Temi di discussione
(Working Papers)

The real effects of 'ndrangheta: firm-level evidence

by Litterio Mirenda, Sauro Mocetti and Lucia Rizzica

The papers published in the Temi di discussione *series describe preliminary results and are made available to the public to encourage discussion and elicit comments.*

The views expressed in the articles are those of the authors and do not involve the responsibility of the Bank.

THE REAL EFFECTS OF 'NDRANGHETA: FIRM-LEVEL EVIDENCE

by Litterio Mirenda[*], Sauro Mocetti[**] and Lucia Rizzica[**]

Abstract

We analyze the real-economy effects of organized crime infiltrations in legitimate businesses. We focus on the case of the 'ndrangheta, a large criminal organization that originates from the South of Italy. Combining information from investigative records with panel data on firms' governance and balance sheets, we build an indicator of 'ndrangheta infiltrations in firms located in the Center and North of Italy, i.e. areas with no tradition of organized crime. We show that (a) organized crime tends to infiltrate firms in financial distress and sectors that are more reliant on public sector demand or more prone to money laundering; (b) infiltration generates a significant rise in the affected firm's own revenues; and (c) the penetration of organized crime produces a long-run negative effect on economic growth at the local level.

Contents

---

[*] Bank of Italy, Local Economic Research Division, Bologna branch.

[**] Bank of Italy, Structural Economic Analysis Directorate, Law and Economics Division.

1 Introduction[*]

The proceeds generated by organized crime in illicit markets are estimated to amount to about 2% to 5% of global GDP (UNODC, 2011). However, what makes the activity of criminal organizations a first order relevance issue is not just the substantial size of the business, but most importantly the costs that it imposes on the economy and on the society as a whole. The available estimates, indeed, suggest that the presence of mafia can substantially reduce GDP per capita growth (according to Pinotti, 2015b the loss would be up to around 16% over a thirty years period).

The channels through which organized crime may reduce the wealth and well-being of a country are manifold. First, direct costs, which include all the public and private resources that are deployed in the fight against criminal organizations and all the resources that such organizations directly subtract from the economy (e.g., through thefts, robberies or extortions). Secondly, indirect costs, which include all the distortions in the economy generated by the presence and action of criminal organizations in the area. While being more difficult to measure and still largely under-investigated, the latter are likely of much larger magnitude than the direct costs.[2] Examples of indirect costs may include cases where corruptive ties between criminal groups and the local government affect public spending redirecting it toward particularistic and criminal objectives (Barone and Narciso, 2015; Pinotti, 2015b); or where the intimidating power of criminal organizations distorts the functioning of the market; or where the availability of illegal capital imposes a competitive advantage on firms that are connected to criminal organizations. Several papers, moreover, documented that organized crime negatively affects the selection and behavior of politicians (Acemoglu et al., 2013; Daniele and Geys, 2015; De Feo and De Luca, 2017; Alesina et al., 2018)[3].

[2]See Gambetta and Reuter (1995) for one of the first attempts to examine the market behavior of organized crime and its involvement in legitimate industries.

[3]See Gambetta (1993), Bandiera (2003), Buonanno et al. (2015), Dimico et al. (2017) and Acemoglu et al.

In this paper we study the spreading of organized crime in the legal economy. To this purpose, we build an indicator of organized crime entry into private business, and then estimate the impact of such infiltrations on the performance of both the targeted firm and the broader local economy. We investigate the case of the 'ndrangheta, one of the world's largest criminal organizations, which originated in the Italian southern region of Calabria and gradually expanded beyond the regional and national borders (Varese, 2006; Ciconte, 2008; Sergi and Lavorgna, 2016).

We construct a statistical indicator of infiltration leveraging on several data sources and some assumptions. Specifically, we combine firm-level data reporting the structure of firms' ownership and governance with information drawn from judicial and investigative evidence on the families belonging to the 'ndrangheta that were found to be infiltrated in business in the Center and North of Italy. This allows identifying firms in the Center-North whose owners and directors share the family name and area of origin typical of the 'ndrangheta, a measure of the probability that the firm is infiltrated.[4]

This indicator produces several interesting figures which well match the existing anecdotal and judicial evidence: the 'ndrangheta is more widespread in the North-West and primarily operates in sectors that rely more on public sector demand and in those that are more prone to money laundering. In the former case, the main driver of infiltration is profit maximization and rent extraction while in the second case infiltrations are aimed at concealing the proceeds of illegal activities. Moreover, we show that infiltrations usually occur in less productive and less profitable firms and that, in a dynamic perspective, the targeted firms are characterized by an increasing degree of financial vulnerability in the years before the infiltration.

Armed with this indicator, we then estimate the effects of infiltration on the infiltrated firm's performance using a Difference in Differences (DID) approach and corroborate them through the Synthetic Control Method (SCM) which allows us to refine the control group

_____

(2019) for different evidences on the origin and rise of the Sicilian Mafia.

[4]While not a direct indicator of true infiltration, and potentially subject to (mis-)measurement issues, this probabilistic measure captures well some aggregate patterns of mafia diffusion, as measured by alternative judicial and police sources. For example, it mimics sufficiently well the geographical distribution of 'ndrangheta activities and the sectoral specialization of criminal organizations (Section 4). In the empirical analysis we will extensively check for the relevance of the potential (mis-)measurement issues stemming from the statistical nature of the indicator (e.g., type I and type II errors) (Section 5). With this caveats in mind, note that in the remainder of the paper we will use the two terms "infiltrated" and "treated" firms interchangeably, always referring to what is predicted by our statistical indicator.

and to observe the dynamics of the effects. These results show that the entry of organized crime significantly increases the revenues of infiltrated firms. Such better performance is also associated with an increase in the number of employees while it tends not to be coupled with an increase in investments. We also find that infiltrated firms have a higher likelihood of exiting the market, although we cannot distinguish whether such exit is voluntary or it is due to the intervention of the judicial authority. These findings are fairly similar across sectors and are consistent with a story of predatory behavior in which investments in legal businesses are used by criminal organizations for money laundering or for skimming money off public contracts and then exit the market.

