

# THE FINANCIAL PROFILE OF FIRMS INFILTRATED BY ORGANISED CRIME IN ITALY

by Marco De Simoni\*

## Abstract

The aim of this work is to investigate the relationship between infiltration by organised crime (or OC) in legitimate businesses and the resulting financial profile of criminal firms. We address some of the shortcomings of the existing economic literature in the field (uncertainty on unlawful nature of businesses analysed, limited geographical span) by relying on a unique sample of firms which were infiltrated by OC almost with certainty and are located in most Italian regions. We identify four different types of infiltrated firms and we focus on the two most frequent ones: *investment* firms (used as conduits to invest illicit proceeds through legal activities) and *competition* firms (which are run to gain control of the market of interest, deploying mafia methods to harm competitors). Overall, we find that infiltrated firms, despite their higher revenues with respect to legal businesses, are less profitable, as they may be pursuing other goals than mere economic performance. Moreover, while all criminal firms feature low inventory levels, *investment* firms have a large stock of tangible assets as opposed to *competition* firms, which prefer relying on leased facilities and equipment. That may be because *competition* firms are more at risk of detection and consequently adopt appropriate strategies to reduce any harmful consequences from potential appropriations by law enforcement. Both classes of criminal firms also feature larger cash holdings in order to have more readily disposable assets in case of detection. Financing costs are lower for *competition* firms and higher for *investment* firms with respect to the control sample. The evidence, though not particularly robust, showing that *competition* firms have higher costs of labour, suggests that they may be providing job opportunities to local people and associates so as to gain support for the criminal organisation.

## Sommario

Questo studio analizza le dinamiche economiche, patrimoniali e finanziarie delle imprese infiltrate dalla criminalità organizzata (CO), con lo scopo di identificarne gli elementi caratteristici della gestione e dell'operatività. Il lavoro offre un contributo originale alla letteratura sul tema da tre punti di vista. (i) Le imprese del campione utilizzato nell'analisi vengono individuate non sulla base di ipotesi più o meno verosimili, come avviene in alcuni studi di riferimento, ma in base ai dati sui sequestri nelle principali operazioni antimafia degli ultimi anni; si tratta quindi di aziende controllate quasi con certezza dalla CO. (ii) I precedenti lavori sul tema si concentrano sull'infiltrazione della CO nel Centro e Nord Italia; il gruppo di imprese qui esaminato comprende principalmente imprese del Sud. (iii) Vengono infine definite varie strategie di infiltrazione, caratterizzate da modalità di gestione e finalità diverse; le più importanti tipologie di aziende sono: le imprese di tipo *investimento*, create con capitali illeciti, ma gestite in maniera lecita; le imprese di tipo *competizione*, con le quali i criminali controllano il mercato locale di riferimento, anche utilizzando metodi *mafiosi*. Mediante l'analisi di alcune variabili e indicatori di bilancio, le imprese infiltrate vengono confrontate con un campione di controllo di imprese che presentano le loro stesse caratteristiche geografiche, dimensionali e settoriali. I risultati suggeriscono che le imprese infiltrate hanno generalmente ricavi più alti, ma una redditività inferiore rispetto alle imprese "sane". Le imprese di tipo *competizione* detengono attività facilmente liquidabili e fanno ricorso a beni di terzi, mentre le imprese *investimento* impiegano beni propri. Gli oneri finanziari sono inferiori per le imprese di tipo *competizione* e superiori per le imprese di tipo *investimento* rispetto al campione di controllo, a segnalare opposte modalità di gestione finanziaria. Infine, il costo del lavoro è maggiore per le imprese di tipo *competizione*.

**JEL Classification:** D22, E26, K42, K49.

**Keywords:** OC, infiltration, money laundering, financial statements.

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## 1. Introduction<sup>1</sup>

In the last decades the fight against organized crime (OC henceforth) has been at the center of the policy makers' agenda of most developed countries and the international security cooperation. One of the main concerns for the national and international authorities is the ever increasing investment of OC in the official economy through the infiltration of legitimate businesses.

The United Nations Office on Drugs and Crime assesses that in 2009 the revenues generated globally by OC amounted to 3.6% of the world's GDP (UNODC, 2011). As for Italy, a study by Transcrime, in cooperation with the Italian Ministry of the Interior, shows that the proceeds of mafia groups may be estimated to range from 1 to 2 per cent of GDP (Transcrime, 2015). Widening the scope, the Italian Institute of Statistics estimates the non-observed economy, which includes underground economy and illegal activities (e.g., drugs, prostitution, etc.), to be 11.9 per cent of Italian 2018 GDP, i.e. 211 billion euro (ISTAT, 2020). All these estimates suggest that the role of OC groups in the economy is relevant, both worldwide and in Italy in particular.

Surely not only is the presence of OC groups in the economy undesirable in its own right, but it also negatively affects the way the economy works, for instance, by hindering competition and the optimal allocation of resources, which in turn may lower the overall level of output. In this field, Pinotti (2015) estimates the loss that the Italian regions of Basilicata and Apulia incurred in the thirty years starting from the second half of the 1970s due to the presence of mafia-type criminal organisations. According to his results, the GDP of the two regions at the end of the period was 16 percentage points lower than it could have been, had no OC been active in those areas.

Peri (2004) shows the presence of a significant negative correlation between murder rate, a proxy for OC presence, and economic development in Italy. He claims that some provinces in Sicily and Calabria may have experienced lower employment growth by as much as one percentage point per year from 1951 to 1991 due to the presence of active criminal organizations. Barone and Mocetti (2014) look at two earthquakes that occurred in two different Italian regions in 1976 and 1980 respectively and show how the ensuing recovery differed as a consequence of the weak institutional setting caused by the presence of OC in one of the two regions.

Literature has also focused on other costs associated to OC presence, such as those arising from the deterioration of the quality of the political class (Daniele and Geys, 2015), the reduction of electoral competition (De Feo and De Luca, 2013) and the decrease in foreign investments (Daniele and Marani, 2011). From another perspective, recent studies show that mafia's presence may also be associated to positive outcomes by acting as an economic stabilizer in the short-run, especially in a context of weak institutional presence (Le Moglie and Sorrenti, 2020), or by attracting public funds (Barone and Narciso 2015).

In conclusion, it is widely acknowledged that OC invests huge amounts of money and resources in legal firms in different fields and for different purposes. In addition to the negative effect on the allocation of resources resulting from unfair competition, these investments can increase local support for OC groups, since often they provide economic opportunities in depressed areas.

In this paper we look at Italian firms run by OC (henceforth infiltrated firms or criminal firms) by analysing their financial statements. The aim is twofold. Firstly, we wish to provide a

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description of the main features of these firms (geographical and sectoral distribution, dimension). Secondly, we employ both a univariate and multivariate analysis of several financial statement indicators in order to describe how they operate and whether they reflect their association to OC.

A crucial feature of our work lies on the selection of the sample of criminal firms. Thanks to the cooperation of one of the main Italian law enforcement agencies involved in the fight against OC and terrorism, we can rely on a unique list of firms, which were seized or confiscated by the judiciary as a result of a criminal investigation in the last decade. This is one of the three crucial dimensions whereby this work substantially differs from the existing literature: while many studies identify infiltrated firms by relying on an educated guess, our sample includes only firms whose infiltration by OC can be held to be almost certain.

A second original contribution our work provides lies in that our sample of infiltrated firms includes also businesses located in the Southern regions, which are the territories of origin of the main Italian OC groups., while most of the research in this area focuses on mafia penetration in the North of Italy,

Finally, in our research we attempt to define OC's different infiltration strategies by providing a classification of criminal firms, which is consistent with what emerges from various other sources (e.g., law enforcement agency reports or official documents<sup>2</sup>). The two more frequent categories of criminal firms we detect are *competition* firms (whose aim is to gain control of the local market of interest, by hook or by crook) and *investment* firms (mostly used as conduits to invest illicit proceeds in legal activities and typically run as legitimate businesses).

The infiltrated firms in our sample are more active in sectors with one of the following features: cash intensive industries (accommodation and food, entertainment); sectors where the bond with the territory is an asset (construction, real estate); economic activities with a low level of innovation, which requires limited R&D investments, low skills endowment and a high degree of contendibility.

