.0431***	0.9447***
	[−1.023]	[31.078]	[90.256]
Debt/Equity	−0.0004***	0.0003***	−0.0022***
	[−13.985]	[14.321]	[−13.363]
EBITDA/Assets		−0.1309***	0.4092***
		[−15.520]	[13.788]
Firm fixed effects	Yes	Yes	Yes
Year × Municipality fixed effects	Yes	Yes	Yes
Year × Industry fixed effects	Yes	Yes	Yes
N	542,319	542,331	547,462
Adjusted R^2	0.687	0.873	0.908

This table reports results for tests examining the effect of anti-Mafia police actions on peer firm profitability, raw material costs, and investments in property, plant, and equipment. Columns 1, 2, and 3 show the results when we substitute *Tax Avoidance* in Eq. (1) with *Operating Profit*, *Raw Materials*, and *PPE Investments*, respectively. The variable *Anti-Mafia Action* takes the value of 1 for peer firms after an anti-Mafia police action, and 0 otherwise. Peer firms (treated group) are defined as those firms that operate in the same municipality and same two-digit industry as the criminal firm. The control group is represented by all firms that operate in the *same* municipality and industries other than the two-digit industry in which the criminal firm operates. We provide a detailed description of the variables in the appendix. We cluster standard errors at the municipality level and report *t*-statistics in brackets. *** and ** denote significance at the 1%, 5%, and 10% levels, respectively.

taxes, and extraordinary items (standardized by total revenues); (2) *Raw Materials*, measured as raw material expenses scaled by the cost of goods sold; and (3) *PPE Investments*, measured as the logarithmic transformation of property, plant, and equipment. The results are reported in table 6.

Column 1 of table 6 indicates that the coefficient on *Anti-Mafia Action* is positive and significant, suggesting improved peer firm performance following anti-Mafia police actions. Specifically, we find that the coefficient on *Anti-Mafia Action* is 0.0134 (*t*-stat.: 2.019) and significant at the 5% level. Column 2 provides evidence of a reduction in the cost of the inputs to the peer firms' production following the Anti-Mafia police action. The coefficient on *Anti-Mafia Action* is −0.0091 (*t*-stat.: −2.829) and significant at the 1% level. Finally, the results from column 3 suggest that the reduction of costs and improved performance incentivizes peer firms to increase their investments, as captured by investments in property, plant, and equipment. Specifically, when *PPE Investments* is the dependent variable, the coefficient on *Anti-Mafia Action* is 0.0650 (*t*-stat.: 2.829) and significant at the 1% level.

Overall, the results presented in table 6 suggest that following anti-Mafia police actions, peer firms exhibit an increase in operating performance, a reduction in the cost of raw materials, and an increase in investment in property, plant, and equipment.[25]

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[25] At this stage, we must reconcile the results in table 6 to those of Slutzky and Zeume [2020], who examine the effect of organized crime on competition. They find that, follow-

6. Robustness Tests

6.1 including municipalities with multiple anti-mafia actions

We perform a battery of tests to determine the robustness of our results. First, we test whether our results are sensitive to the inclusion of municipalities with multiple anti-Mafia police actions. As discussed in section 3, in our baseline analysis, we exclude municipalities in which multiple anti-Mafia police actions occurred, as it is impossible to cleanly identify a pre- and postperiod. Although dropping these observations results in a cleaner sample, it excludes a significant number of municipalities. For example, this criterion reduces the number of sampled municipalities in the Lazio region from 110 to 11.[26] We examine whether our results are sensitive to the exclusion of these municipalities by adding them back to our sample. For these municipalities, like D'Acunto, Weber, and Xie [2019], we define the pre-period (post-period) as the period before (after) the first anti-Mafia police action that occurred in the municipality during our sample period. Put differently, anti-Mafia police actions that occur after the first anti-Mafia police action are included as part of the post-period. Because this test also includes municipalities subject to multiple police actions, the sample for this analysis increases to 1,242,107 observations.

