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"ORGANIZED CRIME AND FIRM PERFORMANCE IN THE ITALIAN LANDSCAPE"

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Abstract

La criminalità organizzata, in particolare di tipo mafioso, è il tema delle seguenti pagine. Specificamente, viene studiato l'effetto della criminalità organizzata di tipo mafioso sulla performance d'impresa nel panorama italiano odierno. L'elaborato si apre con una breve introduzione, e prosegue con una revisione della letteratura sul tema della criminalità organizzata di tipo mafioso: la sua origine storica nel Sud Italia, alcuni sviluppi rilevanti quali la sua espansione nazionale ed internazionale, l'evoluzione delle sue modalità organizzative -da gerarchiche e più decentrate- ed operative -sempre più simili a grandi organizzazioni multinazionali-, quali attività predilige sia nell'ambito illegale che illegale. La mafia, infatti, non opera solamente attraverso estorsioni, omicidi, riciclaggio di denaro e altri modus operandi violenti ed esplicitamente illegali, ma si espande nel paese navigando l'economia legale, ad esempio spingendo imprese a riciclare denaro per essa, o ad acquisire materie prime e accettare incarichi da determinate figure, reinvestendo proventi illeciti e "ripuliti" nell'economia legale, e perfino appropriandosi di aiuti statali rivolti a zone del paese in difficoltà economica. Ciò che più emerge da analisi territoriali dell'espansione mafiosa è che, oggigiorno, la mafia è un problema che riguarda tutta la penisola, da Nord a Sud, anche se diverse zone sono influenzate in differenti modi, e con differenti intensità.

Dopo questa sezione di revisione della letteratura, procederemo con la costruzione di un indicatore di presenza mafiosa sul territorio italiano a livello provinciale attraverso la misurazione di alcuni crimini correlati alle organizzazioni criminali in esame, pesati sull'estensione provinciale a cui fanno riferimento. Successivamente, questo indicatore della presenza di criminalità organizzata di tipo mafioso sarà utilizzato nello svolgimento di un esercizio empirico volto a valutare l'effetto della presenza mafiosa sulla crescita della produttività del lavoro a livello d'impresa, nel periodo 2010-2018. Tale analisi, dapprima rivolta ad un campione di oltre 46.000 imprese manifatturiere italiane, si concentrerà su diverse regioni geografiche, per comprendere se l'impatto sia più significativo per determinate zone del paese. Infine, l'analisi sarà rivolta alla dimensione d'impresa, per comprendere qualora imprese più piccole soffrano maggiormente per la presenza di organizzazioni criminali rispetto alle loro controparti medio-grandi, come suggerito dalla letteratura.

I risultati mostrano un effetto negativo e significativo della criminalità organizzata sulla crescita della produttività del lavoro per imprese manifatturiere italiane. L'intensità e la significatività di questo effetto si rafforzano per micro e piccole imprese, e per imprese nel Nord del paese. Le piccole imprese hanno infatti meno risorse a disposizione per fronteggiare i maggiori costi derivanti dalla presenza di attività mafiosa, mentre invece la natura più economica del fenomeno mafioso si manifesta con maggior forza nelle zone settentrionali del paese, rispetto a quelle meridionali, dove ancora mantiene una presa relativamente minore sull'economia manifatturiera.

1. Introduction

Talking about organized crime requires a short digression on crime as a more general phenomenon. In English, the term "crime" entails both the less severe "delitto" and the graver "crimine", meaning any kind of behavior punishable by law. Economists, among other social scientists, have studied its economic effects mostly from a macroeconomic perspective, showing how heavy the effects of illicit activities are on a country's economic wellbeing. Italy has been characterized by a situation of geographic economic disparity, namely the North-South divide, for quite a long time. Such disparity is present despite a relatively homogeneous panorama from the religious standpoint, the same institutions and laws, school system and justice system. Historically, the South has been ridden with the issue of criminal organizations, and often it has been a quick and easy solution to point the finger towards this issue to explain the Southern regions' lag. As Falcone (1982) points out, especially in more remote years, it was not uncommon to believe that *mafia* was just a "certain kind of disposition, a non-tangible entity, founded on values such as friendship, local traditions and the concept of family" which determined the Southern situation. History has proved how tangible and detrimental to individual and social welfare *mafia* is, even for regions in the North.

From an economic point of view, crime both organized, and not discourages foreign and domestic investments. Eight Southern regions, among the least developed ones of the country, received less than one percent of total Foreign Direct Investments (FDI) in the period 2005-2007 (Daniele and Marani, 2008). Crime also increases uncertainty and inefficiency, reallocates resources, and reduces fair competition among firms, thus worsening the overall business climate and discouraging economic initiative. Marini and Turato (2002) asked a panel of North-Eastern Italian businessmen if they considered the presence of criminal activity a decisive factor to consider when investing in Southern Italy, and about 92% of those interested in internationalization answered that it would constitute the primary blocking factor.

Crime is also linked to the job market, as unemployment reduces the opportunity cost of committing a crime, therefore increasing the likelihood that someone will choose to infringe the law. Many academic works examine this relationship, and a notable one is *Disadvantaged Young Men and Crime* by Freeman (2000), showing how incarceration rates in the USA have increased over the years, without a corresponding decrease in the number of crimes committed. He argues that the rise in crime rates should be pinned on the lack of job opportunities, the growing real salary disparity between the educated (skilled workforce) and the least educated (unskilled workforce), therefore tracing a causal relationship between unemployment and the choice to act against the law. The literature, overall, points to a positive relationship between unemployment and crime. Such relationship is observable

in Italy as well. At province level, for example, unemployment is positively and significantly correlated with crimes such as extortions -also highly correlated with the presence of *mafia* type crimes-, homicides, and attacks. While there is a lower incidence of theft in areas ridden with *mafia* activity (Daniele, 2009).

Overall, crime is a brake on economic growth, affecting the economy through many different channels, and producing long lasting negative effects. It acts as a tax on the entire economy: lower investment, higher uncertainty and inefficiency, unfair competition, resource misallocation and higher costs are some of its effects. Detotto and Otranto (2010) underline how these negative repercussions are stronger when the business cycle enters its negative phases, showing that crime's effect on Italian economic performance becomes 5% stronger during recessions.

Organized crime is what this dissertation focuses on. It is a specific type of criminal activity, where those who participate in it adhere to a stable and structured organization with its own set of rules, internal mechanisms, and hierarchy. There is a shared common objective, which is usually financial or material gain, but it could also be of political, social or ideological origin, as is typical of terroristic criminal organizations. In Italy, organized crime is embodied by *mafia*, which finds its roots in post-war Sicily, where small congregations held together by omertà and honor codes were born. Leonardo Sciascia aptly described it, saying that "The most essential and complete definition one could give of *mafia*, […] is the following: a delinquent association, with the aim of illicit enrichment for its associates, which imposes itself as a parasitic intermediary, and imposes itself with violence, between property and work, between production and consumption, between State and citizen" (Scarpino, 1994).

Mafia is not just a Sicilian prerogative, as *Cosa Nostra*, *'Ndrangheta*, *Sacra Corona Unita* and *Camorra* reach throughout the country well beyond their original locations. *Mafia* is not a phenomenon confined to the Southern part of the country. In fact, the IPM (index of *mafia* presence) elaborated by the research center Transcrime shows Lazio, Liguria, Piedmont, Basilicata, and Lombardy among the regions with the highest presence of organized criminal presence. Still, the index reiterates the strong presence of *mafia* in the Southern regions, where it historically has a strong grip.