We define a set of variables and indicators that account for the main financial and operational features of a business, including its size (both in terms of assets, turnover and staff), the composition of its assets (liquidity, tangibles, inventory), its profitability and the source of the financial resources. Based on these dimensions, first we carry out a preliminary univariate analysis in order to find some features that are typical of criminal companies. Most findings are either consistent with similar results emerging from the literature or with anecdotal evidence and stylised facts.

We also develop a more accurate multivariate analysis, which produces several interesting results in addition to reconciling most of the puzzles emerging from the univariate approach. Main results show that, with respect to legitimate businesses, criminal firms are bigger and generate larger revenues, but not necessarily higher profits. A candidate explanation is that revenues are artificially inflated in order to conceal illicit proceeds in the overall turnover.

As for the composition of assets, criminal firms feature larger cash holdings and lower inventories than their legitimate peers. This result may signal, on the one hand, the need of infiltrated firms to hold readily disposable assets against any risk of seizure and, on the other, inventory management for the purpose of tax avoidance. Also the type of infiltration affects asset composition: whilst *investment* firms seem to rely more on their own means and therefore hold more tangibles, *competition* firms make more extensive use of rented facilities and leased equipment.

Asset composition in turn affects the sources of funding, proxied by financing costs: with respect to legitimate businesses, these are lower for *competition* firms and higher for *investment* firms. The former may probably draw on funds coming from illegal proceeds, plus enjoying the favourable

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<sup>2</sup> See Commissione Antimafia (2018).

treatment of conniving or intimidated local lenders. The *investment* firms may have an initial endowment of funds of illegal origin, but are then left free to build their own debt stock at market conditions.

Evidence, albeit weak, of higher labour costs also emerges for *competition* firms, consistent with the stylised facts that infiltrated firms are used both as a financial support for the families of OC associates and as tools for building consensus.

The paper is structured as follows. Section 2 briefly illustrates the main findings of the literature on the role of OC in the legitimate economy and outlines the motivation behind this work. In Section 3 we provide some descriptive evidence on our sample of infiltrated firms. Section 4 compares our sample of criminal firms with legal entities at a descriptive level. Section 5 presents the results of a univariate analysis and of a set of multiple linear regressions. In section 6 we provide some brief concluding remarks.

## 2. Motivation and literature review

Italy may be considered as a natural case study for investigating the role of OC in the legal economy for two main reasons. Firstly, the mafia's presence in the country is pervasive: mafia-style groups are rooted in the Southern regions of Italy, but over the years they have increasingly spread their presence elsewhere in the country.<sup>3</sup>

Due this pervasiveness, the regulatory framework that has been put in place over the years to fight OC is considered to be particularly advanced, which leads us to the second reason why it is interesting to look at Italian criminal firms. In order to tackle criminal organisations law enforcement agencies have, among others, also the power to seize their assets, including firms.<sup>4</sup> Our sample of criminal firms is made up by businesses seized during anti-mafia operations pursuant to this specific regulation.

The question on how infiltrated firms operate in the economy, with particular focus on Italy, is widely debated in the literature. Indeed, several scholars have recently engaged in explaining the effects of infiltration on Italian firms' financial statements.

Fabrizi et al. (2017a) focus their attention on firms located in Central and Northern Italy, which have been subject to a judicial procedure following a police investigation. They show that the mafia uses companies for different goals. They define three different types of infiltrated firms. A first group is composed by small firms, which appear not to carry out any productive activity and that are used to provide the organization with the goods and services they purchase. A second group includes small and medium-sized enterprises, which are essentially conduits to launder money through false invoicing schemes. The third group, consisting of large firms similar to non infiltrated ones, may achieve different goals, including to liaise with the institutions, which they do thanks to

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<sup>3</sup> Buonanno and Pazzona (2014) highlight two determinants of the mafia's expansion from the Southern regions to the rest of Italy in the second half of the 1950s (the period of the so-called "Italian economic miracle"): the flow of immigrants from the South to the North and the adoption of confinement measures, as a result of which individuals involved in mafia-type criminal activities were forced to resettle outside their province of origin.

<sup>4</sup> The history of seizures of assets linked to OC groups in Italy traces back to the 1980s. Indeed, in 1982 the so-called Rognoni La Torre Act (Law 646/1982) introduced measures that directly attack the wealth of people affiliated to mafia groups. Moreover, since then, various other reforms were implemented aiming to prevent these firms from defaulting when run by the State. Overall, these instruments have been found to be very effective in the fight against OC. Moreover, seized and confiscated firms are a relevant phenomenon in the Italian economy. In the economic debate, it is acknowledged that a proper management of these assets can save jobs and help the State in defeating OC (Donato, Saporito and Scognamiglio, 2013). In 2010 a decree law established an Agency (*Agenzia Nazionale per l'Amministrazione e la Destinazione dei Beni sequestrati e Confiscati alla criminalità organizzata* - ANSBC), whose purpose is to manage seized and confiscated assets from OC. The Agency currently runs almost 2,900 firms and more than 18,000 real estates, and collects data on all seizures of mafia assets.

their scale of activity and their relatively high performance. From their analysis it emerges that criminal firms are overall larger, have more debt and less liquidity than legal ones.

With reference to a sample of firms located in Lombardy, the richest region in Italy, Bianchi *et al.* (2020) examine the consequences of having board directors connected with OC. They find that firms with at least one director or a shareholder who has allegedly committed an OC-related offense have lower profitability, higher sales and lower costs of labour. They also feature higher bank debts and lower cash holdings and experience higher probability of default. On the other hand, such firms have lower financing costs and quicker cash conversion cycles. The authors suggest that connections to OC can be harmful to shareholders, as criminal organisations seem to cannibalize profits and drain resources from the firms, possibly through money-laundering schemes.

Mirenda *et al.* (2019) study the infiltration of *'Ndrangheta*, a criminal organization headquartered in the Southern region of Calabria, into firms located in the Centre and North of Italy<sup>5</sup>. They show that *'Ndrangheta* tends to enter firms in economic and financial distress and those mostly relying on public sector procurement. Infiltration generates a significant rise in the firm's own revenues likely due to money laundering and to the coercive power of the organisation.

Our work builds on these three papers, but it differentiates substantially from them on three main points, as mentioned in the previous section. Firstly, our sample of criminal firms include businesses based in Italy's Southern regions, the territories of origin of the main Italian OC groups, whilst all the three studies focus on mafia penetration in the North of Italy. Secondly, in our work we study firms which were almost certainly infiltrated by OC instead of relying on different assumptions, however sensible they may be, regarding their link with criminal organisations. Finally, we provide an original classification of OC infiltration strategies and find how different strategies may impact on a firm's financial statement. In this latter regard, the work may also provide operational tools to be deployed for anti-money laundering financial analysis purposes.

### 3. The sample of infiltrated firms

Our sample of firms includes firms which were seized during the most important anti-mafia police operations occurring between 2007 and 2017. As a result of these investigations these firms emerged as being linked to various OC groups.

Businesses in our sample have two main characteristics. Firstly, they are mostly “real” businesses, i.e. they are not only mere instruments for money laundering. Instead, they own tangible assets, they have a payroll for their employees and they compete in their local markets, which in most of the cases matches the province in which they are located. As for their ownership structure, almost all firms in the sample display the same shareholders and directors at incorporation and at the time of seizure, which may be interpreted as showing that these firms were incorporated by members of OC groups, i.e. they were “born infiltrated”.

Based on the evidence provided by law enforcement, it is possible to identify four types of infiltration:

- 1) *Investment*: the firm is used as a conduit to invest illicit proceeds through legal activities. After the initial investment, the firm is not financed with illicit funds and competes “fairly” in its local market.
- 2) *Competition*: the firm is run to gain control of the local market of interest, deploying mafia methods when needed in order to harm competitors, either by sabotaging them or by forcing customers

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<sup>5</sup> They define as “infiltrated” all those firms that in a given year had at least one administrator or owner whose last name matched one of those in the list of the Anti-Mafia Agency of clans operating in the Centre and North and who was born in Calabria.



to buy its own products. As a result, the firm is able to gain some sort of monopolistic power using violence and intimidation (Savona and Berlusconi, 2015).

- 3) *Washing machine*: it is not a “real” firm, but only a means to launder illicit proceeds, mainly through false invoicing.
- 4) *Capture*: the firm is gradually taken over by the mafia, at first by quasi-legal means (e.g. provision of funds or contracts) and then through violent acts<sup>6</sup>.