Finally, we exploit our data to estimate the effects of such infiltrations on long-run economic growth at the local level. As the 'ndrangheta was essentially absent in the Center and North of Italy at the beginning of the 1970s and progressively penetrated this area in the following decades, we can use our indicator as a measure of the extent of such long-term penetration at the local level. We thus combine it with historical municipal Census data and employ an instrumental variable approach that exploits the variation in the forced settlements of 'ndrangheta affiliates across municipalities in the Center and North from the 1970s. Our results show that the penetration of the 'ndrangheta produces a large and significant negative effect on the long-run local economic growth, and that such effect is larger for sectors that are more likely to be targeted by organized crime with the aim of making profits, rather than for those where the 'ndrangheta operates to conceal illicit activities.

Relative to the still scant existing literature on the economic impact of organized crime, our paper innovates on several dimensions. First, by building a firm-level indicator of criminal connection, we manage to provide micro-level evidence of the presence and impact of organized crime, whereas the previous contributions mostly looked at aggregate economic outcomes (Peri, 2004; Pinotti, 2015a,b). To the best of our knowledge, we are the first to provide such a detailed picture of the phenomenon, showing the characteristics of the firms more exposed to mafia infiltration and tracing the dynamics of their performance before and after the criminal infiltration. Second, we are able to exploit such micro-level information to analyze the final effect of organized crime penetration at a very fine level of geographical partitioning i.e., the single municipality. Previous studies that attempted to estimate such long-run impact generally relied on more aggregate data, typically province or regional level

ones.[5] Third, we analyze the effects of the expansion of organized crime in areas with no tradition of mafia settlements whereas previous studies focused on the impact of organized crime on its area of origin (Pinotti, 2015b). This issue has gained increased attention in the policy debate in that, as it was somehow anticipated by the suggestive and prescient image of the *palm tree line* by the Sicilian novelist Leonardo Sciascia in the early 1960s, organized crime has progressively "diversified, gone global and reached macro-economic proportions" (UNODC, 2010).

The remainder of the paper is structured as follows: Section 2 introduces the 'ndrangheta, its historical roots and the relatively recent expansion in the Center-North of Italy; Section 3 describes the data and the way we construct our main variables; Section 4 provides some descriptive evidence and validation of our 'ndrangheta infiltration indicator; Section 5 presents the estimates of the impact of 'ndrangheta infiltrations at the firm level and provides a wide array of robustness checks; Section 6 is dedicated to the estimation of the effects on the local economy in the long-run; and Section 7 concludes.

2   The 'ndrangheta

The 'ndrangheta is a criminal organization that originated in Calabria, a region in the extreme south of Italy.[6] The economic relevance of the 'ndrangheta is significant and growing: according to Transcrime (2015) its revenues from illicit activities in 2010 amounted to 3.5 billion euro, nearly twice as much as those of the more famous Sicilian Cosa Nostra; moreover, according to Europol (2013) the 'ndrangheta is currently amongst the richest and most powerful organized crime groups at the global level.

The most prominent characteristics of this criminal organization are expressed in its name. The word 'ndrangheta has uncertain origins, but the most widespread view believes that the name comes from the Greek *andragathia* which stands for courage or loyalty; an alternative explanation would instead connect the word to the Latin *interanea*, which indicates the entrails of an animal. The two interpretations point at two key characteristics of the criminal organization, on the one hand the asserted strength and integrity of its members,

---

[5]A notable exception is the recent paper by Acemoglu et al. (2019) who estimate the effects of Mafia historical development on literacy and public goods provision across Sicilian municipalities in the early 1900s.

[6]For a more in depth introduction to the 'ndrangheta, see Ciconte (2008); Gratteri and Nicaso (2009); Sergi and Lavorgna (2016).

on the other hand the reference to a visceral relationship amongst them. Such characteristics have provided the 'ndrangheta with a tight clan structure that has made it famously difficult to penetrate. As a matter of fact, the number of "penitent" mafiosi amongst 'ndrangheta affiliates has historically been much lower than amongst those affiliated to Cosa Nostra in Sicily (Gratteri and Nicaso, 2009). The reason of such compactness is that membership to a specific clan is generally determined through family ties rather than by affiliation. Salvatore Boemi, prosecutor in Reggio Calabria, told the Italian Antimafia Parliamentary Commission (henceforth APC) that "one becomes a member for the simple fact of being born in a mafia family". As a result, a few blood families constitute each group, and hence "a high number of people with the same last name often end up being prosecuted for membership of a given clan" (Varese, 2006). The direct consequence of such tight family structure of the 'ndrangheta is a high fragmentation: according to the Italian Anti-Mafia in the sole province of Reggio Calabria there are currently more than 50 distinct clans, whereas the larger province of Palermo, traditional territory of the Sicilian Cosa Nostra, would count just seven (Figure A.1).

The 'ndrangheta made its first appearance towards the end of the XIX century in the province of Reggio Calabria. It initially represented degenerate cells of the brigandage movements that were active on the Aspromonte uplands and that were opposing Italy's unification, which was coming along with the dissolution of the feudal system and the introduction of modern capitalism in the rural areas of the South. For almost a century, the 'ndrangheta remained a local phenomenon, a peripheral form of rural banditry, devoted to racket and extortion. This criminal organization started building its economic power in the 1970s and 1980s, first with a penetration in the entrepreneurial soul that was at the time being fed by massive injections of public funds,[7] and later with the ransoms deriving from kidnappings, mainly of Northern Italy businessmen.[8] Revenues from such activities were then invested in cigarette smuggling first, and drug trafficking later on, a transnational business in which over the years the 'ndrangheta reached a leading position. In the 1980s, according to the reports

---

[7]The starting of the construction of the A3 motorway dates back to 1964; the "Pacchetto Colombo", a package of public infrastructure investments in the region, was passed in the early 1970s; in the same period, the works for the construction of the port of Gioia Tauro were started. All these works were later found to be infiltrated by the 'ndrangheta.