At its origins, *mafia*-type organizations found legitimacy in the eyes of the population by providing protection as their main business (Gambetta, 1993). However, they have changed greatly since. Falcone and Turone (1982), among others, encouraged a "follow the money" approach, consisting of investigating the origin of dirty money to find out what criminal organizations are doing. In their introduction, they underline the fact that criminal organizations act as real economic and power structures, which feed themselves like parasites superimposed to legal institutional power.

Since Falcone's paper publishing in 1982, money inflows and outflows of criminal organizations have been pointing to activities such as extortions, money laundering, prostitution, gambling, drug trafficking, interference in public procurements, smuggling, intimidation and so on. Furthermore, these organizations operate on an international level, as proven by countless court rulings, investigations, and the interminable effort of those who prosecute these criminal organizations.

In the following pages we will discuss the issue of organized crime and firm performance, its effects and mechanisms. The terms organized crime and *mafia* will be used interchangeably. After a discussion on the available literature on the topic, we will move onto the question of how organized crime is associated with firm performance, followed by the presentation of a simple econometric model to estimate the association between of the presence of organized crime and performance at the firm level. After a discussion of the empirical results, some concluding remarks will follow.

2. Literature review

2.1 Organized crime in Italy

The consolidated view is that *mafia* emerged in Sicily in the second half of the 19th century, when the country underwent the unification process (Gambetta, 1993; Buonanno *et al.*, 2015). The new Italian State left a vacuum of power in the Southern regions following the end of feudalism, which caused a steep increase in the number of land owners while providing scarce property rights protection, thus creating the ideal conditions for the emergence of *mafia* as a business providing private protection. Gambetta (1993) stated that *mafia* is "[…] an industry that produces, promotes and sells private protection". To worsen the situations, a widespread distrust of the newly born institutions provoked the search for rule enforcement elsewhere, specifically in these congregations of mafiosi.

Leonardo Sciascia aptly described it, saying that "The most essential and complete definition one could give of *mafia*, […] is the following: a delinquent association, with the aim of illicit enrichment for its associates, which imposes itself as a parasitic intermediary, and imposes itself with violence, between property and work, between production and consumption, between State and citizen" (Scarpino, 1994). During the years, *mafia* changed its activities, and the scope of its reach.

The South of Italy has lagged in its economic and social development for a long time, giving birth to the North-South divide, with regions such as Calabria, Sicily, and Campania being among the worst performers. Putnam's (1994) *Making Democracy Work* placed great emphasis on why the Southern regions of the country perform so poorly given the same institutions, laws, and justice system. Putnam (1994) pointed at the different social and cultural context, which determined a different "civic culture". Others, like the sociologist Diego Gambetta, point at other factors such as a tendency to resolve conflict with violent means, a less cooperative nature, and lower tendency to engage in beneficial competition (Gambetta, 2011). There is, however, one factor commonly blamed for -at least part of- the lag in the South: i.e. organized crime.

Regions with higher "civic culture" as defined by Putnam (1994) seemed to be less prone to *mafia* infiltration in their social and economic tissue. The argument stated that a civic society creates a wealthy environment, therefore fostering economic development; as a consequence, the following higher trust in institutions, as well as trust in one's neighbor and better functioning legal protection mechanisms, meant that *mafia* would have a hard time transplanting itself in such regions. Although some empirical research points towards social capital as a tool to stifle criminal activity (e.g. Moro and Villa, 2016; Buonanno *et al.*, 2015; Buonanno *et al*., 2006), today *mafia*-type organizations are present in the Central and Northern regions of the country where higher social capital should have acted as a deterrent. *Mafia* movements have apparently followed migratory movements (Buonanno

and Pazzona, 2014; Varese, 2011). Furthermore, they might have received a helping hand from the adoption of measures such as "*confino*" (Buonanno and Pazzona, 2014), a mechanism consisting in the forced relocation of a mafioso in regions where her organization was not present, first adopted in 1863 with *Legge Pica* under the name "forced domicile", and transformed in 1926 in *confino di polizia*. Through this escamotage, aimed at breaking off the connections and communications between members, the opposite effect happened: relocated mafiosi kept their contacts with organizations, but also managed to establish new connections in their new locations, easing the access into new territories for criminal organizations.

Today, organized crime actively operates in every Italian region, with regions such as Lazio, Liguria, Piedmont and Lombardy right after regions historically plagued by *mafia*, namely Campania, Calabria, Sicily and Puglia (PON – *Gli investimenti delle mafie*; Calderoni, 2011). A publication by Transcrime for the Project PON Sicurezza 2007-2013 titled "*The Investments of Mafias*" attempted to map the presence of the main *mafia* organizations across the territory for the period of 2000-2011, revealing widespread presence of all organizations throughout the peninsula. The most widespread organization is *'Ndrangheta*, with a notably strong presence in Piedmont, Liguria and Emilia-Romagna; right after there is *Camorra*, with a strong presence in almost all of the Central regions of the country. Some of the biggest cities have up to four out of five of the considered *mafia*s, namely Rome, Milan, Florence and the provinces of Brescia, Viterbo, and L'Aquila. Some regions, such as Lazio, have more than one organization on their territory, and none of them is predominant (around 30% share of imputability for *mafia*-related crimes is acribable to *Cosa Nostra*, *Camorra* and *'Ndrangheta*). Other regions, such as Lombardy, show a slight dominance of one kind of *mafia*, in this case *'Ndrangheta*, while some other regions have very strong predominance of one organization, among these we find Piedmont, with 95.2% of its organized criminal activity ascribable to *'Ndrangheta*. What is even more relevant is that *mafia* has trespassed national borders, becoming an international organization.

2.2 Internationalization of *mafia*

Today *mafia* has a global presence, strong international connections and adaptive strategies of territorial control, in stark contrast to the era when *mafia*s used to compete for territorial control, reciprocally limiting their growth. The expansion of *Cosa Nostra* in the American continent in the 19th century is well known, but there are other examples where foreign *mafia*s insert themselves in the Italian territory, such as the attempt of the Russian *mafia* to breach in the area of Rome in the 1990s, to carry out money laundering operations (Varese, 2011; 2012). Throughout this transformation, transnational criminal organizations maintained a polycentric and authoritative

structure, where each semi-independent unit follows its own hierarchy, as well as inter-unit hierarchy (Decker and Chapman, 2008; Varese, 2012). Other authors underline that such structures show an increasing degree of fluidity, thus becoming less rigidly hierarchical, with the aim of expanding the scope and scale of their activities in an agile manner (Williams, 2001).

The network structures of criminal organizations are, in many cases, still family or clan based. They act as defensive structures, facilitate cooperation to establish strategic alliances, and provide *mafia*s with an effective way to transcend national boundaries. A great example is how *Cosa Nostra* established relationships with the cocaine cartel of Colombia, providing them with local knowledge, distribution channels, and the ability to launder consistent sums of money (Williams, 2001).

Transnational organized crime is involved in both legitimate and illegitimate sectors of the economy. In the illegal realm, it ranges from more classic activities like drug trafficking, smuggling and providing illicit goods and services (e.g. exotic animals and toxic waste disposal), to human trafficking, weapon trafficking, identity theft, fraud scams, stock market manipulation, counterfeit checks (Shelley *et al.*, 2003). Their activities are also moving towards technology and cybercrime (Smith, 1998). Among the activities touching the legitimate sector there is money laundering, carried out through many channels and sophisticated techniques, such as the use of classic phony corporations, bank accounts both national and offshore, to the newer Internet banking, financial securities such as derivatives and more informal banking systems (Shelley *et al.*, 2003). Money laundering is what allows criminal organizations to transfer illicit profits to the legal world, where the money can be used discretionally without arising suspicion.