The firms belonging to the latter two categories are rare in our sample; hence they are not included in the analysis. Conversely, we focus our attention on the firms belonging to the first two groups. A similar classification to the one proposed here is outlined in the findings of Commissione Antimafia (2018) and the pivotal work on mafia and entrepreneurship by Arlacchi (2007). The latter states that OC-run firms have three competitive advantages: the first two are the capacity to restrain competition and the ability to curb salaries using intimidating power, which are the main features of *competition* firms; the third is the availability of liquidity to invest, possibly in richer markets (Northern Italy or abroad), which is typical of *investment* firms.

In theory, the categories we propose are not mutually excludable. For instance, a firm can be captured and then run as an *investment* or a *competition* company. In practice, we found only a few firms belonging to more than one typology, which indirectly confirms that our classification has some ground. Those few firms were classified based on the most fitting category.

Our initial sample includes around 500 firms. However, almost half of them cannot be included in our analysis as they lack complete financial data: some are individual companies, which disclose only limited financial information to the public; others are simplified limited liability companies, which provide fewer financial statements; the financial statements of others are incomplete in the period of analysis. In addition, we disregard *washing machines* and *capture* firms. Eventually, there remain 237 businesses we can focus on.

**Table 1** shows the distribution of the firms in our final sample according to the type of infiltration and the criminal organisation they are associated to. Nearly half of the firms are associated to *Ndrangheta*. This is consistent with the findings of law enforcement agencies whereby *Ndrangheta* has strongly increased its share in the legitimate economy in the last decades. *Ndrangheta* has a higher share of *investment* than *competition* firms. Despite being not as famous abroad as the Sicilian *Cosa Nostra*, it is currently believed to be the most powerful crime syndicate in Italy and one of the richest and most influential worldwide (Gratteri and Nicaso, 2009). Traditionally, its main source of revenues has been drug trafficking, but there is solid proof that it is also systematically involved in the whole range of unlawful activity available to OC, including appropriating public procurement, extortion, usury, arms trafficking, gambling, human trafficking, and disposal of toxic and radioactive waste (Gratteri and Nicaso 2016).

**Table 1**  
Infiltrated firms by OC groups and type of infiltration (*number of firms*)

	Apulian OC (Apulia)	Camorra (Campania)	Cosa Nostra (Sicily)	'Ndrangheta (Calabria)	<b>Total</b>
Investment	12	24	21	70	127
Competition	19	17	11	63	110
<b>Total</b>	<b>31</b>	<b>41</b>	<b>32</b>	<b>133</b>	<b>237</b>

<sup>6</sup> Arguably this is the type of firm analysed by Mirenda *et al.* (2019) who study the dynamics of infiltration.

**Figure 1**  
**Presence of infiltrated firms across Italian provinces by OC group membership**

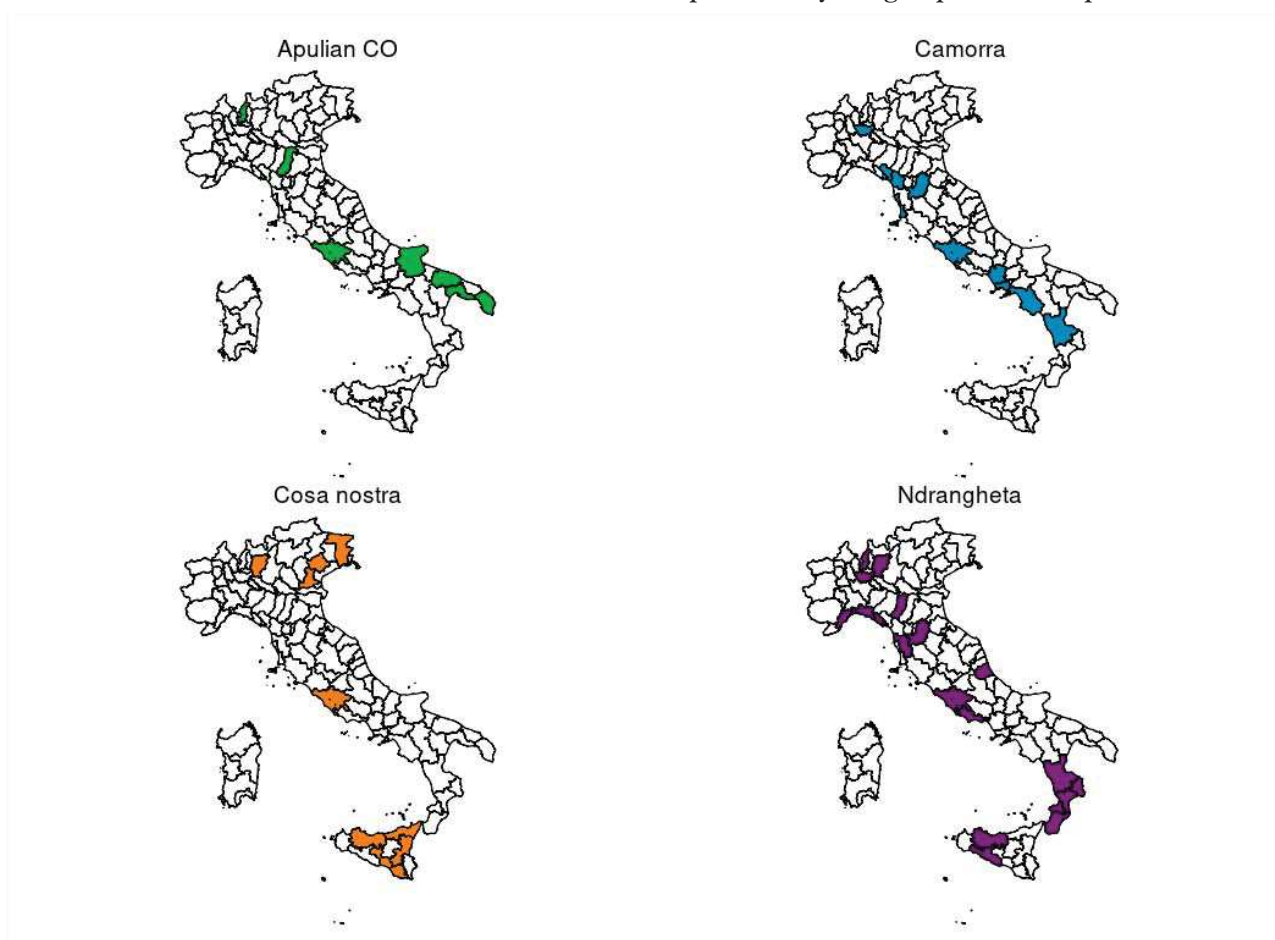


Figure 1 shows the distribution of our sample of infiltrated firms across Italian provinces by OC group membership. Most provinces in the sample are in the Centre and the South of Italy. In particular, the four largest Southern regions (Apulia, Calabria, Campania and Sicily), which are also the headquarters of the four Italian OC groups, cover two thirds of the firms in the sample. *Camorra* and especially *Cosa Nostra* seem to be relatively more tied to their regions of origin (Campania and Sicily respectively). Finally, in Apulia there are several OC groups, which we refer to as Apulian OC syndicate. *Ndrangheta* is spread nationwide, even in Sicily. When considering the type of infiltration (data not shown), *competition* firms, as opposed to *investment* firms, feature a higher relative incidence in the North West<sup>7</sup>.

As stated before, the fact that most of the firms in our list comes from Italy's Southern regions is relevant. Indeed, in these regions the infiltration is more likely to be associated with the "physical" occupation of the territory than in Northern Italy. For instance, Piedmont, the region of Turin, is absent from the sample, despite being recently in the spotlight for some mafia infiltration cases. Donato *et al.* (2013) confirm that seized firms are rare in Piedmont. A tentative explanation, which is often provided, holds that public prosecutors or courts operating outside those areas traditionally controlled by the mafia may be less prone to order seizures. Nonetheless, as will be shown in the

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<sup>7</sup> The Italian Financial Intelligence Unit performed a study of suspicious transaction reports related to OC groups in 2015, showing a geographical distribution similar to that emerging from our sample. Other studies on mafia diffusion at provincial level provide analogous results (Calderoni, 2011).



next sections, our methodology adequately addresses the lack of some relevant provinces in the sample.