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ing anti-Mafia enforcement actions, there is an increase in competition and incumbent firms shrink in size and experience a decline in profitability. The authors conclude that these findings are consistent with the existence of criminal cartels, which create barriers to entry, and incumbent peer firms benefiting from the cartels. When police actions target and dismantle the cartels, peer firms experience a reduction in performance, as their operations are no longer protected by Mafia organizations. Like us, Slutzky and Zeume [2020] use the Italian setting, yet they examine police actions resulting in the confiscation of Mafia property throughout Italy. Given the significant variation in Mafia's presence across Italian regions, this difference in samples is key to the results of these studies. The Mafia's presence is much less pervasive in Central and Northern Italy, compared to Southern Italy. To put this into perspective, the sum of confiscations in the regions studied in our study (vide table 1 for the Italian regions included in our sample) represent only 24% of the confiscations included by Slutzky and Zeume [2020] (table I of Slutzky and Zeume [2020]), even though these regions represent over 66% of total gross product and 56% of the total Italian population. Put differently, the sample of Slutzky and Zeume [2020] is disproportionally weighted to regions in Southern Italy. The lower incidence of Mafia organizations in the regions sampled in our study makes it unlikely that Mafia organizations could enforce cartels that benefit all peer firms. In fact, our results show peer firms improve performance following anti-Mafia police actions. Our study complements the work of Slutzky and Zeume [2020] by showing the effect of anti-Mafia police actions on peer firms differs as a function of how pervasive Mafia activities are in the region in which such actions occur. Our results are consistent with those of Mete and Sciarrone [2017] and Storti and Sciarrone [2016], who differentiate Mafia activities in Southern Italy from other regions in which the Mafia operates. Pizzini-Gambetta [2002], Mete and Sciarrone [2017], and Storti and Sciarrone [2016] suggest that, in Southern Italy, Mafia is active in the business of private protection, thus regulating transactions on behalf of the State, while in Northern Italy, the Mafia provides illegal services to entrepreneurs willing to accept them to obtain a competitive advantage.

[26] See table 1 for details of how the sampling criteria influence the geographic distribution of observations in our sample.

TABLE 7
Including Municipalities with Multiple Operations

	Tax Avoidance (ETR*−1)			
	(1)	(2)	(3)	(4)
Anti-Mafia Action	−0.0104***	−0.0102***	−0.0115***	−0.0123***
	[−5.091]	[−4.993]	[−5.463]	[−5.603]
Log(Assets)		−0.0292***	−0.0220***	−0.0168***
		[−12.539]	[−9.785]	[−6.846]
Debt/Equity			−0.0012***	−0.0011***
			[−9.866]	[−11.075]
EBITDA/Assets				0.3739***
				[8.734]
Firm fixed effects	Yes	Yes	Yes	Yes
Year × Municipality fixed effects	Yes	Yes	Yes	Yes
Year × Industry fixed effects	Yes	Yes	Yes	Yes
N	1,242,107	1,242,107	1,242,107	1,242,107
Adjusted R^2	0.557	0.559	0.564	0.575

This table reports the regression results for the effect of the removal of a criminal firm after an anti-Mafia police action on peer firms' tax avoidance when included in the sample municipalities with multiple anti-Mafia actions over the sample period. The dependent variable is *Tax Avoidance*, measured as minus 1 the firm's GAAP ETR. The variable *Anti-Mafia Action* takes the value of 1 for peer firms after an anti-Mafia police action, and 0 otherwise. When more than one anti-Mafia police action is observed, we define the pre-period (post-period) as the period before (after) the first anti-Mafia police action that occurred in the municipality during our sample period. Peer firms (treated group) are defined as those firms that operate in the same municipality and same two-digit industry as the criminal firm removed by the anti-Mafia police action. The control group is represented by all firms that operate in the *same* municipality and industries other than the two-digit industry in which the criminal firm operates. We provide a detailed description of the variables in the appendix. We cluster standard errors at the municipality level and report *t*-statistics in brackets. *** denotes significance at the 1% level.