[8]The so called "kidnapping season" counts over 200 kidnappings attributed to 'ndrangheta clans. The first resounding one was that of the 16-years-old Paul Getty III, nephew of the homonym petrol-industrialist, kidnapped in Rome in 1973. The boy was released after the payment of a 3 million US$ ransom.

of the APC, the 'ndrangheta began to invest in the North of Italy the proceeds of its illegal activities. Penetration in the northern regions followed the post WWII migration patterns when hundreds of thousands of Calabrians settled in the richer and more dynamic North. Moreover, the application of the *confino* law from the 1960s, forced the relocation of some members of the 'ndrangheta in the regions of the Center and North, in the (unsuccesful) attempt to break their links with the criminal associations of their homeland. In the 1990s, finally, the Calabrian mafiosi started to build business connections with the South American drugs cartels, thus turning the 'ndrangheta into a truly global organization. Today, indeed, the Calabrian mobsters are believed to control most of the transatlantic drug traffic that feeds the European market (Gratteri and Nicaso, 2016) and the vast majority of the organization's revenues are estimated to be produced outside Calabria. According to Transcrime (2015), only 23% of the 'ndrangheta revenues are currently produced in the organization's region of origin while the corresponding figures for the Sicilian Cosa Nostra and the Neapolitan Camorra are above 60%. Unlike other criminal organizations, upon expansion outside of its original borders, the 'ndrangheta tended to recreate its own structure and environment, building a tight criminal network that encompasses both productive and political bodies in a proceeds that has been explained by sociologists in terms of *colonization* or *transplantation* (Varese, 2006).[9]

Its economic and financial primacy amongst criminal organizations, together with its core characteristics, namely its tight family structure and its *glocal* character, make the 'ndrangheta particularly suitable for our study. Stated differently, the 'ndrangheta represents the archetype of the criminal organization that becomes international and that infiltrates the legal economy outside its area of origin.

---

[9]This was certainly due, at least partly, to the very different environments in which the organizations operated in their areas of origin: while Cosa Nostra and Camorra controlled large urban and industrial areas, 'ndrangheta clans could only rely on the activities that were carried out in small rural villages, so that searching for new and more profitable markets was essential. See also Varese (2006), Varese (2011), Buonanno and Pazzona (2014) and Scognamiglio (2018) for evidence on the migration patterns of mafias.

3 Data and variables

3.1 Data sources and sample construction

Our analysis combines several data sources to identify the presence of the 'ndrangheta in a given firm and estimate its effects both on the firm itself and on its competitors.

The first source of information is the Company Account Data Service (CADS), which contains balance sheet information for the universe of all Italian corporations from year 2000 to 2016.[10] From this database we can extract yearly information on economic and financial variables, such as the revenues, sector of economic activity, age, (tangible and intangible) assets, wage bill, production costs, measures of profitability and of financial distress and a credit rating index.

Second, we take data from the Italian Chamber of Commerce (Infocamere). This contains records of the names and social security numbers (*codici fiscali*) of all owners and directors of all Italian firms. We reconstructed the ownership structure of firms tracking owners up to four levels (i.e., owners of the owning companies). The Infocamere data are available from 2006. All limited liability firms whose balance sheet information is recorded in the CADS dataset are also registered on Infocamere so we can merge the two datasets using the fiscal identifier of the firm to obtain a sample spanning from 2006 to 2016, with complete information on all Italian corporations.

The last source of data we employ is a report on the presence of Organized Crime in the Center and North of Italy prepared for the APC. This includes information drawn from judicial and investigative evidence over various years (Dalla Chiesa et al., 2014). In particular, the report contains the names of the clans that were found doing business in those areas. The number of 'ndrangheta clans operating in the Center and North, according to the report, amounts to about 250 families, a number significantly larger than that of Cosa Nostra or Camorra clans operating in those areas. This confirms the strong propensity of the 'ndrangheta to export its activity outside its area of origin as well as its fragmentation into numerous small family-based clans.

---

[10]Corporations in Italy account for about 20% of the total number of firms, but employ over 50% of the private sector workforce. According to Transcrime (2015), limited liability firms, in particular, are those with the greatest risk of infiltration because they can be easily set up and provide limited liability to their owners.

3.2 Detecting 'ndrangheta infiltrations

We combine these three datasets to define a *treatment* variable that will be a binary proxy for 'ndrangheta infiltration. To this purpose, we exploit information on last names and place of birth of all directors and owners of firms located in the Center and North. As discussed in Section 2, last names carry a particularly high informational content when considering 'ndrangheta affiliations. Operationally, we consider only firms based in central and northern Italy and identify all those that in a given year had at least one director or owner *(i)* whose last name matched one of those in the list of the APC of family clans operating in the Center and North and *(ii)* who was born in Calabria. Whenever these two conditions are jointly met we assign the treatment indicator value one in that given year and we classify the firm as infiltrated from that moment onwards. Our definition of treated and control units clearly has a purely statistical nature and may potentially be subject to classification errors. In particular, we may be misclassifying an infiltrated firm as a non-infiltrated one (*Type I error*) and also misclassifying a healthy firm as one connected to the 'ndrangheta (*Type II error*). The first case would arise, for example, whenever the member of the criminal clan that takes a seat in the firm does not carry the family name of the clan, for example if he is the husband or son of a female member of the family, or in cases in which the member of the clan is a second generation immigrant. It may also be the case that a clan enters a firm through some figurehead rather than directly through a member of the family clan. Finally, and most obviously, it may be that not all the families connected to 'ndrangheta that operate in the Center and North have been detected by anti mafia investigations and thus their names would not be reported on the list of the APC. The second case, instead, will occur if we incorrectly assign value one to the infiltration indicator when the person sitting in the board of the firm or figuring amongst its owners, despite his name and origin, does not belong to a clan.