On the basis of these initial considerations, we compare *competition* and *investment* firms, the main classes of firms in our sample, so as to highlight the differences in terms of three basic dimensions that represent their main structural characteristics:

- 1) province where the firm is located;
- 2) size – we group firms into four categories according to total assets (micro, up to 2 million euros; small, from 2 to 10 million; medium, from 10 to 50 million; large, over 50 million);
- 3) sector of activity – here we refer to the 19 categories defined by the Italian Institute of Statistics.

Information was extracted from the Italian commercial database that collects financial statements data of all Italian limited liability and public companies. Although these characteristics are supposed to change very little in a short time span, we decide to use data of the second to last year before the seizure, so as to prevent results from being influenced by seizure-related operations or anticipatory effects.<sup>8</sup>

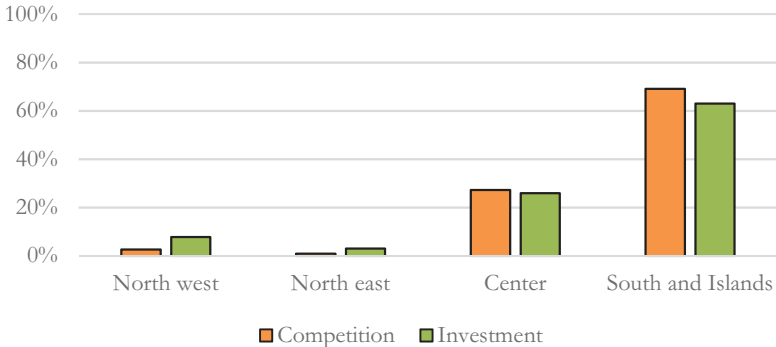
Only small differences emerge in the geographical distribution of the two groups (Figure 2.1): *investment* firms are slightly more common in richer areas of the country, the North-West and the North-East, where there are likely greater investment opportunities, while *competition* firms are easier to be found in the Centre-South.

Figure 2.2 shows that *competition* firms tend to enter sectors, such as construction, transportation and entertainment, where they can exploit the set of mafia-style “competitive advantages” at their disposal. Entertainment includes gaming arcades and slot machines distribution, which are known to be highly infiltrated by OC groups (DIA, 2020). *Investment* firms are relatively more concentrated in the accommodation and food service business, in addition to both wholesale and retail trade, which are traditional fields of investment for criminal organisations.

As for firms dimension, data show that most criminal firms are either small- or micro-sized, regardless of the type of infiltration; just very few *investment* businesses are large (Figure 2.3).

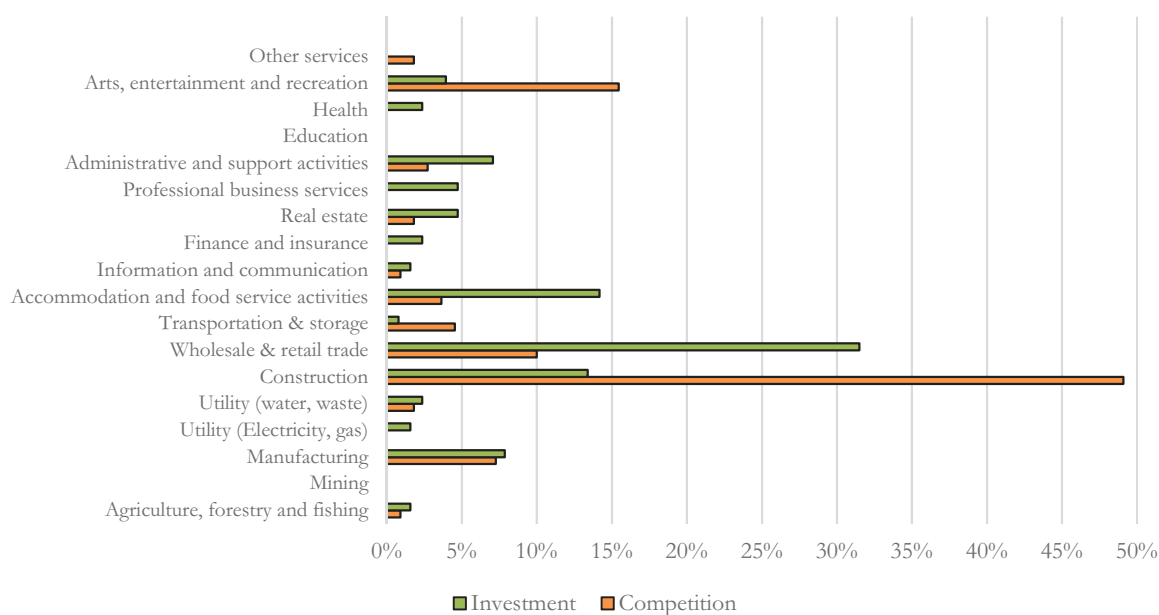
**Figure 2 – Comparison between *competition* and *investment* firms**

*2.1 Distribution across macro-regions*

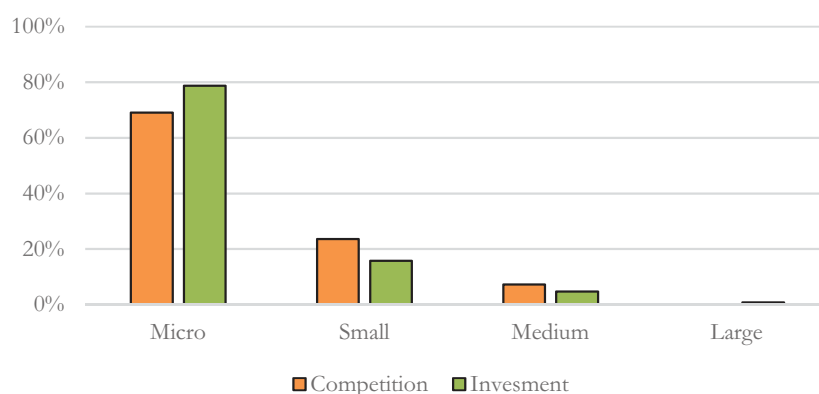


<sup>8</sup> The effect of anticipation of seizure on credit has been extensively analysed by Donato et al. (2013).

## 2.2 Distribution by sector of economic activity



## 2.3 Distribution by size



## 4. A comparison between criminal and legal firms: the structural characteristics

In this section we compare the whole sample of infiltrated firms (*competition* and *investment*) with the population of Italian limited liability companies, in order to highlight the differences between criminal and legal businesses in terms of geography, size and sector of economic activity. We perform the comparison with reference to the same features considered in the previous section. Data refer to 2015 which is the year for which data for infiltrated firms are more exhaustive.

From a geographical point of view (Figure 3.1) whilst legal firms seem to be evenly distributed across macro-areas, our sample of criminal firms is disproportionately concentrated in the South, which hosts the main OC groups.

As for the distribution across sectors (Figure 3.2), infiltrated companies are relatively more active in sectors presenting features that may be associated with the unlawful goals OC firms may pursue. For instance, sectors such as accommodation and food and entertainment are typically cash intensive, which translates into wider opportunities for money laundering and at the same time a

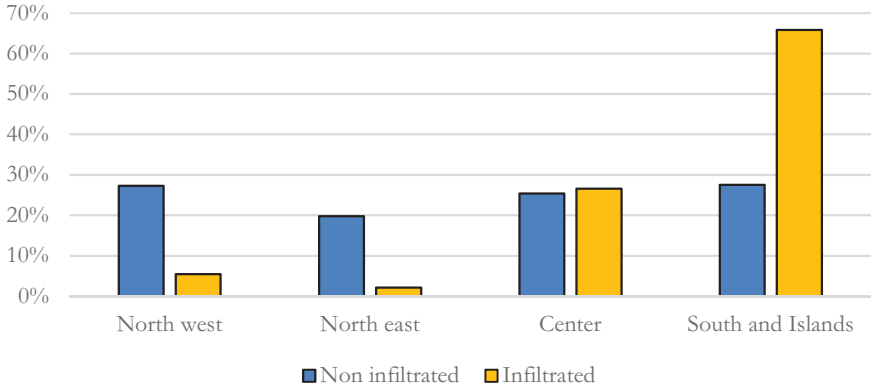
shield against the risk of seizure by the judiciary. As for construction and real estate, these are economic activities that require a good knowledge of the areas where they are based and also grant a direct control of the territory as a valuable by-product. Finally, sectors requiring a low level of innovation are usually preferred by OC since these are more easily controllable, require less R&D investment and better match OC limited skill set. Overall, these findings are consistent with those of other authors (Transcrime 2015; Fabrizi *et al.* 2017a; Mirenda *et al.* 2019).