The results reported in table 7 show that when we run Eq. (1) for a sample including municipalities subject to multiple anti-Mafia police actions, the coefficient on *Anti-Mafia Action* remains negative and significant in all specifications. In the most comprehensive specification, column 4, the coefficient on the variable of interest is −1.23% (*t*-stat.: −5.603) and significant at the 1% level. These results suggest that the research design choice to drop municipalities subject to multiple anti-Mafia police actions does not drive our results.

6.2 LONG-RUN GAAP ETR AND LABOR MARKET QUALITY

As previously discussed, the limited data available on sample firms do not allow us to compute different proxies for tax avoidance. Indeed, we can only estimate GAAP ETR as a proxy of tax avoidance because, for instance, we do not have data on deferred tax liabilities and assets to compute cash ETR as commonly done in the tax literature (e.g., Dyreng, Hanlon, and Maydew [2019]). To test the sensitivity of our results to the measure of tax avoidance, in table 8 we estimate Eq. (1) using a long-run ETR measure. Dyreng, Hanlon, and Maydew [2008] show that annual ETR is not an accurate proxy of tax avoidance, as annual ETR measures might be cyclical and present asymmetric persistence. Ideally, we would like to compute the long-

T A B L E 8
Long-Term ETR and Labor Quality

	Tax Avoidance (Three Years) (1)	Wages (2)
Anti-Mafia Action	−0.0071**	−0.0006
	[−2.202]	[−0.244]
Log(Assets)	−0.0279***	−0.0173***
	[−16.323]	[−12.286]
Debt/Equity	−0.0012***	−0.0001***
	[−30.573]	[−6.264]
EBITDA/Assets	0.2422***	0.0328***
	[28.656]	[5.495]
Firm fixed effects	Yes	Yes
Year × Municipality fixed effects	Yes	Yes
Year × Industry fixed effects	Yes	Yes
N	478,821	547,473
Adjusted R^2	0.692	0.854

Column 1 reports the regression results for the effect of the removal of a criminal firm after an anti-Mafia police action on peer firms tax avoidance using the three-year GAAP ETR (multiplied by minus 1) as the dependent variable. Column 2 reports the regression results for the effect of the anti-Mafia police action on peer firms' labor costs, computed as the ratio of wages and salaries to total assets. The variable anti-Mafia Action takes the value of 1 for peer firms after an anti-Mafia police action, and 0 otherwise. Peer firms (treated group) are defined as those firms that operate in the same municipality and same two-digit industry as the criminal firm removed by the anti-Mafia police action. The control group is represented by all firms that operate in the *same* municipality and industries other than the two-digit industry in which the criminal firm operates. We provide a detailed description of the variables in the appendix. We cluster standard errors at the municipality level and report *t*-statistics in brackets. *** and ** denote significance at the 1%, 5%, and 10% levels, respectively.

run ETR over a period of five to 10 years, but we do not have a sufficiently long time series. Therefore, we compute our measure of long-run GAAP ETR over a period of three years. Doing so significantly reduces the sample size but allows us to document the robustness of our results to different proxies of tax avoidance. The results are reported in column 1 of table 8 and are consistent with those shown in our baseline model.

Next, we consider a possible alternative explanation that is consistent with our results, namely, the fact that the presence of organized crime may reduce labor market quality at the industry–municipality level. In other words, the presence of criminal firms might be known by the local workforce, and potential employees might be reluctant to work in the industry where criminal firms operate. Labor market considerations may thus affect the tax avoidance of peer firms. This alternative explanation requires a very strong assumption, namely, that the presence of a Mafia firm is known by the local workforce. Our setting, and specifically the decision to focus on Northern and Central Italy, greatly reduces this concern because it is highly unlikely that, in these regions, the presence of a firm connected to the Mafia is known by third parties (to the extent that it can affect labor market decisions). Nonetheless, we have empirically explored this possibility by using the ratio of wages and salaries to total assets as a proxy for the

quality of the labor force.[27] To the extent that the presence of a Mafia firm affects the quality of the labor market, we should observe a change in this ratio after the removal of the criminal firm. The results reported in column 2 of table 8 indicate no changes in the ratio of wages and salaries to total assets following anti-Mafia police actions and thus are inconsistent with this alternative explanation.