Globalization may have played a key role in the expansion of organized crime on a transnational level, helping a once local phenomenon to become an international issue (Shelley *etal.*, 2006; Varese, 2011, 2012; Williams, 2001). As Shelley (2006) points out, criminal businesses take advantage of globalizations just as multinational corporations do, establishing international branches to take advantage of resource and labor markets.

There are two main views on the interaction of organized crime and globalization. The predominant view is the first one, which underlines how criminal organizations forge new connections on an international level, transplanting themselves into other countries; the effect is that many *mafia*s, ranging from the Italian and American ones, to the South American cartels, Yakuza and Chinese Triads, have formed a global network (Castells, 2000; Varese, 2011; Campana, 2011). The second view stresses that *mafia*s are stationary and local, and their business is hardly exportable due to their high group management costs, having to rebuild a reputation in each new location, connections, and finding information on the new territory (Gambetta, 1993; Reuter, 1985; Varese, 2011), such that any international endeavor is destined to be short lived and unstable.

2.3 A general look at the activities of criminal organizations

2.3.1 Network analysis of mafia organizations

The Sicilian *mafia* is structured in clans (or families) which control a specific territory with a monopolistic type of control on illegal activities. This structure is hierarchical, with the boss at the top, assisted by a number of "vice-bosses" and numerous "lieutenants" and soldiers (Agreste *et al.*, 2016; Mastrobuoni and Patacchini, 2012). Social connections between members of the same organizations and family and between different organizations and families plays a crucial role for the success of the *mafia* as a whole, so much so that a branch of study is dedicated to analyzing the quantity and quality of connections within criminal organizations using social network analysis (Natarajan, 2006; Mastrobuoni, 2015; Agreste *et al.*, 2016; Ferrara *et al.*, 2014; Bouchard, 2020). The literature shows consistently the presence of central nodes of connections, corresponding to figures of power within the organizations, while the overall network appears as a web of strong relationships among members; it is important to note that a paper by Agreste *et al.* (2016) highlights the presence of a few high-end criminals deciding to avoid the adoption of technology to remain off the radar during investigations.

Nevertheless, social network analysis techniques have proven useful to detect criminal activity. For example, Drezewski *et al.* (2015) focused on money laundering detection using social network analysis algorithms. Taking advantage of data from bank statements and national court registers they were able to assign roles to people within the network and identify connections between them. Mastrobuoni and Patacchini (2012) used criminal data from 800 *mafia* members in the USA in the 1950s and 1960s to predict the role of mobsters and their kind of activities within the organizations.

2.3.2 Activities of criminal organizations

The strength of criminal organizations resides essentially in their external relationships, and their ability to establish relations and build social networks constitutes their social capital. *Mafia*s need to obtain passive or active cooperation from other actors, such as firms, individuals, public official, and local institutions. They do so by providing protection, sponsoring, resources which are both tangible and symbolic, and by establishing relationships with public offices (Sciarrone, 2002).

*Mafia*s are economic entities. As Sciascia's definition of *mafia* underlines, it acts as an intermediate between property and work, between production and consumption, between the State and citizens, becoming a sort of extralegal authority without the aim of becoming legal. Organized crime groups provide a range of illegal services and goods, among which stand out money laundering,

extortion, arson, illegal disposal of waste, gambling, trafficking arms, narcotics and humans, bribery, electoral fraud, appropriation of public funds, usury, kidnapping, counterfeiting, and many more. Transcrime (PON Sicurezza 2007-2013) measured the revenues from nine illegal activities by criminal organizations: sexual exploitation, firearms trafficking, drug trafficking, counterfeiting, gambling, illicit trafficking of tobacco, usury and extortion. This specific subgroup amounted to 1.7% of Italian Gross Domestic Product (GDP) on average for the years analyzed. Drug trafficking generates the most revenue, followed by extortions, sexual exploitation, and counterfeiting. In particular, extortions are a *mafia* prerogative.

*Mafia*s also invest in the legal economy, favoring some sectors to carry out their deeds. There are several reasons why they would choose the legal economy, besides profit. The main one is money laundering, through which illegal proceeds are cleansed and used for further profit; some other motives include obtaining social consensus, having better territorial control and personal motivators (PON Sicurezza 2007-2013). A paper by Caneppele *et al.* (2013) investigates the exemplary case of *mafia* investments in the wind power sector in Southern Italy. Renewable energies received incentives and funding from the national government, but most of the economic incentives were assigned neglecting the issue of crime infiltration, therefore creating fertile ground for infiltration of *mafia*s. Wind energy investments are present in the South of Italy for about 86% of facilities, and Italy received a consistently higher amount of funding for the wind power sector, despite the performance was on par with that of France and Spain, which received half the funding. A mix of factors such as the high profitability of investments, the absence of clear regulations for the assignment of authorization and the consequent discretion of local public officials created the ideal environment for *mafia*s.

Money laundering can be divided into three steps: *placement* of the illegal proceeds inside of a legitimate business; *layering*, i.e. the process of masking dirty money within other clean transactions; and *integration*, providing a legitimate explanation for the existence of the wealth in question. The phases can be either separate or interlaced. The demand for laundering is driven by the need for liquidity of the criminal organizations, the desire to avoid attention from law enforcement and the need to avoid asset confiscation and seizure (Savona, 1993).

Criminal organizations become entrepreneurs when they operate in the legal economy, "entrepreneur with a Kalashnikov" as defined by Arlacchi (1986). Champeryrache (2018) argues that such legal *mafia*-connected businesses are a long-term strategy. However, their legal economic activity can be described as *unproductive* and *destructive* entrepreneurship, as they actively destroy talent, trust and wealth in order to carry out their activities. *Mafia*-ruled territories are affected by the sterilization of entrepreneurial potential, as many entrepreneurs limit their initiative to avoid

unwanted attention (Censis-Fondazione BNC, 2003), cause talent to migrate to areas where property rights are better enforced (Arlacchi, 1986), and force non-criminal entrepreneurs to adopt preventive expenses.

Extortion is not among the most profitable *mafia* activities, as manufacturing and sale of illegal goods and services take the crown. Nevertheless, it represents the typical activity of every criminal organization worldwide (Konrad and Skaperdas, 1998). Extortion affects shopkeepers in urban areas, farmers and even large firms alike, and is most effective when corruption and abuse of power are common. Given how widespread and common the practice is, it turns firms into one of the main victims of *mafia*s.

2.4 Firms as victims of organized crime

Mafia places noticeable negative pressure on economic activity, especially firms. Typical sectors pestered with *mafia* presence are construction, transport, hospitality (hotel and restaurant). These sectors are attractive in the eyes of organized crime due to their low entry barriers, their weak propensity to engage in export and mostly small and localized businesses, low differentiation of products, mature technologies and generally unskilled workers. These factors influence the porosity of a sector, which in turn has a significant impact on the likelihood that *mafia* will operate in a municipality, while marked size per se is not a useful predictor (Moro and Villa, 2016).

Mafiosi can also employ violent means to discourage competition, as well as lower their costs unfairly by reducing the price of inputs, either by paying their workforce low salaries or by accessing large sums of money in need of laundering (Moro and Villa, 2016). *Caporalato,* an illegal form of recruitment and organizing of the workforce using intermediaries (*caporali*) and the drastic underpaying of employees is a prime example of acquiring work at the cheapest price which is particularly common in agriculture (Perrotta, 2014; Salvia, 2020).

Criminal activity can influence firms' performance in other ways. Racketeering, for example, guarantees control over the territory and the local economy, while guaranteeing fixed income for the criminal organization. Money laundering alters the functioning of the markets, allowing criminal firms to collect financial resources quickly and at advantageous rates; this also creates the condition for disadvantageous credit terms and conditions in areas where crime is rampant (Albanese and Marinelli, 2013).