No substantial differences emerge as for the size of the company, but for a slight higher likelihood that criminal firms are small- or medium-sized with respect to legal firms, which tend to be smaller (Figure 3.3).

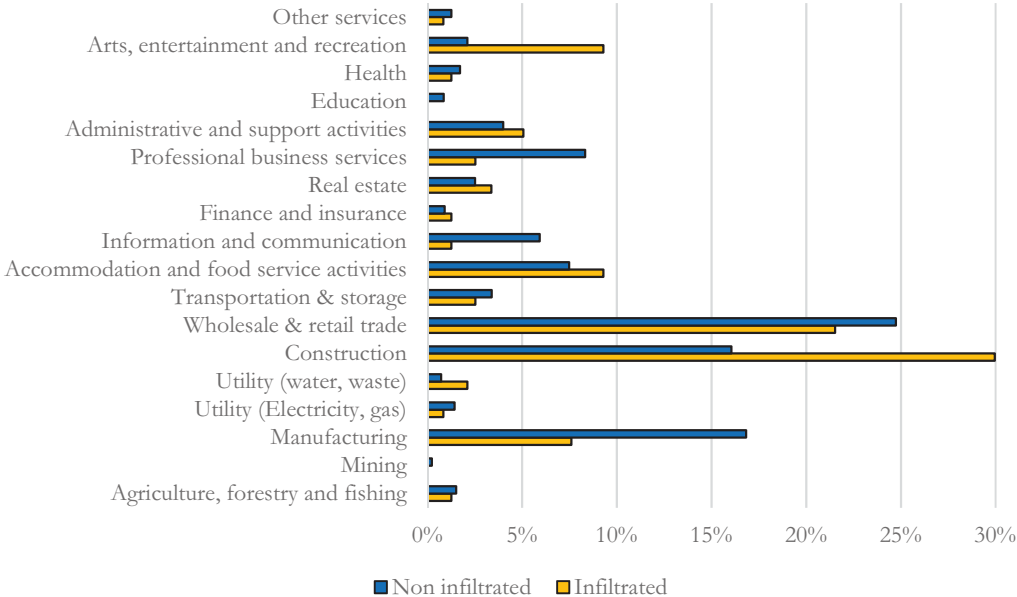
Some of the indicative outcome emerging from the descriptive analysis carried out in this section will be confirmed by the empirical analysis in the following section.

**Figure 3 – Comparison between infiltrated and non-infiltrated firms**

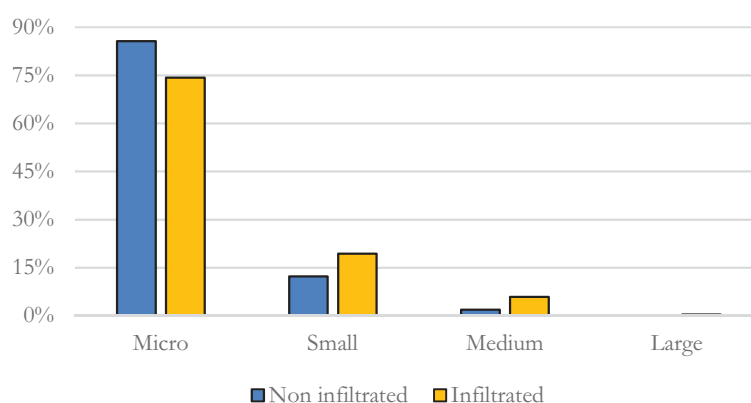
*3.1 Distribution across macro-regions*



*3.2 Distribution by sector of economic activity*



### 3.3 Distribution by size



## 5. A comparison between criminal and legal firms: empirical analysis

### 5.1 Financial and economic indicators

After describing the composition of the sample of criminal firms in terms of their area, sector of activity and size, and having highlighted the structural differences with legal firms, we move on to analyse some financial statements data so as to compare the two groups of companies.

To this end, we build a longitudinal dataset including both legal and criminal firms observed over a homogeneous time span from 2010 to 2015. As was done in the previous section, for the criminal firms we only use the financial statements data up to the second to last year preceding the seizure. We disregard the years following the seizure because in this period companies are usually run by directors who are appointed by the courts and hence would provide little evidence on OC management style.

Regarding the legal firms, there would have been little sense in including in our analysis the universe of all legal limited liability companies active in Italy in the period of analysis (nearly 6.7 million). We need to build a control group of legal firms that are comparable with our sample of OC businesses in terms of their main structural features. To this end, our control group only include firms featuring a combination of size class, province<sup>9</sup>, sector of activity and budget year matching that of at least one criminal firm. Accordingly, the number of total limited liability companies included in the control group shrinks to about 877,000 firm/year observations.

We reckon that the probability that our sample of infiltrated firms contains actual non-infiltrated ones (false positives) is close to zero. Our sample is a selection of firms seized after the most important police operations against OC. On top of that, the selection was made in cooperation with an Italian law enforcement agency actively involved in the fight against OC. For these reasons, we can affirm that the firms of our sample are infiltrated almost with certainty. Conversely, some of the firms flagged as non-infiltrated in our control sample might be in fact infiltrated (false negatives). But, since our control sample is made by hundreds of thousands of firms-year observations, the actual incidence of false negatives can be reasonably held to be very limited. Hence, given that false positives are almost zero and false negatives are very limited, the bias deriving from the misclassification error in the multiple linear regression model is negligible.

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<sup>9</sup> Selecting the province allows us to avoid endogeneity problems that would have arisen if the city or the district had been taken into account. Two firms, A and B, located in the same small city are likely to compete for the same market. If firm A increases its revenues, then firm B's may decrease, given the size of their market. This selection procedure ensures by construction that the common support hypothesis is satisfied.

Once we set up our control group, we compare it with the sample of criminal firms on the basis of criteria other than the structural features used for matching purposes. To this end we use an array of dimensions meant to account for the main financial and operational features of a business, including some customary variables and indicators extracted from the financial statement.

The first dimension we analyse is the size of a firm in terms of total assets and revenues. Whilst for most firms the latter are the most reliable variables to refer to, for those business operating in specific sectors (e.g. real estate) assets are more important in assessing their financial dimension.

We also analyse the amount of resources held in the form of cash holdings. For this purpose we refer to both the amount of cash and cash equivalents held by a firm and the so-called cash ratio (cash plus cash equivalents over total assets) to control for dimension.

In order to have an exhaustive picture of the financial footprint of a business it is certainly worth looking at the liabilities and their composition. In fact, data in this respect are scarcely available for Italian limited liability companies, the class of business we focus on. Indeed, the law allows part of this type of firms to publish a “simplified” version of financial statements which provide only aggregate measures of some financial variables. For instance, no distinction is made between banking and commercial debts. Moreover, debt data are often missing in the dataset of the central commercial register. Since we are interested in examining how firms finance their activity we use the two best proxies we have: financing costs, which is the sum of all the costs a company incurs in financing its debt, and financing costs over revenues.

Granted an important feature one may wish to look at in assessing a business is its profitability. This is extremely relevant in our analysis, since it is certainly key to understanding the main drivers underlying the infiltration by OC of a legitimate business and, most notably, whether infiltrated firms are more or less profitable than their control counterparts. To this end, we can rely on a wide array of variables and indicators: total profits, as stated in the balance sheet; earnings before interest, taxes, depreciation and amortization (EBITDA); return on assets (ROA); and finally, the ratios of EBITDA over assets and over revenues.

Next in line as a qualifying feature of a company is its capital stock. Accordingly, we attempt to understand whether infiltrated firms employ more or less capital, which can be done in two ways: considering the raw amount of tangible assets, including net properties, plants and equipment or, alternatively, looking at the costs a firm can bear for rents and leases.