6.3 INVESTMENTS IN PROPERTY, PLANT, AND EQUIPMENT

In table 6, we show that after an anti-Mafia police action, peers increase their investments in property, plant, and equipment. A potential concern in interpreting these results relates to the fact that, following the removal of a criminal firm, peer firms might invest in property, plant, and equipment in a tax-disadvantageous manner (i.e., in a way that will increase GAAP ETR). This would be consistent with findings in table 6, but it would call into question whether the reduction in tax avoidance incentives following the anti-Mafia police action drives our results. To address this concern, we replicate the results in column 3 of table 6 by partitioning the sample between peers that increased investment in property, plant, and equipment after the anti-Mafia police action and those that did not. The results reported in table 9 suggest that even peer firms that did not increase their investment in property, plant, and equipment reduced their tax avoidance following anti-Mafia police actions, and the difference between the two coefficients is not statistically significant at conventional levels. Therefore, it is unlikely that our results are driven by tax-disadvantageous investments following anti-Mafia police actions.

6.4 REDUCED PERFORMANCE OF THE CONTROL GROUP

Column 1 of table 6 shows that after anti-Mafia police actions, peer firms enjoy higher operating performance, and we interpret this result as evidence that once the Mafia firm is removed, peers no longer suffer from market dislocations and thus show higher performance. However, a potential concern is that this result is driven by a reduction in performance of the control group and not by improved performance of the treatment group. Specifically, the concern is that the removal of a Mafia firm might have increased the procurement costs of control group firms that were previously customers of the Mafia firm and had received favorable prices from the Mafia firm. To check whether this explains our results, we run an analysis similar to that discussed in subsection 4.2. Specifically, we compute the pre- and posttreatment average operating performance (defined as in table 6) for each firm individually. Next, we compute the pre- versus post-difference in operating performance for each firm. Finally, we run a two-sample *t*-test on those differences. The results are reported in table 10 and confirm that

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[27] Results are qualitatively similar if we use unscaled wages and salaries to proxy for the quality of the labor force.

TABLE 9

Peer Firm Tax Avoidance and Changes in Property, Plant, and Equipment

	Tax Avoidance (ETR*−1)	
	Change in PPE > 0	Change in PPE ≤ 0
	(1)	(2)
Anti-Mafia Action	−0.0098*	−0.0106**
	[−1.888]	[−2.413]
Log(Assets)	−0.0064***	−0.0314***
	[−3.342]	[−11.248]
Debt/Equity	−0.0016***	−0.0014***
	[−25.291]	[−24.207]
EBITDA/Assets	0.5614***	0.4282***
	[37.754]	[30.909]
Firm fixed effects	Yes	Yes
Year × Municipality fixed effects	Yes	Yes
Year × Industry fixed effects	Yes	Yes
N	261,966	285,512
Adjusted R^2	0.541	0.562

This table reports the regression results for the effect of the anti-Mafia police action on peer firms' tax avoidance, partitioning the sample based on whether peers increased (column 1) or not (column 2) their amount of property, plant, and equipment (PPE). The dependent variable is *Tax Avoidance*, measured as minus 1 the firm's GAAP ETR. The variable *Anti-Mafia Action* takes the value of 1 for peer firms after an anti-Mafia police action, and 0 otherwise. Peer firms (treated group) are defined as those firms that operate in the same municipality and same two-digit industry as the criminal firm removed by the anti-Mafia police action. The control group is represented by all firms that operate in the *same* municipality and industries other than the two-digit industry in which the criminal firm operates. We provide a detailed description of the variables in the appendix. We cluster standard errors at the municipality level and report *t*-statistics in brackets. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