In Italy, organized crime is entrenched in the socio-economic fabric of some Southern regions such as Sicily, Puglia, Calabria, and Campania, among the worst economic performers of the country. The presence of *mafia* positively affects both the probability of receiving subsidies by 64% and the amount of funding by one standard deviation; *mafia* ends up pocketing part of this excess amount of

funding through the aid of fictitious businesses and corruption (Barone and Narciso, 2015). On a national level, the effect of *mafia* has been estimated to be responsible for a 16% loss in GDP per capita over 30 years (Pinotti, 2016).

A common misconception regards bigger firms as impermeable to *mafia*s. However, according to Albanese and Marinelli (2013), firm size and sector do not seem to act as insurance against organized crime. They find *mafia* negatively impact firms' performance, with a 9-10% increase in Total Factor Productivity (TFP) when moving from the 90^{th} to the 10^{th} percentile of the provincial crime distribution. However, firm size becomes relevant when looking at negative effects, with smaller firms suffering more than larger ones (Ganau and Rodríguez-Pose, 2018).

Industrial clustering has generally positive contributions with respect to the productivity of firms. Such benefits derive from positive externalities such as localization economies, introduced by Marshall (1920), which occur when the increasing size of an industry contributes to the increase in the productivity of a certain activity, and diversification economies, which happen when industries located in the same area carry out activities in different industries (Rosenthal and Strange, 2004; Ganau and Rodríguez-Pose, 2018). Industrial clustering allows for knowledge and information sharing, technological spillovers and the formation of strong inter-firm relationships. Organized crime contrasts any positive externalities, with a negative direct effect on firm productivity and negative indirect effects undermining the positive effects of clustering on productivity growth (Ganau and Rodríguez-Pose, 2018). Trust and reciprocity also suffer from the presence of criminal organizations, thus further affecting firms' performance and economic initiative.

Moving onto the effect of *mafia*s on the business climate as a whole, the distribution of FDI on the national level is a telling sign of how detrimental organized criminal activity is to the business climate. The correlation between organized crime is negative and significant, while the correlation between other criminal activities not typical of organized crime is not as significant, showing how certain criminal activities impact the business climate from the perspective of a foreign investor, while other kinds do not (Daniele and Marani, 2008). Eight of the least developed Southern Italian regions received less than 1% of total FDI over the period 2005-2007, and less than 5% of internationalized firms reside in those regions, a share too low even when accounting for the physiological regional asymmetries observed in every other country. All of this happens in regions with supposedly attractive features, where the cost of labor is lower, the workforce is skilled and which receive financial incentives to stimulate economic growth (Daniele and Marani, 2008; Basile, 2001).

Overall, crime imposes significant economic costs, from those relative to preventive and protective measures to those faced by victims. The former includes insurance costs, for example against property damage or arson, while the latter includes costs such as *pizzo* or restoration costs

after damage. Those mentioned above are the more tangible costs of organized crime. Other economic costs are loss of investments, employment, new business opportunities not taken, lower local institutional quality which in turn decreases economic growth (Daniele and Marani, 2008; Acemoglu, 2008). Then there are effects on credit, as organized crime means higher risk and higher costs of investment, with high-crime areas receiving higher interest rates for loans, higher requirements of collateral, and restricted access to bank credit. Finally, less credit means less investment, worsening lagging growth.

3. On the measurement of organized crime

3.1 Measuring the presence of organized crime

Measuring crime is an arduous task, as we are attempting to quantify a phenomenon which by nature does everything possible to remain hidden, and the complexity and variety of criminal activities carried out by organized crime contribute to the difficulty. One way to infer the presence of a *mafia* activity is to look at its symptoms, specifically crimes denounced to the authorities. There have been numerous attempts to measure the presence of organized criminal activity through the constructions of indexes, such as the IPM proposed by Transcrime (PON Sicurezza 2013) which considers the following crimes: homicides and attempted homicides with *mafia* aims, people denounced for *mafia* association, municipalities and public administrations dissolved for *mafia* infiltration, goods confiscated from organized criminality, active groups reported by DIA and DNA.

A crime always considered when building an index is extortion, highly correlated with the activity of the Italian *mafia* for both historical and economic reliability (Jennings, 1984; Gambetta, 1993; Daniele and Marani, 2008; Buonanno *et al.*, 2015; Pinotti, 2015; Ganau and Rodríguez-Pose, 2018; Albanese and Marinelli, 2013), with all *mafia* organizations exerting their power through the racket of extortion. However, extortions are wildly underreported, as just a minuscule fraction of the real victims decide to report the crime; thus, we require other crimes to gauge the presence of *mafia* on the territory.

In the Italian *Codice Penale*, article 416 details the crime of "delinquent association", when three or more persons associate (promote, constitute, or organize) with the aim of committing multiple crimes. In the 1980s the article was integrated, and today there is article 416-*bis*, punishing the crime of "delinquent association with *mafia* aim", happening when those who associate employ intimidation by the name of the association, subjugating and imposing omertà to commit felonies, control economic activities, and so on. The number of rulings with sentencing for 416-*bis* crimes are recorded and available on public datasets, and are strongly telling of the existence of criminal organizations, which is the reason why they are often included when building an index.

The literature often turns to bomb attacks and arson, used as intimidation techniques (Daniele and Marani, 2008), racketeering, money-laundering, bribery, homicide, all correlated with the presence of criminal organizations (Albanese and Marinelli, 2013). Crimes such as robberies and thefts are instead negatively correlated with the presence of *mafia*, while usury is not reliable as it is hard to tell the proportion of crimes imputable to organized crime.

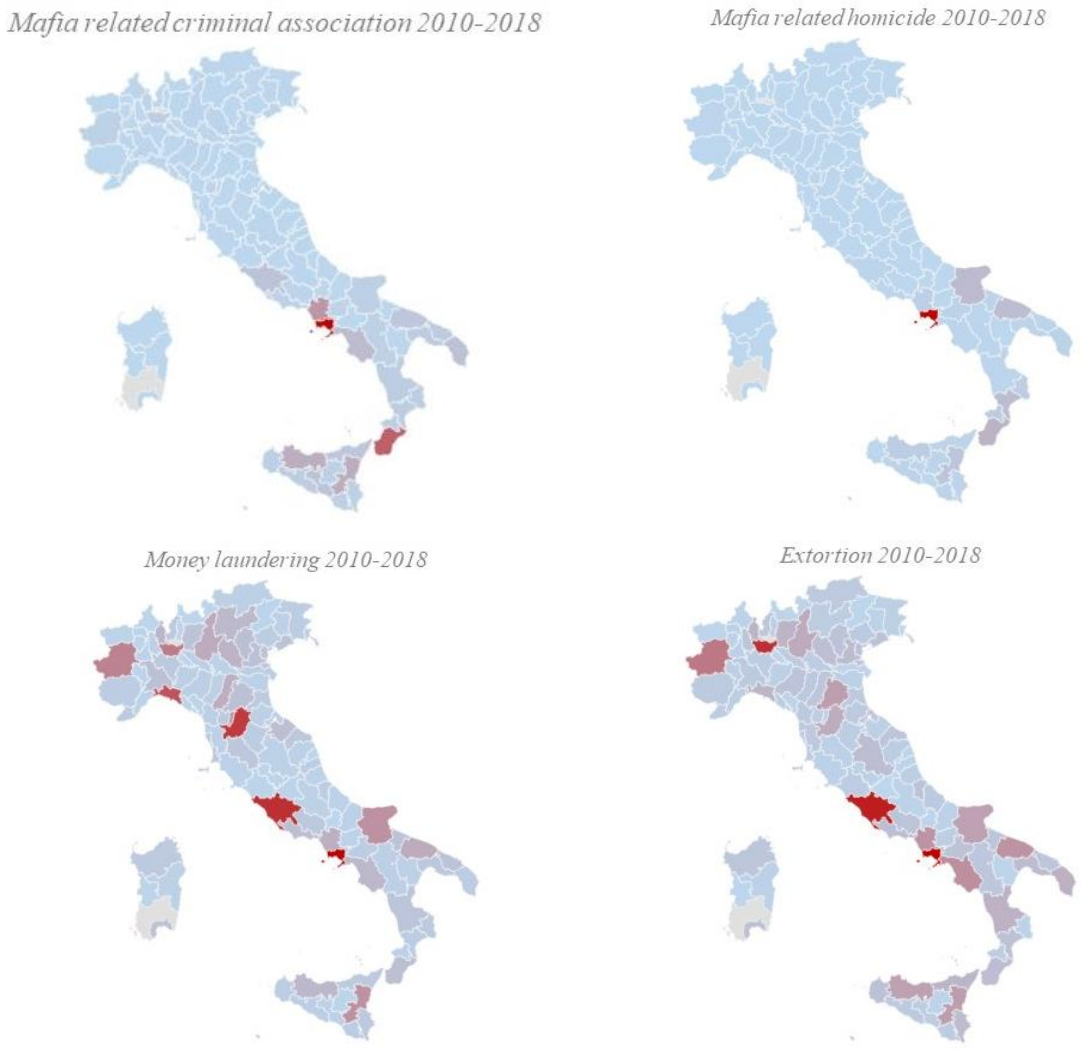
It is important to note that all judicial-based measures of crime are subject to the issue of underreporting (MacDonald, 2002).