In Appendix B we show that, as long as we can confidently assume that both Type I and Type II error are below 0.5, i.e., that our classification criteria carry sufficient predictive power, the coefficient we estimate will have the correct sign and a magnitude that is lower than the true parameter of interest. Thus the effect we estimate will need to be interpreted as *lower bound* of the real one.

Our coefficient would be upward biased, instead, if the error was positively correlated with the outcome variable. This would be the case if, for example, we were systematically

over-classifying as treated larger firms and if such larger firms, in turn, had a higher growth rate of revenues with respect to the rest of the sample. To at least partially address this concern, we also replicate our analysis on a subsample of firms in which the (observable) characteristics of treated and control units are balanced.

4 Validation and descriptive evidence

Following the methodology described in section 3.2 we identify nearly 8,000 owners or directors with the specified characteristics, these account for 0.2% of the total number of individuals in our dataset. The corresponding number of firms that were infiltrated, according to our methodology, at some point in time is about 9,200, i.e., 0.7% of the total. These, are generally large firms, so that the revenues they produced in 2016 accounted for almost 2% of the total, i.e., about 42 billion euro.

Crucially, for about two thirds of the firms that we classify as treated ($N = 5,959$) we are able to identify the year in which the 'ndrangheta entered the ownership or administration of the firm. These are the cases in which the infiltration took place after 2006, i.e., the first year in which we observe the ownership and governance structure of the firms. In Figure 1 (left panel) we show that infiltrations were evenly distributed over time until 2011 and then diminished. This figure is to be interpreted as evidence of the fact that the criminal activity we are analyzing resulted from the investigations published in 2014, therefore it is natural to expect it to be reduced in the years just before the release of the APC report. In Figure 1 (right panel) we show the distribution of the age of the firm when the infiltration took place. Interestingly, a significant fraction of the firms (27%) were infiltrated in the very first year of activity.

[Figure 1]

In 51% of our infiltrated firms we find only one alleged mafioso amongst the owners or directors while in only 10% we find more than three individuals likely affiliated to the 'ndrangheta (Figure 2). Moreover, infiltration mostly occurs through the acquisition of the shares of the company and to a lesser extent through the entrance of a member of the clan in the board of directors. We will exploit such variation to carry out some sensitivity checks in Section 5.2, but for our main analysis will only rely on the extensive measure described

in section 3.2. Indeed, we believe that is difficult to obtain a measure of the intensity of infiltration from this information in that the presence of at least one alleged mafioso is arguably a signal of the infiltration of the criminal organization in the firm, whereas the number of infiltrated individuals and/or their role in the firm are not necessarily related to their influence over the firm behavior.

[Figure 2]

To test the accuracy of our index of infiltration, we perform several test. First, we compare the geographical distribution of the infiltrated firms that results from our index, with that of the other existing indicators of 'ndrangheta presence. As shown in Figure 3, the distribution of treated firms resulting from our methodology is not uniform over the territory but highly concentrated in the North-West of Italy. Moreover, the share of treated firms is well above the mean in most of the metropolitan areas (i.e. Turin, Genoa, Roma, Milan and Bologna). This geographical pattern is consistent with the existing evidence. Indeed, according to Transcrime (2015), outside its region of origin, the 'ndrangheta would be mainly concentrated in the North-West, whereas the Sicilian Cosa Nostra and Camorra would be more active in central Italy (Figure 4). Moreover, as of today, there have been eight municipal governments in the Center and North that have been dismissed for organized crime infiltrations and in all cases they were located in the North-West (only one was in Emilia-Romagna) and were dismissed for 'ndrangheta allegations.[11]

[Figures 3 and 4]

Second, we get some insights from the sectoral distribution of infiltrated firms.[12] Figure 5 shows the sectoral distribution of the treated firms (left panel) and the sectoral specialization (right panel), the latter being measured as the ratio between the share of a given sector amongst treated firms and that across all firms. Our indicator suggests that the 'ndrangheta is more likely to enter the constructions sector (19%) followed by the real estate (15%) and the wholesale and retail trade (11%). Yet, looking at the odds ratios, we see that treated

---

[11]These were: Bardonecchia (Piedmont) in 1995, Bordighera (Liguria) in 2011, Ventimiglia (Liguria) in 2012, Leini (Piedmont) in 2012, Rivarolo Canavese (Piedmont) in 2012, Sedriano (Lombardy) in 2013, Brescello (Emilia-Romagna) in 2015 and Seregno (Lombardy) in 2017.

[12]We define sectors following the ISIC (International Standard Industrial Classification of All Economic Activities) classification.

firms are particularly over-represented in the sector of utilities (which is characterized by the presence of firms operating in close relationship with the Public Administration) and in that of financial services (e.g., money transfer services); in contrast, the 'ndrangheta is under-represented in the agriculture and in the manufacturing sector.

[Figure 5]

To better understand this strong sectoral heterogeneity, we correlated these figures with other measures computed again at the sectoral level. Namely, in Figure 6 we show that the incidence of 'ndrangheta infiltration is higher in sectors that rely more heavily on public demand (top-left panel) and with an estimated higher share of shadow activities (bottom-left panel). The 'ndrangheta, in contrast, shows a lower propensity to penetrate sectors more exposed to international competition (top-right panel) or activities that are less suitable for money laundering (bottom-right panel), i.e., activities characterized by a lower incidence of production costs with respect to revenues (e.g., accommodation and food services), an occurrence that facilitates over-invoicing and hiding of the real revenues.[13] As expected, these figures suggest that the 'ndrangheta tends to prefer sectors that are more protected from competition, those in which it can exploit its coercive and corruptive power to extract rents (mostly from public spending) and those in which it can mask illicit activities.