TABLE 10

Firm-Specific Changes in Performance in the Post- Versus Preperiod

	Average Operating performance in the Post-Period minus Average Operating performance in the Pre-Period
[A] Treated group (Peers)	0.0173
[B] Control group (Nonpeers)	0.0031
Difference [A] − [B]	0.0142
t-Statistic (two-tailed)	5.0605

This table shows the average difference between treatment and control firms' operating performance, where the difference is calculated as the post- versus pre-difference in operating performance for each firm in the sample. Specifically, we compute the pre- and posttreatment average operating performance for each firm individually. Next, we differentiate these values, and we obtain the pre- versus post-difference in operating performance for each firm. Finally, we run a two-sample *t*-test on those differences. We provide a detailed description of the variables in the appendix.

treated firms significantly increase their performance after the anti-Mafia police action and are inconsistent with the notion that our baseline results are driven by a reduction in the performance of the control group.

6.5 SMALL VERSUS LARGE INDUSTRY–MUNICIPALITY PAIRS

In this section, we investigate whether the results documented in this study are stronger in industry–municipality pairs characterized by a small

TABLE 11
Large Versus Small Municipality–Industry Pairs

	Tax Avoidance (ETR*−1)
Anti-Mafia Action	−0.0162***
	[−2.718]
Anti-Mafia Action*Many_Firms	0.0142*
	[1.924]
Controls	Yes
Controls*Many_Firms	Yes
Firm fixed effects	Yes
Year × Municipality fixed effects	Yes
Year × Industry fixed effects	Yes
N	547,490
Adjusted R^2	0.551

This table reports the regression results for the effect of the anti-Mafia police action on peer firms' tax avoidance, partitioning the sample based on the size of the industry–municipality. *Many_Firms* is a dummy variable that takes the value of 1 if the number of firms in the industry–municipality combination is above the sample median, and 0 otherwise. We define the dummy variable using data at the beginning of our sample period (in 2005), thus before any anti-Mafia police action in our sample. We cluster standard errors at the municipality level and report *t*-statistics in brackets. *** and * denote significance at the 1% and 10% levels, respectively. We provide a detailed description of the variables in the appendix.

number of firms. We expect Mafia firms to be less able to increase the cost of doing business for peer firms, for example, by raising peers' procurement costs, in municipalities that have many firms in that industry. To this aim, we compute the number of firms in each industry–municipality combination and define a dummy variable (*Many_Firms*) that takes the value of 1 if the number of firms in the industry–municipality combination is above the sample median, and 0 otherwise. For consistency, the dummy variable is defined at the beginning of our sample period (in 2005), thus before any anti-Mafia police action in our sample. Next, we interact this dummy variable with our variable of interest *Anti-Mafia Action* (and all other variables included in the model) and tabulate the results in table 11. The results for this analysis show that the effect of anti-Mafia police actions on peer firm tax avoidance is concentrated in industry–municipalities with a low number of firms, and the results become weaker as the number of firms in the industry increases.

7. Conclusion

We examine the effect of the presence of Mafia firms on peer firms' tax avoidance. The literature suggests that firms connected to Mafia organizations secure preferential treatment in the granting of orders, contracts, and commercial outlets and enjoy lower costs of inputs with respect to peers (Ravenda, Argilés Bosch, and Valencia Silva [2015a], Arlacchi [1983]). Moreover, anecdotes suggest that Mafia firms raise peers' procurement

costs. Through these channels, Mafia firms gain a competitive advantage at the expense of peers.

Using anti-Mafia police actions from 2005 to 2016 and the consequent removal of criminal firms in a staggered difference-in-differences research design, we find that peer firms reduce their tax avoidance following anti-Mafia police actions. These results are consistent with Cai and Liu [2009], who argue that firms in a relatively disadvantageous position within an industry have stronger incentives to avoid taxes to have more investment money with which to compete.