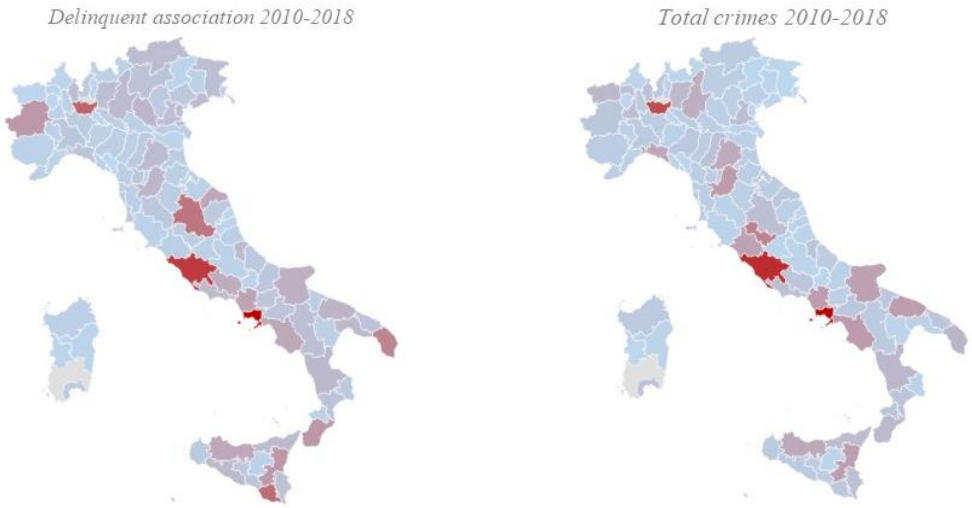
3.2 Building an index

We need to choose a significant subset of crimes to build an indicator for the presence of organized crime on the territory, and, specifically, at the province level. To do so, the choice fell on the following: extortion, delinquent association, *mafia*-related delinquent association, money laundering, *mafia*-related homicides. As pointed out in the above sections, extortion and money laundering are activities carried out by organized criminal organizations everywhere they are established; *mafia*-related delinquent association and delinquent association are crimes punished by article 416-*bis* and 416 of *Codice Penale*, both directly related to *mafia* but especially *mafia*-related delinquent association, and *mafia*-related homicides directly relates to the criminal activity in exam.

The Italian National Institute of Statistics (ISTAT) registers data on these crimes when they are notified to the judicial forces by the police authorities. Figure 3.1 reports some geographic representations of the cumulative number of crimes for each of the crimes chosen, for the period 2010-2018, considering 106 provinces as unit of reference.

Figure 1: Crimes notified to the judicial forces by police authorities.





Note: Author's elaboration on ISTAT data.

Provinces with darker color have higher absolute number of crimes. Starting from the map in the top left corner, *mafia*-related criminal association crimes are concentrated in Southern Italy, with the provinces of Naples (206), Reggio Calabria (114), and Caserta (62) taking the podium. For *mafia*-related homicides we find, once again, Naples (227) at the top, with far more killings than Reggio Calabria (38), coming in at second place. The other three crimes differ from those mentioned, appearing spread out on the territory. For all crimes, the province of Rome stands out as the second worst performer for money laundering (1113), extortions (4922) and delinquent association (378), only beaten by Naples (1431 for money laundering, 5659 for extortions, 518 for delinquent association). Milan comes in third place for delinquent association (277) and extortions (4390). Therefore, a quick analysis of this data confirms the now consolidated view that organized crime has migrated to the Northern regions.

There are several factors influencing the number of total crimes which could be useful to create an index, such as the propensity to report the crime, how big is the province, and how populated it is. Data on province dimension and population are available (ISTAT or Eurostat source), while measuring the propensity to report a crime is difficult, as it influenced by many factors such as the type of crime or the levels of trust and reciprocity. Therefore, the choice of denominator for our index falls on surface per province.

3.3 Results of the index

The index for organized crime, (OC_{pt}), referring to province *p* at time *t*, with *t* = 2010, …, 2018, is defined as follows:

$$\frac{mafia\ related\ delinquent\ ass._{pt} + delinquent\ ass._{pt} + extortion_{pt} + money\ laundering_{pt} + mafia\ related\ homicide_{pt}}{population_{pt}} \quad (1)$$

For the 2010-2018 period the index shows little variation of rankings in between years. Figure 2 maps the spatial distribution as time-average value:

Figure 2: Organized crime index results every 100,000 inhabitants.

Note: Author's elaboration on ISTAT data.

Provinces such as Terni and Valle d'Aosta consistently score as the top two for the whole period, with an average of 158 and 109 crimes per hundred thousand inhabitants. Viterbo and Vercelli come right after, with an average of 71 and 64, respectively, while Naples ranks eight despite having the highest absolute number of crimes due to the province being highly populated. The lowest period average values belong to Venezia, Udine, Torino, Verona, Treviso and Vicenza.

Another possible way to build the OC index would be to measure the total of crimes over the square kilometer surface of the province:

$$\frac{mafia\ related\ delinquent\ ass._{pt} + delinquent\ ass._{pt} + extortion_{pt} + money\ laundering_{pt} + mafia\ related\ homicide_{pt}}{surface_p} \quad (2)$$

Figure 3.3 maps the average value of this alternative index over the period 2010-2018:

Figure 3: Organized crime per provincial surface index.

Note: Author's elaboration on ISTAT data.

The results are more in line with the absolute number of crimes committed, with Naples showing the highest score, followed by Milan, Prato, Trieste, Terni, Monza and Rome. In this index as well, there is little variation in the top scores between years. However, measuring organized crime over territorial surface might not capture the phenomenon as well as measures related to population, as such criminal activity has an essential element of networking.

In the following pages the OC index per square kilometer will be used in a simple econometric model, with the aim of estimating the effect of criminal organization on firm performance at the province level.

4. The dataset

The empirical analysis is carried out using firm level data from Bureau Van Dijk's AIDA database, for the period 2010-2018. Only firms in the manufacturing sector were included in the sample by selecting for ATECO 2007 codes 10-33.