[Figure 6]

Unsurprisingly, this sectoral distribution broadly reflects that of the firms seized by the central government from the mafia. Even though the figures are not perfectly comparable, as those on confiscated firms refer to a broader time window (from the 1980s) and mostly refer to the Sicilian Cosa Nostra and to activities located in southern regions, the correlation between the sectoral distribution observed for firms infiltrated by the 'ndrangheta and that observed for confiscated firms is 0.74.

[Figure 7]

---

[13]Money can be laundered through several channels and in different sectors of activity, but one of the most common ways to do it is through a legitimate cash-based business: for instance, if the criminal organization owns a restaurant (or other service activities where it is more difficult to detect discrepancies between revenues and variable costs), it might inflate the daily cash receipts to funnel its illegal cash through the restaurant and into the legal credit system.

Finally, we exploit the maximum available detail of information on firms seized from the mafias in the Center-North. This corresponds to nearly 40,000 (municipality-sector) cells for which we observe the distribution of both confiscated firms (according to the data of the Ministry of the Interior) and of infiltrated firms (according to our indicator). The two distributions are significantly correlated and such correlation is robust to the introduction of municipality and sector fixed effects, aimed at capturing potential omitted variables at those levels.

[Table 1]

Compared to the non-infiltrated ones, treated firms present some peculiar traits. Table 2 shows the main characteristics of treated firms *before* infiltration and of all other firms.[14] The comparison of simple mean values shows that infiltrated firms are on average larger and more productive but less profitable, while we find mixed evidence about their financial soundness. These findings are, nevertheless, partially reverted when we control for the different sectoral and geographical distribution of the firms and for their size. In such case, we find that the firms that the 'ndrangheta targets are, amongst those of larger size, less productive and less profitable.

[Table 2]

Beyond the above *static* differences, our data allow us to look at the *dynamics* of the firms' balance sheet data before the treatment. We are thus able to make an exercise that mimics those of Grogger (1995) and Kling (2006), who look at the dynamics of individual earnings *before* committing a criminal offense. Looking at the firms infiltrated by organized crime, we thus find that before infiltration the group of treated firms experience an average deterioration of both economic and financial conditions (Figure 8). Yet, such differences are largely driven by compositional effects, specifically by the progressive entry of new firms, which are generally smaller and less productive, in the market. Indeed, once we impose that all firms must be observed in the sample for the full period of analysis, i.e., for at least five years prior to infiltration, most of differences disappear. We thus find that infiltrated firms are characterized by a progressive worsening of their financial stability indicators i.e.,

---

[14]Treated firms in this table are only those that were infiltrated after their birth.

leverage and financial burden, before treatment whereas their economic activity indicators display a flat trend.

[Figure 8]

5   Empirical analysis

Identification of the impact of infiltrations on firms' outcomes is a challenging task. Indeed, infiltrated firms may be different from the other ones along many dimensions, most of which are likely to be correlated with our outcome variables of interest. In the following subsections we first present our main results (Section 5.1), then perform a set of robustness checks (Section 5.2) and propose a different empirical strategy based on the SCM (Section 5.3); finally, we examine the effects of infiltration on other firm outcomes to shed some light on the underlying mechanisms (Section 5.4).

5.1   Main results

Our first approach is to exploit the panel dimension of our data to handle, in a simple way, the endogeneity that is related to the time-invariant unobserved heterogeneity, while exploiting the variation over time of the infiltration status. The resulting staggered Difference in Differences or, more generally, fixed-effects model (Autor, 2003) can be formally written as follows:

$$y_{it} = \alpha + \beta NDR_{it} + \theta_i + \tau_t + \epsilon_{it} \tag{1}$$

where y_{it} is the firm's performance (e.g., revenues); NDR_{it} is a dummy variable that equals 1 for treated firm i from period t on (i.e., from infiltration onwards) and 0 otherwise. β is the parameter of interest and measures the effect of 'ndrangheta infiltrations on the outcome of the treated firms. The specification includes firm and time fixed effects (θ_i and τ_t respectively) to capture firm idiosyncratic characteristics and common shocks. The time span considered is that of the years 2006 to 2016.

The credibility of the DID crucially relies on the assumption that, in the absence of the treatment, the performance of the treated and the control units would have followed parallel

trends over time. This assumption may be implausible if the pre-treatment characteristics that are associated with the dynamics of the performance variable are unbalanced between the treated and the control groups. For example, different trends might arise if the treated and the control units operate in different markets and are exposed to different macro shocks. To address this issue we enrich the specification with a set of sector-year and province-year fixed effects to account for possible shocks that are common to narrowly defined clusters of firms.

Table 3 shows the effects of 'ndrangheta infiltrations on firms' performance for all firms that were active in the 2006-2016 period. Specifically, we consider as dependent variable the (log of) revenues and we use four different specifications: the first includes year and firm fixed effects to control for yearly shocks common to all firms and idiosyncratic (time-invariant) firms' characteristics; the second and the third include fixed effects obtained from the interaction between province and year and between sector and year dummies, respectively; the fourth includes both sets of fixed effects to control for provincial and sectoral cycles. According to the most demanding specification, 'ndrangheta infiltrations increase the revenues of the treated firms by approximately 24%.

[Table 3]

The specification discussed so far provides no sense of the dynamic effect of infiltration on firms' outcomes. Moreover, one might wonder whether there are anticipation effects that might cast doubts on the validity of the parallel trend assumption. To explore these issues, we augment the model with leads and lags of the explanatory variable in the spirit of Autor (2003). Specifically, we include dummies that capture the difference in (log) levels of revenues between treated and control firms for different years, before and after the infiltration (with the year $t - 1$ taken as reference category). The coefficients on the infiltration lags are not significantly different from zero, suggesting the absence of an anticipation effect and of divergent patterns between the two groups before the treatment (Figure 9). Hence, the parallel trend assumption is empirically satisfied.[15] In the year of infiltration the revenues increase significantly, by nearly 30%. In the following years the gap slightly shrinks, though

---

[15]Figure A.2 shows the graphs that are obtained using different sets of fixed effects. These show that without firm fixed effects, the difference in the trend between treated and control units before treatment can hardly be eliminated.

it remains significant both from an economic and a statistical point of view. However, it is worth noting that the impact of the 'ndrangheta is easier to detect in the short term while in a longer perspective we might fail to disentangle firms' performance from other unobserved shocks (e.g., the firm comes under investigation by the police and the judicial authority for suspected mafia infiltration).