In terms of a company’s overall assets composition, we look at the amount of intangibles and inventory detained. Inventory is interesting from two viewpoints. On the one hand, the raw amount may signal the health of a business, for instance a high level of inventory may be due to difficulties in selling the products of the firms. On the other hand, tampering with the way inventories are valued is often a lever used to evading taxes, which illegal firms practice regularly. Both intangibles and inventory are also considered with respect to total assets.

Finally, we take into account the dimension of a company’s staff and payroll. This is a key element for infiltrated firms, since they are often used as a consensus- generating tool: investigative evidence shows that, by hiring affiliates or their relatives, criminal organisations also aim at gaining consensus. However, also in this case we need to overcome a dearth of data on labour, such as wages or the number of employees, which are often unavailable, and thus resort to proxies, namely total wage bill.

Overall our analysis includes 11 variables and 10 financial indicators which are illustrated in Table 2. The 10 financial indicators derive from the 11 variables according to the rule of thumb whereby balance sheet variables are normalised by total assets and income statement variables by revenues. The only exception is EBITDA, which is normalized by both total assets and revenues. Assets and revenues *per se* are considered only as variables.



**Table 2**  
**Variables and financial indicators of analysis**

<b>Dimension of analysis</b>	<b>Variables</b>	<b>Financial indicators</b>
Size	Assets	
	Revenues	
Liquidity	Cash	Cash over assets
Indebtedness	Financing costs	Financing costs over revenues
Profitability	EBITDA	EBITDA over revenues
		EBITDA over assets
	Profit	ROA (Return on assets)
Assets composition	Tangibles	Tangibles over assets
	Intangibles	Intangibles over assets
	Inventory	Inventory over assets
Investment (internal vs external resources)	Cost of rents and leases	Cost of rents and leases over revenues
Employment	Cost of labour	Cost of labour over revenues

The complete dataset is made of around 877,000 observations for legal firms and over a thousand observations for criminal firms. Regretfully, all variables and indicators, except from assets, have several missing data for both legal and criminal firms. Moreover, firms have a heterogeneous number of budget data across the years. In order to control for this large unbalance across the firms and variables, we build a system of weights for every variable/indicator as the inverse of the number of times each firm is taken into account in the dataset. All statistics and tests described in the following sections are estimated by using this system of weights.<sup>10</sup>

## 5.2 Univariate analysis

Once we have defined the financial dimensions on which we base our comparison between infiltrated and non infiltrated firms, we move on to develop the first stage of such comparison, which involves a mere analysis of the differences in the means of each variable and indicator between the two groups. In addition, we perform the same analysis comparing *investment* and *competition* firms, so as to explore whether the type of infiltration has any effect on the way a company is run.

For the first comparison we perform a standard statistical test which shows whether the mean of each variable for criminal firms feature a statistically significant difference from non-infiltrated firms. Results are shown in Table 3. At first glance, the results convey the idea that the two groups (criminal and legal firms) feature widespread differences, which is itself a remarkable outcome.

Consistently with Mirenda *et al.* (2019) and Fabrizi *et al.* (2017a), Table 3 shows that infiltrated firms are significantly larger than legal firms both in terms of assets and revenues. Consequently, almost all variables in levels are larger for criminal enterprises. Conversely, the test shows that infiltrated firms are less profitable than their legal peers, according to both profit and EBITDA.

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<sup>10</sup> Each firm has as many duplicates as the number of times a variable is present in each financial statements. For instance, firm A has been active from 2010 to 2015, i.e. 6 financial statements in a row. If in 5 out of 6 of them, firm A presents data on cash, the statistical procedure controls for this number of duplicates.

**Table 3**  
**Comparison of means between infiltrated and non-infiltrated firms**

Variable/indicator	Infiltrated firms (A)		Non infiltrated firms (B)		Difference in means
	N. of obs.	Mean	N. of obs.	Mean	A vs B
Assets	1038	3227.4	877,186	637.2	A > B ***
Revenues	857	2204.8	694,899	578.0	A > B ***
Cash	925	143.9	778,321	50.0	A > B ***
Cash over assets	925	0.14	778,321	0.18	A < B ***
Financing costs	632	84.7	468,749	13.11	A > B ***
Financing costs over revenues	596	0.08	426,399	0.15	A < B
EBITDA	866	-28.2	655,583	27.0	A < B ***
EBITDA over revenues	796	-0.75	586,975	-0.23	A < B **
EBITDA over assets	866	-0.001	655,583	-0.039	A > B
Profit	983	-104.1	805,375	-14.3	A < B ***
ROA	983	-0.097	805,375	-0.696	A > B
Tangibles	635	867.5	561,995	281.4	A > B ***
Tangibles over assets	635	0.44	561,995	0.42	A > B
Intangibles	725	198.6	486,681	37.0	A > B ***
Intangibles over assets	725	0.12	486,681	0.11	A > B
Inventory	525	516.9	441,745	330.5	A > B ***
Inventory over assets	525	0.26	441,745	0.36	A < B ***
Cost of rents and leases	942	550.0	800,181	142.5	A > B ***
Cost of rents and leases over revenues	846	0.91	682,609	0.71	A > B
Cost of labour	689	285.4	437,003	126.5	A > B ***
Cost of labour over revenues	674	0.35	428,571	0.32	A > B

Difference in means is tested with a two-sample t-test. \*\*\*: significant at 1 per cent; \*\*: significant at 5 per cent; \*: significant at 10 per cent. All statistics and tests are computed by controlling for the number of duplicates for each firm, i.e. by using a set of weights computed as the inverse of the number of times each firm is present in the sample.

This result is further confirmed if one looks at the ratio of EBITDA over revenues, which is significantly lower for infiltrated firms. The result that infiltrated businesses earn less profits despite their larger revenues suggests that they are inefficient, since criminal organisations may drain resources from their firms (Arlacchi 2007; Bianchi *et al.*, 2020). Moreover, they may have other goals than being profitable and staying on the market, which they are able to achieve regardless, by relying on illegal competitive advantages. In addition, criminal firms may artificially inflate their revenues and costs in order to better conceal illicit proceeds.

Additional insights emerge when looking at financial indicators. The cash holdings are larger for infiltrated firms in absolute terms, but smaller relative to total assets. The latter is consistent with Fabrizi *et al.* (2017a). Also, the same applies to inventories (larger in absolute terms, but smaller as a share of total assets). These non-univocal indications may be reconciled by multivariate analysis.

Some results diverge from what one could have expected. Infiltrated firms' payroll is larger than legal ones' in absolute terms, but the difference is not statistically significant if measured against revenues. Moreover, although criminal outfit are typically held to rely on sources for funding outside the official financial sector, yet infiltrated businesses in our sample bear higher financing costs in absolute terms, but such difference fades if set against the scale of their turnover.

In comparing infiltrated firms on account of the type of infiltration, one must bear in mind that *investment* firms, by definition, differ from legal businesses solely due to their owners, but are run in a similar fashion. For this reason, *ex ante* one would expect this group of criminal firms to show similar features to non-infiltrated ones. In fact, Table 4 seems to provide a somewhat different picture.

**Table 4**  
Comparison of means between *competition* and *investment* firms

Variable/indicator	Competition (C)		Investment (D)		Difference in means
	N. of firms	Mean	N. of firms	Mean	C vs D
Assets	454	2370.1	493	4349.5	C < D **
Revenues	398	1951.5	378	2754.2	C < D
Cash	406	129.2	440	175.5	C < D
Cash over assets	406	0.15	440	0.13	C > D
Financing costs	273	24.68	303	163.4	C < D *
Financing costs over revenues	266	0.04	275	0.06	C < D **
EBITDA	397	-11.14	389	1.43	C < D
EBITDA over revenues	373	-0.07	345	-1.57	C > D **
EBITDA over assets	397	-0.02	389	0.02	C < D
Profit	443	-166.1	457	-66.17	C < D
ROA	443	-0.12	457	-0.08	C < D
Tangibles	345	585.4	239	1349.2	C < D ***
Tangibles over assets	345	0.42	239	0.50	C < D
Intangibles	332	291.6	329	141.8	C > D *
Intangibles over assets	332	0.14	329	0.10	C > D **
Inventory	213	705.3	271	385.9	C > D ***
Inventory over assets	213	0.25	271	0.27	C < D
Cost of labour	345	301.9	291	307.6	C < D
Cost of rents and leases	420	677.1	436	495.4	C > D
Cost of rents and leases over revenues	393	1.15	372	0.70	C > D
Cost of labour over revenues	337	0.44	284	0.25	C > D *

Difference in means is tested with a two-sample t-test. \*\*\*: significant at 1 per cent; \*\*: significant at 5 per cent; \*: significant at 10 per cent.