About each individual firm we gather information about year of establishment, ATECO code, operative headquarters information (region, province), ROA, ROE and EBITDA, total fixed assets, value added, number of employees, sales revenue for the period 2010-2018.

We proceed with the deletion of all firms with missing data for ATECO code, operative headquarters, firms with negative numbers of employees for any given year, data lacking for more than two years in the period 2010-2018 for any of the other variables. In the end, a total of 46056 observed firms constitute our final sample.

We use ISTAT data on extortion, homicide related to *mafia*, criminal association, *mafia*-related criminal association and money laundering in the form of crimes reported by police forces to the judicial authorities, organized by province, to build the organized crime index described in the previous section (OC per square kilometer). Here we encounter an issue, as some provinces were suppressed or incorporated in the considered period, specifically: Carbonia Iglesias and Medio Campidano were abolished, and Sud Sardegna took their place, Ogliastra became part of Nuoro and Olbia-Tempio became part of Sassari. AIDA data presents only the current list of provinces, while ISTAT data shows the old ones; for ease of resolution, ISTAT provinces were modified by incorporating the deceased provinces' data into the data of the current provinces (e.g. sum all Ogliastra data to Nuoro data). The only exception is the province of Sud Sardegna, for which ISTAT provides no data as there are no territorial offices to gather the local information.

ISTAT also provides data on provinces' extension, used to calculate the OC index. Finally, firm-level data on value added and fixed assets are deflated at the 2005 level, using sectorial ISTAT data to build the deflator.

A shown in Table 1 most of the firms in the sample are micro firms and small firms, with less than 50 employees (European Union classification), as is characteristic of the Italian productive panorama. Tables 2 and 3 complement Table 1 by reporting the distribution of firms by province and ATECO manufacturing sector.

Table 1: Firm size distribution.

	No. Employees	**%**
Micro	≤10	47.91
Small	10<n≤50	39.07
Medium	50<n≤250	11.19
Large	>250	1.83
TOTAL	46,056	100.00

Table 2: Province distribution of firms.

Province	**%**	**Cumulated**	**Province**	**%**	**Cumulated**
Agrigento	0.12	0.12	Messina	0.19	39.76
Alessandria	0.87	0.99	Milano	7.94	47.70
Ancona	1.05	2.04	Modena	2.80	50.50
Arezzo	1.16	3.20	Monza e della Brianza	2.79	53.30
Ascoli Piceno	0.33	3.53	Napoli	1.84	55.14
Asti	0.37	3.90	Novara	0.90	56.04
Avellino	0.53	4.43	Nuoro	0.10	56.14
Bari	1.19	5.62	Oristano	0.06	56.20
Barletta-Andria-Trani	0.36	5.98	Padova	2.65	58.85
Belluno	0.41	6.40	Palermo	0.36	59.20
Benevento	0.22	6.61	Parma	1.57	60.77
Bergamo	4.31	10.92	Pavia	1.05	61.82
Biella	0.43	11.35	Perugia	1.08	62.90
Bologna	3.03	14.38	Pesaro e Urbino	0.97	63.87
Bolzano/Bozen	0.47	14.85	Pescara	0.29	64.16
Brescia	4.76	19.61	Piacenza	0.65	64.81
Brindisi	0.25	19.86	Pisa	1.06	65.87
Cagliari	0.22	20.08	Pistoia	0.65	66.53
Caltanissetta	0.12	20.20	Pordenone	1.02	67.54
Campobasso	0.14	20.33	Potenza	0.22	67.77
Caserta	0.66	20.99	Prato	1.22	68.99
Catania	0.46	21.45	Ragusa	0.15	69.14
Catanzaro	0.12	21.58	Ravenna	0.72	69.85
Chieti	0.61	22.19	Reggio Calabria	0.11	69.97
Como	1.77	23.96	Reggio nell'Emilia	2.01	71.98
Cosenza	0.25	24.21	Rieti	0.09	72.07
Cremona	0.81	25.02	Rimini	0.44	72.51
Crotone	0.05	25.07	Roma	2.19	74.70
Cuneo	1.08	26.15	Rovigo	0.37	75.07
Enna	0.06	26.21	Salerno	1.05	76.12
Fermo	0.68	26.88	Sassari	0.25	76.37
Ferrara	0.46	27.34	Savona	0.17	76.54
Firenze	2.50	29.84	Siena	0.43	76.97
Foggia	0.24	30.08	Siracusa	0.17	77.13
Forlì-Cesena	0.80	30.88	Sondrio	0.36	77.49
Frosinone	0.54	31.41	Taranto	0.36	77.85
Genova	0.76	32.17	Teramo	0.61	78.46
Gorizia	0.17	32.34	Terni	0.19	78.65
Grosseto	0.13	32.47	Torino	3.80	82.45

Imperia	0.09	32.57	Trapani	0.22	82.67
Isernia	0.07	32.64	Trento	0.78	83.45
L'Aquila	0.19	32.83	Treviso	3.34	86.79
La Spezia	0.26	33.09	Trieste	0.17	86.96
Latina	0.57	33.65	Udine	1.23	88.19
Lecce	0.50	34.15	Valle d'Aosta	0.10	88.30
Lecco	1.46	35.61	Varese	2.82	91.11
Livorno	0.20	35.82	Venezia	1.26	92.37
Lodi	0.43	36.25	Verbano-Cusio-Ossola	0.25	92.62
Lucca	0.88	37.13	Vercelli	0.28	92.90
Macerata	0.92	38.04	Verona	2.26	95.16
Mantova	1.06	39.11	Vibo Valentia	0.06	95.23
Massa-Carrara	0.33	39.43	Vicenza	4.55	99.78
Matera	0.14	39.57	Viterbo	0.22	100.00

Table 3: Firms ATECO classification distribution.

ATECO 2007 (Two-Digit)	%	Cumulated
10 Food products	7.70	7.70
11 Beverages	1.30	9.00
12 Tobacco products	0.01	9.01
13 Textiles	3.97	12.98
14 Wearing apparel	3.53	16.51
15 Leather and related products	3.25	19.76
16 Wood, wood and cork products except furniture; straw articles, plaiting materials	2.87	22.63
17 Paper and paper products	2.13	24.76
18 Printing and reproduction of recorded media	2.95	27.71
20 Coke and refined petroleum products	3.48	31.19
21 Basic pharmaceuticals products and pharmaceutical preparations	0.58	31.78
22 Rubber and plastic materials	5.77	37.55
23 Other non-metallic mineral products	4.72	42.27
24 Basic Metals	2.03	44.30
25 Fabricated metal products, except machinery and equipment	21.50	65.80
26 Computer, electronic and optical products	3.37	69.16
27 Electrical equipment	4.14	73.30
28 Machinery and equipment N.E.C.	13.37	86.68
29 Motor vehicles, trailers and semi-trailers	1.33	88.01
30 Other transport equipment	0.89	88.90
31 Furniture	3.46	92.36
32 Other manufacturing	3.37	95.73
33 Repair and installation of machinery and equipment	4.27	100.00

5. Empirical strategy

The empirical exercise aims, first at analyzing the association between organized crime and firm performance with respect to the entire sample of manufacturing firms. To this aim, the following baseline regression will be estimated:

$$\Delta lnLabProd_{ipt} = \beta_0 + \beta_1 lnOC_{pt-1} + \beta_2 lnLabProd_{ipt-1} + \beta_3 lnAge_{ipt-1} + \beta_4 lnEmpl_{ipt-1} + \beta_5 lnCapEmp_{ipt-1} + \gamma_i + \delta_t + \varepsilon_{it} \quad (3)$$

where the dependent variable, ΔlnLabProd$_{ipt}$, is the natural log of the variation in labor productivity, measured as total deflated value added over number of employees, between the priods *t* and *t-1*. The explanatory variables are all defines at the beginning of the yearly growth period. They include the beginning-of-the growth period labor productivity, the age of the firm (defined as year of observation minus the year of a firm set up), the number of employees, the per employee capital of the firm (defined as total fixed assets over employment), and, finally our variable of interest, capturing the presence of organized crime in province *p*, namely OC$_{pt-1}$. The terms γ_i and δ_t denote firm- and year-specific fixed effects (FE), while ε_{it} is the error term. Equation (3) is specified as a log-log two-way FE model, with errors clustered at the province level. Tables 4 and 5 report the correlation matric and some descriptive statistics of the explanatory variables, respectively.