[Figure 9]

5.2   Robustness checks

Table 4 contains a first set of robustness checks where we analyze the sensitivity of our results to the definition of the treatment indicator.

In columns 1 and 2 we adopt two alternative definitions of the treated units. In one case we use a "looser" definition based on the last names only without considering the geographical origin of the directors and owners; in another case, instead, we impose a tighter geographical requirement i.e., being born in the provinces of Reggio Calabria and Crotone only, the areas in which the 'ndrangheta is more historically rooted (Sergi and Lavorgna, 2016). The two alternative indicators might increase or reduce the misclassification error. For example, tighter geographical requirements might, on the one hand, increase the accuracy of the indicator (i.e., lower the *Type II error*) and, on the other hand, lead to a larger measurement error if infiltration mainly occurs through second-generation migrants born in the Center and North of Italy (i.e., raise the *Type I error*). The results show that the estimated effect is slightly larger when we build the indicator using only family names and slightly smaller when we consider only those born in Reggio Calabria or Crotone.

In column 3, instead, we test the degree of confoundedness of our results by exploiting differences in the frequency of the family names reported in the APC list. Indeed, if a name is particularly widespread in the country, we risk to systematically overestimate the number of infiltrations because we would classify as connected to the 'ndrangheta a significant number of people who only happen to share the same last name. On the other hand, for sufficiently rare last names, our classification should be less subject to error. To test this, we attach to each last name its frequency amongst the adult population resident in the Center and North as recorded in the 2005 list of taxpayers. We then split the last names in the APC list into two groups depending on whether their frequency is above or below the median.

19

Results show that indeed, when we use rare last names to classify infiltrated firms, we obtain a (significantly) larger difference between treated and control units, likely due to a reduction of the measurement error.

In column 4 we control for the "intensity" of infiltration, distinguishing between firms with a fraction of alleged mafiosi (over the total number of owners and directors) above or below the median. We find that the impact of infiltration is significantly higher when there are more mafiosi involved. However, this result might also be due to the fact that a higher intensity of infiltration also reflects a reduction of the measurement error to the extent that the company is effectively more likely to be infiltrated when we find two members, instead of one, presumably belonging to the organized crime. Moreover, this result might also (mechanically) reflect the fact that this measure of intensity is greater for small businesses for which the same absolute increase in turnover translates into higher growth rates compared to larger firms.

In column 5 we distinguish between infiltrations that occurred through directors and those that occurred through shareholders. The estimated impact is slightly higher when infiltration occurs through the acquisition of the shares of the company, i.e., when there is a more direct involvement of the criminal organization in the control of the firm.

[Table 4]

Table 5 contains a second set of robustness checks. These are aimed at disentangling the effect of the 'ndrangheta infiltration from those of other changes in the governance of the firm that may generate similar effects.

In column 1 we consider the effect of the entry in the board of the firm of an individual born in Calabria, whose last name is not on the APC list. We exclude all those cases in which the firm was also one of our treated units. In this case we still estimate a positive effect of the entry of such individuals in the firm, but the magnitude of the coefficient is about one fifth of the effect of the 'ndrangheta infiltration that we showed in Table 3.

In columns 2 and 3 we perform two pure placebo exercises. Specifically, we identify a subset of surnames among taxpayers coming from the regions of Basilicata and Sardinia. These are areas located in the South, have a comparable GDP per capita (in 2005 it was 15,700 euro in Calabria, 17,500 in Basilicata and 18,600 in Sardinia) but are not mafia-regions. In order to construct a comparable group of treated units we selected, for each of

the two regions, a random sample of last names whose frequency in the Center and North of Italy was similar to that of the names in the APC list. Specifically, we used Propensity Score Matching to identify such names, using the frequency as recorded in the 2005 list of taxpayers, as predictive variable. Interestingly, we find that (i) the presence of such placebo individuals in the governance of firms in the Center and North is much lower (about one third) than that of the Calabrians whose last name is one of those on the APC list; (ii) the estimated effects of the entry of such individuals in the firm's board is null.

These results are consistent with the hypothesis that the surnames contained in the APC list are associated with people who have a greater financial liquidity than those of the other two regions, such as to justify a greater infiltration rate in the Center and North, and that this greater liquidity likely comes from unobserved sources of income (as the GDP per capita is similar across the three regions). Moreover, the finding that the infiltration of a Calabrian with an APC surname generates a larger effect on revenues is consistent with the idea that this such revenues are mostly due to criminal activities (money laundering or larger market power resulting from coercion or availability of illicit liquidity).

In column 4, eventually, we run our baseline regression adding a control for the number of shareholders and directors in the year. This is meant to directly account for the effect of other changes in the governance of the firm. In this case, therefore, our coefficient of interest is to be interpreted as the effect of having a member of the clan entering the firm over and above the effect of having a new board member or a new shareholder. The results show that the inclusion of such control variable affects the main coefficient only marginally.[16]

Finally, in column 5, we restrict the sample using a more comparable set of control units, chosen through Propensity Score Matching (PSM). Namely, for each year, we consider firms infiltrated in the following year as treated observations and firms that have never been infiltrated as control group. Then, we use PSM to select, for each treated firm, one control firm with similar estimated propensity of being infiltrated on the basis of previous observed characteristics. The characteristics used to obtain the propensity score are the level of revenues and of production inputs as well as dummies for the sector of activity and the province where the firm is located.[17] The results are again qualitatively confirmed and, if

---

[16]This exercise should capture also the fact that the likelihood of having a surname included in the APC list is (mechanically) higher when the number of owners and directors is higher.