In further analyses, we examine whether the reduction in the cost of doing business or the perception of increased enforcement drives our results. We find that the observed effect is irrespective of the police authority that conducts the anti-Mafia police action but is limited to police actions targeting Mafia organizations. In other analyses, we explore changes in peer firms' operations following anti-Mafia police actions and find that peers exhibit improved performance, increased investment in property, plant, and equipment, and reduced raw material expenses. Taken together, these results suggest that the reduction in the cost of doing business following anti-Mafia police actions drives our results.

Due to inherent limitations in data availability, our results should be interpreted with the following caveats. First, we only measure the outcome of tax avoidance proxied by the effective tax rate. Limitations of the GAAP ETR include that it might capture variation due to factors unrelated to tax avoidance (e.g., changes in pre-tax income); it misses relevant variation in the deferral of tax payments; and it does not capture tax avoidance resulting from artificially lowering taxable profits (i.e., pre-tax income; Hanlon and Heitzman [2010]). In addition, due to data constraints, we cannot observe transactions that lead to changes in the amount of tax paid. Second, given that our sample is solely composed of private firms, we cannot speak to the effect of organized crime on public firms. Notwithstanding these limitations, our study identifies a new channel through which organized crime imposes social costs and introduces distortions in the legal economy. In doing so, we highlight the microlevel channels through which Mafia organizations affect firm-level outcomes.

APPENDIX

Variable Definitions

This appendix lists and defines the variables used in the analyses presented in the study and in the online appendix.

Variable Name	Variable Definition
Anti-Mafia Action	Dummy variable equal to 1 for peer firms after an anti-Mafia police action, 0 otherwise. The anti-Mafia police actions considered are those reported in online appendix B. Peer firms (treated group) are defined as those firms that operate in the same municipality and same two-digit industry as the criminal firm removed by the anti-Mafia police action. The control group is represented by all firms that operate in the same municipality than the removed criminal firms but in other two-digit industries with respect to the criminal firm.
Cash	Total cash and marketable securities divided by total assets
Cogs	Cost of goods sold divided by total assets
Debt	Total financial debt divided by total assets
Debt/Equity	Total liabilities divided by equity
EBITDA/Assets	Earnings before interests, taxes, depreciation, and amortization divided by total assets
Interest	Reported interest expense divided by total assets
Inventory Period	Natural logarithm of inventory period in year t.
Log(Assets)	Logarithm of the firm's total assets
Many_Firms	Dummy variable that takes the value of 1 if the number of firms in the industry–municipality combination is above the sample median, 0 otherwise. We define the dummy variable using data at the beginning of our sample period (in 2005), thus before any anti-Mafia police action in our sample.
Operating Profit	Net income before depreciation, amortization, taxes and extraordinary items, standardized by total revenues
Police Action	Dummy variable that takes the value of 1 for peer firms after a police action carried out by the *Guardia di Finanza*, 0 otherwise. Peer firms (treated group) are defined as those firms that operate in the same municipality and same two-digit industry as the firm targeted by the police action. The control group is represented by all firms that operate in the same municipality than the targeted firm but in other two-digit industries with respect to the targeted firm.
PPE Investments	Logarithmic transformation of property, plant, and equipment.
Raw Materials	Costs for raw materials scaled by the cost of goods sold.
Roa	Return on assets measured as income before taxes divided by total assets.
Sales	Sales revenue divided by total assets.
TaxAuthority	Dummy variable that takes the value of 1 if the anti-Mafia police action has been undertaken by the *Guardia di Finanza*, 0 otherwise.
Tax Avoidance	Total income tax expense divided by pre-tax book income (GAAP ETR) multiplied by −1. The variable is bounded between 0 and −1.
Tax Avoidance (3-year)	Average value of the variable *Tax Avoidance* over years t, $t-1$, and $t-2$.
Wages	Salaries and wages divided by total assets

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