Table 4: Correlations between explanatory variables.

	lnOC	lnLabProd	lnAge	lnEmpl	lnCapEmp
lnOC	1				
lnLabProd	0.0152	1			
lnAge	0.0298	0.1784	1		
lnEmpl	-0.0456	0.2285	0.3042	1	
lnCapEmp	-0.0844	0.3341	0.2489	0.1536	1

Table 5 - Descriptive statistics.

Variable		Mean	Std.Dev.	Min	Max	Observations
lnLabProd	overall	3.980027	0.6130285	-4.125538	11.31129	N = 394335
	between		0.5470065	-0.8063413	10.06934	n = 46289
	within		0.2979446	-2.97134	10.55919	T-bar = 8.51898
lnOC	overall	-0.6120066	0.1309997	-0.6931472	0.0806121	N = 426395
	between		0.1270591	-0.689528	0.0169648	n = 47381
	within		0.0319649	-0.7733048	-0.4037115	T-bar = 8.99928
lnAge	overall	2.923626	0.7207386	0	5.030438	N = 425583
	between		0.6852251	1.325575	5.003796	n = 47381
	within		0.2323517	1.501201	3.777903	T-bar = 8.98214

lnEmpl	overall	2.598578	1.247395	0	9.382107	N = 394335
	between		1.228551	0	9.146167	n = 46289
	within		0.2628965	-4.032958	9.087878	T-bar = 8.51898
lnCapEmp	overall	3.232618	1.58205	-9.17533	12.15982	N = 392331
	between		1.509267	-7.739538	11.99487	n = 46223
	within		0.5547624	-5.913869	10.18539	T-bar = 8.48779

A higher number of employees may not reflect the effective need for more labor, but instead inefficiency within the firm, therefore denting labor productivity after a certain number of employees are already utilized. Therefore, to account for possible nonlinear effects of the number of employees we introduce the square number of employees in the regression.

The age of a firm, on the other hand, has a less clear impact on labor productivity: is labor productivity lower in the first years of a firm? Part of the literature seems to point towards a positive answer. During their initial years, manufacturing firms are smaller and have access to lower intangible capital, which is accumulated with experience (Hosono *et al.,* 2020). Furthermore, inefficient firms are usually younger, as with time firm self-selection mechanisms tend to leave only the better performers in the industry (Jovanovic, 1982). To control for these concerns, we include a regression with the square of the age variable, allowing to separate the effect of being a younger firm from the effect of being an older firm.

As pointed out in the previous sections (§1.3), organized crime has different prerogatives in different regions, more economically oriented in the Center-North and more socio-politically focused in the South. *Mafia* has also been shown to affect all firms regardless of their size, however its impact is stronger for smaller firms. To verify these hypotheses, the same regression can be run on sub-samples of firms from the Northern, Central and Southern regions, and then for micro, small, medium and large firms, where we expect the effect of criminal organizations to become weaker as size increases.

6. Empirical results

6.1 Baseline regression tweaking

Below are the results of the three different regressions, the first one being the most basic, and the second and third including nonlinear effects for firm age and size.

Table 6: Baseline regression results.

	(1) ΔlnLabProd		(2) ΔlnLabProd		(3) ΔlnLabProd	
lnOC	-0.208	**	-0.209	**	-0.204	**
	(0093)		(0.093)		(0.090)	
lnLabProd	-0.794	****	-0.793	****	-0.793	****
	(0.005)		(0.005)		(0.005)	
lnAge	-0.008		-0.009		-0.071	****
	(0.006)		(0.006)		(0.013)	
lnEmpl	0.019	****	0.036	****	0.036	****
	(0.005)		(0.010)		(0.010)	
lnCapEmp	0.021	****	0.022	****	0.022	****
	(0.002)		(0.002)		(0.002)	
lnEmpl^2			-0.004	*	-0.004	*
			(0.002)		(0.006)	
lnAge^2					0.028	****
					(0.006)	
No. Observations	345,695		345,695		345,695	
No. Firms	46,056		46,056		46,056	
Model F Statistic	3,910.027		3,720.424		3,463.292	

Standard errors are clustered at the province level and shown in parentheses.
* p<0.1, ** p<0.05, *** p<0.01, **** p<0.001
Firm and year FEs included in the model are not shown.

Let us start by addressing column 1. Our organized crime index per square kilometer is in a significantly negative association with labor productivity for the whole sample, with the increase of one percentage point of the index for organized crime impacting labor productivity by -0.21%. Then, as expected, the variation in labor productivity is positively affected by the number of employees and the amount of capital per employee.

Regression 2 allows for nonlinear effects of the number of employees, seemingly confirming our suspicion that too many employees harm labor productivity as the square number of employees reports a negative -and statistically significant- coefficient. The same holds for regression 3, where we include the square of firm age. Here, even more so than with the number of employees, the change is significant: the coefficient of the age variable further decreases from -0.01 to -0.07, while also becoming extremely significant ($p < 0.001$). Its squared counterpart has the same significance level, but a positive impact on labor productivity.

Therefore, younger firms perform worse than their older peers, and firms with too many employees suffer the crowding out effect of labor productivity. Organized crime, overall, has a negative impact on firm productivity measured by labor productivity, in the manufacturing sector.

6.2 Territorial breakdown

Next, we must verify if our sample supports the territorial assumptions we made before, as well as those about firm size. To this aim, we proceed by distinguishing three sub-samples, one with all firms in Northern provinces, one for Central provinces, and one for Southern provinces (including also the two main islands of Sicily and Sardinia). What we expected to find is a weaker effect of organized crime for the Southern regression, as *mafia*s supposedly carry out their economic endeavors in the more economically prosperous provinces.

Table 7: North (1), Center (2), South (3).

	(1) North ΔlnLabProd		(2) Center ΔlnLabProd		(3) South ΔlnLabProd	
lnOC	-0.336	***	-0.087	*	-0.078	
	(0.122)		(0.051)		(0.048)	
lnLabProd	-0.778	****	-0.788	****	-0.857	****
	(0.005)		(0.010)		(0.010)	
lnAge	-0.083	****	-0.077	***	-0.028	
	(0.016)		(0.024)		(0.034)	
lnAge^2	0.034	****	0.043	****	0.009	
	(0.007)		(0.011)		(0.017)	
lnEmpl	0.029	**	0.031		0.031	
	(0.003)		(0.020)		(0.019)	
lnEmpl^2	-0.006	**	0.002		0.001	
	(0.003)		(0.005)		(0.005)	
lnCapEmp	0.020	****	0.021	****	0.030	****
	(0.002)		(0.003)		(0.005)	
No. Observations	243,717		59,480		42,498	
No. Firms	32,305		7,996		5,755	
Model F Statistic	3,067.798		1,231.753		1,617.229	

Standard errors are clustered at the province level and shown in parentheses.
* p<.1, ** p<.05, *** p<.01, **** p<.001
Firm and year FEs included in the model are not shown.