[17]Guadalupe et al. (2012) estimate the impact of foreign ownership on innovation and use firm-fixed effects and propensity score matching to account for selection issues related to the probability of being acquired.

anything, the estimated effect is slightly revised upward.

[Table 5]

5.3   Synthetic Control Method

All the robustness checks carried out so far may still not be sufficient to eliminate all the identification concerns to the extent that selection into treatment might be endogenous and there might unobserved factors correlated to the outcome variable that we are not able to control for. Indeed, within our local market definition (i.e., the interaction between provinces and sectors of economic activity), organized crime might strategically target firms with a peculiar pattern in the economic and financial conditions. To address this concern, and improve the fit between treated and control units with respect to the pre-treatment *dynamics* we resort to the Synthetic Control Method (SCM) as developed in Abadie and Gardeazabal (2003) and Abadie et al. (2010).

The main idea of this method is to construct an artificial control unit (i.e., a synthetic firm) for each treated firm by selecting and weighting the untreated firms in such a way that the resulting synthetic unit has a behavior similar to that of the treated firm before the treatment. In contrast to the DID with a flexible set of controls and to other techniques used to refine the control group (e.g., the propensity score matching), which compare firms that are similar in terms of observable characteristics, the SCM compares firms that are similar in terms of observable explanatory variables and behavior of the outcome variable in the pre-treatment period, thus partly accounting for differences in unobservable characteristics as well. The causal effect of infiltration will then be given by the difference between the observed outcome of the treated unit and that of the synthetic one after the start of the treatment. This, method, moreover, allows us to better understand how the difference between the treated and control units evolves over time.[18]

Operationally, in our setting, the SCM entails four main steps. First, we need to impose that the treated and the control firms can be observed for a sufficiently long time span before the treatment in order to obtain a good match. We thus consider only firms that have been observed for at least five years before the year of infiltration. As suggested by the evidence in Figure 1, this generates a large drop in the number of treated units.

---

[18]Formal details can be found in Abadie et al. (2010).

Second, we identify a suitable group of donors for each firm. This will be made of firms located in the same province and operating in the same sector as the infiltrated ones. This is done to consider, amongst the potential donors, only firms that were plausibly exposed to the same economic shocks and to avoid computational problems of the algorithm.

Third, we implement the SCM for each treated firm. We include among predictors the capital stock and the wage bill, as proxies of the production inputs, and the firm's total factor productivity. Moreover we include two lagged values of the outcome variable (in years $t - 5$ and $t - 1$ with respect to the infiltration). The synthetic control algorithm will then minimize the root mean square prediction error (RMSPE) over the whole available time window.

Finally, we aggregate the evidence obtained for each treated firm and for each synthetic control. The synthetic control approach has been typically implemented in cases where there is only one (or very few) treated unit. In our case, instead, we replicated the analysis for a large number of infiltrated firms and consequently estimated a large number of corresponding synthetic controls. The outcomes of the treated and the synthetic firms are thus aggregated, assigning larger weights to better matches i.e., to matches with a lower RMSPE in the pre-treatment period.[19]

We are able to find a synthetic control for about 800 treated firms.[20] Descriptive statistics and balancing properties are reported in Table 6. They show that the synthetic control donors closely mimic the infiltrated firms for all the main observable variables.

[Table 6]

In Figure 10, we show our main results. Namely, we plot the revenues of the infiltrated firms and of their corresponding synthetic controls together with the difference between the two (on the right axis). The difference is essentially null for all the years preceding the infiltration, thus reassuring us about the quality of the match. On the other hand, in the

---

[19]The rationale behind this weighting strategy is that the difference between actual firm performance and synthetic firm performance should contain more information about the treatment effect when we are better able to predict the firm performance during the estimation window (Acemoglu et al., 2016). In unreported estimates we use alternative methods of aggregation and results are qualitatively similar.

[20]The loss of observations is due to two main factors. First, we restrict the analysis to firms observed for at least 5 years before the infiltration (for nearly 9 years on average). Second, the algorithm might fail to find a proper synthetic unit when either the pool of donors is too large or when the donors are too different from the treated unit.

three years following the infiltration, the gap between the two types of firms widens up. This is the result of a marked increase in the revenues of the treated firms vis-à-vis a fairly stable patterns of the synthetic control units. The magnitude of the estimated effect is in line with our DID estimates.[21]

[Figure 10]

5.4 Mechanisms

In order to understand the mechanisms underlying the improvement in the performance of infiltrated firms, in this section we examine other firm's outcomes and heterogeneity across sectors.

In Table 7 we examine whether the increase in revenues was accompanied by a similar increase in the production inputs i.e., the (log of) tangible and intangible assets (as a proxy for the capital stock) and the wage bill (as a proxy for labor inputs). We find that the capital stock is substantially unaffected by infiltrations while labor inputs do increase significantly. Therefore infiltrated firms become more labor intensive. The reduction in the capital stock relative to the revenues might suggest a potential short-termism in the infiltration strategy by the 'ndrangheta. Higher employment at the firm level, in contrast, might as well reflect some non-economic drivers of infiltration such as the search for social consensus and the control of the territory (Sergi and Lavorgna, 2016). The firm's profits significantly increase too. Finally, we consider firms' exit from the market as a potential outcome.[22] We find that infiltrated firms display a higher likelihood of exiting the market (around 2 percentage points). The latter result, apparently at odds with the increase in the revenues, might hint at the existence of strategic default behaviors on the part of infiltrated firms (e.g., predatory competition) as well as signal the effectiveness of the judicial action. Therefore we refrain from drawing implications from this evidence.

---

[21]In Appendix A we further report some robustness checks that we run for this exercise. Namely we expanded the set of predictors for the Synthetic Control, adding the firm's profitability, its leverage and its credit score and we restricted the sample of donor firms to those that experienced a change in governance in the same year (Figure A.3). The results are in line with the main specification: the addition of further controls does not alter the main result while the comparison with control firms experiencing a change in the governance in the same year lead to a slightly weaker effect of the 'ndrangheta infiltration.