All statistics and tests are computed by controlling for the number of duplicates for each firm, i.e. by using a set of weights computed as the inverse of the number of times each firm is present in the sample.

Firstly, it clearly emerges that the two groups of infiltrated firms diverge along far fewer dimensions than one would expect (the difference in the means of our variables and indicators is statistically significant in a handful of cases) and fewer than those whereby legal businesses and the whole of criminal firms are shown to differ in the previous table.

Secondly, unlike their legal counterparts, *investment* firms are larger than *competition* businesses in terms of assets, which is consistent with results shown in Fabrizi *et al.* (2017a). The same applies to the financing cost sustained (both in absolute terms and compared to revenues).

Additionally, the two groups of criminal firms significantly differ by the composition of their assets. Somewhat counter-intuitively, *competition* firms hold more intangibles and inventory. Finally, they are also more profitable (in terms of EBITDA over revenues) which may be due to the wide competitive leverage, including violence and intimidatory power, they deploy to uphold their advantage with respect to their legal competitors.

In assessing these results, however, one should bear in mind that univariate analysis takes into account one dimension at a time; therefore, differences between these two groups of firms may arise also due to other factors than the type of infiltration. Hence, some of the inconsistencies highlighted in this section may be reconciled by using the multivariate approach illustrated in the next.

### 5.3 Multivariate analysis

The inconsistencies, though minor, highlighted in the previous section should puzzle only to a limited extent, since results do not factor in all the available information at one time. More informative outcomes may certainly be obtained by switching to a multivariate approach that exploit more exhaustively the wide dataset we described at the beginning of section 5.1.

In this section we illustrate the result of a set of multiple linear regressions aiming to study the connection between financial-economic variables/indicators and infiltration. In these regressions, we include additional factors which were not taken into account in the univariate analysis: age of the firm (number of years after the incorporation), province of location, sector of activity and economic cycle (based on the year of the financial statement). We also include a variable measuring a firm's market power,<sup>11</sup> since infiltrated firms' market power has important implications on the operations of their competitors. Fabrizi et al. (2017b) show that when in a given market a criminal firm goes out of business, the performance of non-criminal competitors increases significantly.

We run a wide set of regressions each using as dependent variable, a different financial variable or indicator of Table 2, with the exception of total assets, which is only used as a control for the size of the firm (taken in log). Each regression, on the right hand side, displays two key variables for the analysis: a dummy for *investment* firms and one for *competition* firms; the sign and the size of the infiltration coefficients measure the marginal differentials between each type of infiltration and non-infiltration.

The model can be expressed as follows:

$$y_{i,t} = \alpha + \beta_{INV} INV_i + \beta_{COMP} COMP_i + \gamma X_{i,t} + \delta Z_i + \phi W_t + \varepsilon_{i,t}$$

where  $y$  is a financial statement variable or indicator,  $INV$  and  $COMP$  are the infiltration dummies,  $X$  is a vector of time-variant control variables (concentration, age, total assets),  $Z$  is a vector of time invariant control variables (sector of activity and province of location),  $W$  is the vector of year dummies to control for the economic cycle, and  $\varepsilon_{i,t}$  is the error term.

Table 5 shows the estimates for the coefficients of the models for the different variables measuring the most relevant features of a business, including size (both in terms of turnover and assets), indebtedness, liquidity, profitability, assets composition, investment (internal vs external resources) and employment. The main results can be summed up as follows.

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<sup>11</sup> Market power is measured as the sum of the squared ratios of the assets of the firm over the assets of all the firms in the same province, sector and dimension and in the same year.

**Table 5 - Estimation results***5.1 Revenues, indebtedness and liquidity*

	(1) Revenues	(2) Financing costs	(3) Financing costs over revenues	(4) Cash	(5) Cash over assets
Competition	685.55*** (4.62)	-34.10*** (-6.67)	-0.21 (-0.83)	20.31 (1.39)	0.05** (2.30)
Investment	1082.69*** (7.29)	61.84*** (11.72)	-0.14 (-0.55)	26.72* (1.93)	0.00 (0.09)
Concentration	20528.63*** (38.81)	2017.23*** (113.38)	1.13 (1.28)	2518.74*** (51.71)	0.61*** (9.21)
Size	388.76*** (170.75)	9.32*** (99.87)	0.06*** (12.16)	24.59*** (128.51)	-0.08*** (-306.61)
Age	-4.13*** (-13.73)	0.06*** (5.44)	0.00 (1.50)	0.32*** (11.36)	0.00*** (7.36)
Observations	239,692	172,804	161,765	265,340	265,340
r2	0.16	0.16	0.00	0.09	0.30

*5.2 Profitability*

	(6) EBITDA	(7) EBITDA over assets	(8) EBITDA over revenues	(9) Profit	(10) ROA
Competition	-92.23*** (-4.49)	-0.17 (-0.41)	0.10 (0.17)	-155.66** (-2.16)	-0.84 (-0.08)
Investment	-104.10*** (-5.04)	-0.02 (-0.05)	-1.44** (-2.32)	-51.18 (-0.75)	-0.18 (-0.02)
Concentration	1675.38*** (24.11)	-2.66* (-1.91)	2.15 (0.99)	15.51 (0.06)	-21.79 (-0.62)
Size	20.11*** (67.46)	0.17*** (28.13)	0.05*** (4.90)	-0.27 (-0.29)	1.13*** (8.19)
Age	-0.24*** (-5.33)	-0.01*** (-9.41)	-0.01*** (-7.01)	-0.48*** (-3.55)	-0.04** (-2.13)
Observations	228,825	228,825	209,354	271,296	271,296
r2	0.03	0.00	0.00	0.00	0.00

t statistics in parentheses

\* p&lt;0.10, \*\* p&lt;0.05, \*\*\* p&lt;0.01

All statistics and tests are estimated by controlling for the number of replicates for each firm, i.e. by using a set of weights computed as the inverse of the number of times each firm is present in the sample.



5.3 Assets composition

	(11) Tangibles	(12) Tangibles over assets	(13) Intangibles	(14) Intangibles over assets	(15) Inventory	(16) Inventory over assets
Competition	-65.22 (-0.88)	0.09 (0.53)	208.25*** (12.47)	0.08*** (4.90)	-263.85** (-2.35)	-0.13*** (-3.41)
Investment	424.17*** (5.18)	0.07 (0.37)	21.18 (1.26)	0.02 (1.02)	-501.23*** (-4.94)	-0.05 (-1.48)
Concentration	17383.99*** (56.43)	1.36** (2.03)	1867.27*** (31.93)	0.38*** (6.34)	21669.27*** (43.62)	-0.88*** (-5.33)
Size	209.31*** (160.76)	-0.12*** (-40.95)	22.48*** (91.59)	-0.04*** (-162.58)	296.04*** (165.38)	0.01*** (14.72)
Age	7.95*** (51.17)	0.01*** (43.92)	-0.02 (-0.52)	0.00*** (17.72)	-2.83*** (-12.26)	-0.00*** (-9.17)
Observations	189,310	189,310	189,698	189,698	158,586	158,586
r2	0.25	0.03	0.07	0.21	0.23	0.18

5.4 Investment (internal vs external resources) and employment

	(17) Cost of rents and leases	(18) Cost of rents and leases over revenues	(19) Cost of labour	(20) Cost of labour over revenues
Competition	331.09*** (7.17)	0.25 (0.37)	45.58* (1.82)	0.09 (0.42)
Investment	60.42 (1.36)	-0.14 (-0.21)	22.63 (0.83)	-0.06 (-0.26)
Concentration	7067.27*** (45.44)	5.16** (2.11)	2514.18*** (25.83)	0.20 (0.23)
Size	87.22*** (138.05)	0.06*** (5.54)	72.81*** (151.08)	-0.03*** (-6.97)
Age	-1.03*** (-11.58)	-0.00 (-0.47)	0.30*** (4.75)	0.00*** (5.99)
Observations	266,062	236,337	160,149	157,461
r2	0.10	0.00	0.19	0.00

t statistics in parentheses

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

All statistics and tests are estimated by controlling for the number of replicates for each firm, i.e. by using a set of weights computed as the inverse of the number of times each firm is present in the sample.