Indeed, our initial supposition seems at least partially correct. Age is negative in all three regressions, however it becomes less significant when moving towards the Center, until it loses all significance in the Southern regression, while age squared has a higher positive impact, remaining highly significant for North and Center, and losing all significance in the South. The number of employees, both plain and squared, loses all significance in the Center and South regressions, differently from the North regression, where it has the same pattern seen in the initial regressions

(positive for lnEmployees, negative for lnEmployees squared). However, what is most notable is that organized crime impacts manufacturing firms almost four times stronger in the North (-0.336, and $p < 0.01$) than in Center firms (-0.087, and $p < 0.1$), and is also more significant for the former. This last consideration holds for the South regression as well.

Our model does not seem to explain well what is happening in the South. A concern is that regions like Campania, Sicilia, and Calabria may skew the results for the third regression due to being the birthplace of *Camorra, Cosa Nostra*, and *'Ndrangheta*, so it is worthwhile to see how the Southern regression behaves when we factor out these regions. Does it become more like the North and Center regressions, or does it remain similar to the initial South regression? In the following table the South regression (1) is reported along the South sample without Campania, Sicilia and Calabria -see column (2)- and a regression of only Campania, Sicilia and Calabria -see column (3).

Table 8: South focused regressions.

	(1) South ΔlnLabProd		(2) Subsample ΔlnLabProd		(3) HighOCsample ΔlnLabProd	
lnOC	-0.078		-0.026		-0.052	
	(0.048)		(0.267)		(0.063)	
lnLabProd	-0.857	****	-0.862	****	-0.852	****
	(0.010)		(0.016)		(0.013)	
lnAge	-0.028		-0.037		-0.022	
	(0.034)		(0.051)		(0.049)	
lnAge^2	0.009		0.003		0.012	
	(0.017)		(0.023)		-0.027	
lnEmpl	0.031		0.033		0.030	
	(0.019)		(0.031)		(0.025)	
lnEmpl^2	0.001		0.002		0.001	
	(0.005)		(0.007)		(0.007)	
lnCapEmp	0.030	****	0.030	****	0.029	****
	(0.005)		(0.007)		(0.006)	
No. Observations	42,498		19,859		22,639	
No. Firms	5,755		2,678		3,077	
Model F Statistic	1,617.229		8,747.324		1,086.229	

Standard errors are clustered at the province level and shown in parentheses.
* p<.1, ** p<.05, *** p<.01, **** p<.001
Firm and year FEs included in the model are not shown.

The three isolated regions of Calabria, Sicilia and Campania show no significant effect of organized crime on labor productivity and a very small negative impact, as does the South sample without them. The only coefficients with any significance are the labor productivity and capital per employee ones, for the three regressions. This does not point to a different economic dynamic of organized crime in the regions where it has been historically present, at least for the considered sector.

6.3 Firm size breakdown

A common misconception in the past was believing that larger firms were not as permeable to organized criminal activities, however, the literature has often shown the falsity of such claims. Work such as Albanese and Marinelli (2013) and Ganau and Rodríguez-Pose (2018) stress the presence of criminal activity within firms of all sizes, while the dimension of the firm becomes relevant in terms of damages deriving from organized crime.

To verify if smaller firms are actually more vulnerable in our sample, we run our regression with the square of age and employment on sub-samples of firms classified as micro (≤10 employees), small (10<employees≤50), medium (50< employees ≤250) and large (>250 employees), according to the European Union classification. In the following table, regression 1 is for micro firms, 2 for small, 3 for medium, and 4 for large firms.

Table 9: Micro, Small, Medium and Large firms.

	(1) ΔlnLabProd		(2) ΔlnLabProd		(3) ΔlnLabProd		(4) ΔlnLabProd	
lnOC	-0.264	**	-0.171	****	-0.145	*	-0.186	
	(0.126)		(0.050)		(0.080)		(0.128)	
lnLabProd	-0.842	****	-0.742	****	-0.680	****	-0.760	****
	(0.006)		(0.007)		(0.012)		(0.040)	
lnAge	-0.070	***	-0.044	**	-0.013		0.003	
	(0.023)		(0.018)		(0.035)		(0.106)	
lnAge^2	0.034	***	0.020	***	-0.000		-0.027	
	(0.010)		(0.007)		(0.013)		(0.037)	
lnEmpl	-0.077	****	0.255	****	0.740	****	0.526	**
	(0.014)		(0.042)		(0.067)		(0.204)	
lnEmpl^2	0.041	****	-0.023	***	-0.080	****	-0.043	**
	(0.004)		(0.008)		(0.008)		(0.017)	
lnCapEmp	0.029	****	0.018	****	0.011	***	-0.016	
	(0.002)		(0.002)		(0.004)		(0.018)	
No. Observations	148,219		147,857		42,635		6,984	
No. Firms	24,457		24,461		6,831		1,106	
Model F Statistic	2,217.902		1,966.592		590.037		156.812	

Standard errors are clustered at the province level and shown in parentheses.
* p<0.1, ** p<0.05, *** p<0.01, **** p<0.001
Firm and year FEs included in the model are not shown.

The organized crime variable shows the largest estimated coefficient for the smallest firms, with micro firms seeing a decrease of labor productivity growth by -0.26% if organized crime increases by 1%. Small and medium firms suffer a smaller, but still significant, effect of organized crime (-0.171 and -0.145). Medium firms, despite having a coefficient value like that of small firms, see a decrease in significance (from $p < 0.001$ to $p < 0.1$).

Large firms, on the other hand, do not have a significant coefficient of organized crime at any confidence level, despite a negative coefficient close to that of small and medium sized firms. Thus, we can conclude that larger firms in the manufacturing sector do not suffer as much as smaller sized firms, despite the very likely infiltration of criminal organizations in their activities.

7. Concluding remarks

The initial part of this dissertation traced the history of *mafia*, while also introducing the past and current literature on the subject of organized criminal activity. We detailed how criminal organizations of the Italian peninsula, particularly *Cosa Nostra*, *Camorra*, and *'Ndrangheta*, have long left behind their old ways of local territorial control to become differently structured organizations with a clear focus on profit, reaching their tendrils into the legal fabric of the economy on a national scale. Furthermore, in their relentless path towards delinquency, these organizations now interact on an international level to control some of the world's most damaging activities such as human trafficking, drug smuggling and illegal weapons trafficking. For firms, criminal activity of this kind means higher risk, costs, and uncertainty.

This dissertation studies the effects of organized crime of firm productivity using a large sample of Italian manufacturing firms and data on criminal activity. The analysis is developed at the province level. First, we built an index to have an indicative measure the presence of organized crime, and subsequently used the index as a regressor to study the association between organized crime and firm level performance, assessed using yearly growth rate of labor productivity.

The results of the regressions highlight the negative returns of organized criminal activity on labor productivity of firms in the same province, and further focusing on specific subgroups of interest within our overall sample allowed to have a cleared perspective on where this negative effect is worse. We conclude by underlining that firms who suffer most are usually micro and small firms, and the effect of *mafia* activity for the manufacturing sector is worse and more significant for Northern and Central regions of the country.

What is most concerning about these results is the stronger effect on smaller firms, as the Italian productive landscape is mostly constituted by micro and small firms. This is also reflected in our sample, where 87% of firms have less than 50 employees. Besides the need for a strong array of instruments and interventions to contrast *mafia* activities, a weakness like this requires parallel intervention to sustain firms most affected by the issue. However, finding the right instruments to contrast this negative impact should always take into account the tendency of criminal organizations to appropriate incentives and funding targeted at firms, therefore profiting off of the legal economy once again.

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