Revenues are higher for both types of infiltrated firms with respect to legal ones (the coefficient of the respective dummies are both positive and statistically significant), which is consistent with other findings in the literature and proves that criminal firms are successful in increasing their scale of activity.

Financing costs are lower for *competition* firms and higher for *investment* firms with respect to the control sample. Such costs may be higher (lower) due to a higher (lower) interest rate or a larger (smaller) debt stock. Lower financing costs, as is the case of *competition* firms, may be mainly due to two reasons. On the one hand, *competition* firms may avoid using official sources of financing, such as banks, since they can be funded with the proceeds of illegal activities, thus lowering the debt burden and the associated costs. On the other hand, these firms may obtain better conditions thanks to their coercive powers or the connivance of local lenders, thus lowering the interest rates they are charged. The two effects are given equal emphasis in the literature. Fabrizi *et al.* (2017a) state that the provision of illicit funds may decrease criminal firms' dependence on the banking system while Bianchi *et al.* (2020) find that these firms use more bank loans than legal ones as they can benefit from lower interest rates than their peers.

As for *investment* firms, our results suggest that they incur higher financing costs than their *competition* peers and the legal ones alike. There are two tentative explanations we may provide: first, since they are run as legitimate businesses, they are not able to obtain lower rates from their lenders at any means, as *competition* firms manage to do; second, they depend on a larger debt than their peers to finance their larger capital stock (see results on tangibles below).

Regarding liquidity, the multivariate approach reconciles the puzzle emerging from univariate analysis, since we found that *competition* firms detain a higher share of cash holdings over total assets, whilst cash stock of *investment* firms is larger in absolute terms than that of legal businesses. Although whether criminal manager hold more or less cash than their lawful peers is debated in the literature, our results seem to support the view whereby infiltrated firms increase the amount of cash in order to have more readily disposable assets to edge against the risk of seizure (Riccardi, Milani, Campedelli, 2016a and 2016b).

In spite of the scale of their revenues, all indicators we deploy are consistent in showing that infiltrated firms are less profitable than legal ones, regardless of the type of infiltration. The most noticeable result in this respect concerns *competition* firms, which pocket far lower profits than all other outfits. A possible explanation may be that this group of firms employ the whole set of mafia-style competitive advantages to scale up their turnover also in order to pursue goals other than mere profitability (e.g., money laundering, turf control, social support) which in turn may dent their profits due to higher costs. Regarding other variables and indicators, EBITDA is lower for both *competition* and *investment* firms, while only the latter feature a lower EBITDA over revenues. On this issue, our results are particularly clear-cut, whilst findings emerging elsewhere in the literature are more controversial (Bianchi *et al.*, 2020; Riccardi *et al.*, 2016a and 2016b).

*Investment* firms are shown to display also a larger stock of tangibles. A candidate explanation for this may be the fact that they are conduits for investing proceeds from illegal activities and, therefore, OC groups endow them with hefty assets from the outcome. Conversely, *competition* firms show a propensity to deploy goods provided by others (e.g. through renting or leasing), as the risk of detection may provide a disincentive for investing in own properties that risk being seized by the judiciary. *Competition* firms are also associated with lower inventory, both in absolute terms and relatively to their assets. In this latter regard, different explanations may be provided. Firstly, lower inventories may signal their systematic undervaluation to the purpose of evading taxes, an illegal practice in which all criminal firms often engage (Bianchi *et al.*, 2020). Secondly, less inventory could mean that *competition* firms sell more goods in the year, possibly through coercive methods. *Investment* firms' inventory stock is smaller in absolute terms both with respect to legal businesses and their *competition* peers.

Cost of labour is slightly higher in criminal firms, but only in absolute terms and for *competition* businesses. That may be because *competition* firms provide job opportunities to local people in depressed areas as a way to increase their approval and as a way to reward relatives of imprisoned associates. Investigative evidence seems to point out that infiltrated firms employ more labour and that organisations transfer the burden of paying members from the criminal organisation to the firms, providing a safe and legal income through fictitious salaries (DIA, 2020). This is also consistent with a recent study (Le Moglie *et al.*, 2020) showing that, although criminal organisations are largely detrimental for local economic conditions, their economic activity might act as an economic stabilizer in the short-run, especially in a context of weak institutional presence.

Overall, our results are consistent with the fact that the purpose of *competition*-type infiltrated firms is to acquire market share with mafia methods. This allows them to increase revenues and to stay in the market despite being less competitive than their peers. Moreover, since most of our firms are located in the South of Italy, where turf control is an issue for OC groups, higher costs may be a way through which they gain support, by hiring people or over-paying suppliers. Another channel through which higher revenues do not lead to higher profitability may be the necessity to conceal illicit proceeds in the normal turnover of a firm. Our findings also suggest that for *competition* firms, fear of detection may push firms' preferences towards liquid assets.

In order to check the robustness of our findings, we test several alternative specifications of our model. Instead of province and sector, we employ a firm level random effect in order to control for unobserved firm-specific factors. Many firms have many missing data for many variables, that is why the number of observations varies for each regression. To overcome these shortcomings, we estimate two additional models. The first one performs the same set of regressions only on firms without missing data. The second model replaces missing data with the mean of the group at geographical, sectoral and dimensional level. The results do not significantly differ. Additionally, we also drop all control variables, with the exception of the dummies (year, province, sector); again the results do not differ as in the case in which province-year and sector-year interactions are added to control for geographical or sector-specific shocks.

## 6. Concluding remarks

The existing economic literature on the relationship between criminal infiltration of legitimate businesses and their financial profile focuses on the North of Italy and identifies infiltrated firms with an educated guess. In this paper we overcome some of these shortcomings by relying on a unique sample of firms seized to OC, which was provided by one of the main Italian law enforcement agencies involved in the fight against OC. Firms included in the sample are located nationwide and are connected to OC with near certainty.

Based on the evidence available, we identify four different types of infiltrated firms and we focus on the two most frequent ones, *investment* and *competition* firms. *Investment* firms are a means to invest illicit proceeds through legal activities. Since, after an initial investment, these firms are run without the provision of illicit funds and compete “fairly” on the market, they are hardly distinguishable from legitimate businesses. *Competition* firms are run to gain control of the market of interest, deploying mafia methods to harm competitors when needed. Support for our classification emerges from various sources.

The analysis we carry out on our sample of firms aims to highlight the differences between legal and criminal firms in the financial, management and operations realm as emerging from their financial statement data. A similar comparison is also made between the two groups of illegal firms featuring a different type of infiltration.

Our control sample is built so that each illegal firm is compared with a legal business with the same size and operating in the same sector and province. After collecting a few hints from a univariate analysis, we run a set of regressions on several economic and financial variables.

Despite their higher revenues with respect to legal businesses, infiltrated firms' profitability is lower, regardless of the type of infiltration, as they may be pursuing other goals than mere economic performance.

Their unlawful nature also affects the composition of their assets in many respects. *Investment* firms have a large stock of tangible assets as opposed to *competition* firms, which prefer relying on leased facilities and equipment. That may be because the latter are more at risk of detection and consequently adopt appropriate strategies to reduce the consequences of potential appropriations by law enforcement. Also the larger cash holdings of both groups of criminal firms may be related to the necessity to have more readily disposable assets in case of seizure. Moreover all illegal firms hold smaller stocks of inventory, which may signal systematic inventory undervaluation for the purpose of tax avoidance and evasion.

The cost structure of infiltrated businesses is quite telling, too. Financing costs are lower for *competition* firms and higher for *investment* firms with respect to the control sample. This may be due to the fact that, while investment firms are run like legitimate business, *competition* firms may exert their coercive power to obtain financing at particularly convenient conditions from local lenders.

Finally, the evidence, though not particularly robust, showing that *competition* firms have higher costs of labour suggests that they may be providing job opportunities to local people and associates so as to gain support for the criminal organisation and also as a way to strengthen their control over local territory, whilst *investment* firms pursue neither of these goals.

The wide array of findings seems to provide a significant contribution to the literature in the field and may also yield operational results in the realm of anti-money laundering financial analysis.

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