[22]As, by construction, an infiltrated firm cannot exit from the market before infiltration, we run the regression on the subsample of firms identified through the PSM i.e., the sample that resulted from imposing the existence of the treated firm in $t-1$ and comparing it with a similar control firm (Table 4).

[Table 7]

The fact that the increase in revenues is disproportionately larger with respect to that of the production inputs may be interpreted either as a higher capacity of the clans to produce output out of the given production factors or as an artificial inflation of the revenues to mask money laundering activities through over-invoicing. These two hypothesis reflect the two main types of motivation behind infiltration (UNICRI, 2016). More specifically, in the first case an infiltrated firm operating in a licit market might have a competitive advantage on those operating lawfully for different reasons. For example, an infiltrated firm might have access to massive financial resources that are available at no or very low interest rates. Moreover, they might exploit their coercive power to gain access to certain markets or to fix more favorable trade conditions. Finally, and more subtly, they may exploit their relations with corrupt politicians or bureaucrats. In the second case, the criminal organization aims at infiltrating the legal economy to launder the profits that have been made through criminal activities or to conceal those activities themselves (e.g., drug trafficking). With some oversimplifying assumptions, we map the sectors of economic activity into two broad groups according to what is the (supposed) main motivation of infiltration.

We thus define a "business oriented" group of activities that comprises sectors that are more dependent on public spending and/or more involved in interactions with the public administration. They include education and training, health, public utilities (e.g., energy and waste disposal) and activities related to the construction business (mining and quarrying, constructions itself and real estate activities). About 40% of infiltrated firms is included in this group. On the other hand, we label "illicit" the residual sectors, including activities that are more exposed to money laundering (e.g., restaurants, hotel and trade activities) and/or those for which the infiltration into legal companies primarily serves to mask other illegal activities (e.g., to transport, store and hide illegal goods).[23]

In Table 8 we replicate the analysis of the effect of infiltration on revenues and on the main production inputs by sector. The results we obtain suggest that the pursuit of legal profits and the conceal of illicit activities (including money laundering) are both important

---

[23]It is worth noting that this partition of the economic activities is subject to some arbitrary choices and the boundaries between each group of activities are not always clear. For example, according to UNICRI (2016), one of the most profitable business oriented activities of criminal organizations in the legal economy is counterfeiting, which we are not able to trace to our data in a clear way.

drivers of the infiltrations of criminal organizations into legitimate businesses. Indeed, the impact of infiltration on revenues is positive and sizable in both sectors. In the sectors that are more related to "illicit' activities, however, the divergence in the patterns between revenues and production inputs is larger, suggesting that in these sectors the increase in the stated level of revenues is at least partly a mere artifact.[24]

[Table 8]

6 Evidence of long-run effects on the local economy

So far we have showed that the infiltration of the 'ndrangheta in a firm generates a large positive effect on the performance of the treated firm, although in some cases such increase may be artificial and not related to a real improvement in the output of the firm. However, our analysis so far has been silent about the effect that such infiltrations may generate more broadly on the local economy.

To shed light on this aspect we adopt a long run perspective with the idea that such aggregate effects on economic growth would require time to display. We thus exploit the fact that at the beginning of the 1970s the 'ndrangheta was essentially absent in the Center and North of Italy while it progressively infiltrated these areas in the following decades. Therefore the current extent of the 'ndrangheta in the Center and North of Italy can be interpreted as the result of the progressive penetration that occurred over the past 40 years. Using our indicator, moreover, we are able to characterize in a very precise way the geographical variation in the presence of the 'ndrangheta so as to build a proxy of 'ndrangheta penetration at a very local (i.e., municipal) level and relate it to measures of economic growth at the same level that we draw from census data.

One important threat to identification in this context is due to the possible endogenous sorting of the 'ndrangheta in certain areas. To address this issue we rely on an instrumental variable approach that draws on the historical data about the forced relocation of mafia affiliates in the Center and North from the 1970s on.

The law on forced relocation ("*confino*"), first passed in 1956 and then modified in 1965 to become the first real anti-mafia law, provided that, under some circumstances, the mafiosi

---

[24]In Appendix A we also show the results of this exercise done through Synthetic Control Method (Figure A.4.

were forced to resettle in towns located in Central and Northern regions where they would serve their convictions away from their homeland and their criminal networks so as to be re-educated and integrated in a context of law-abiding people. The decision regarding the place and duration of the forced resettlement was taken by the judge who headed the tribunal in the province where the suspected criminals were residing. However, the law was vague and did not specify which should be the characteristics of the hosting town where the mafiosi should be relocated.[25] The law on forced relocation was eventually abrogated in 1995.

We hand-collected data on the 'ndrangheta members that were forced to resettle and on their destinations. The difference with respect to the data used by Buonanno and Pazzona (2014) and Scognamiglio (2018) is that we use data at the municipal level rather than at the province level (thus having a finer definition of exposure to infiltration in the legal economy) and that we restrict the analysis to the 'ndrangheta (consistently with our setting) whereas they do not distinguish between the different types of mafias. Namely, we have information on 220 individuals 'ndrangheta affiliates and on the municipalities where they were forced to resettle. This information is obtained from an internal document of the Ministry of Interior dated 1974 containing the list of the mafiosi forced to resettle up to that year, and by subsequent judicial documentation, journalist inquiries and experts' reports (e.g., Gratteri and Nicaso, 2009).

Our identification assumption is that the judge's choice of where to relocate the member of the 'ndrangheta is unrelated to the current and expected economic growth of the chosen town. We argue that this assumption is plausible since, on the one hand, the destination town was chosen using criteria unrelated to expected economic growth and, on the other hand, it is unlikely that the judge located in Calabria was able to predict the growth of (often small) cities hundreds of kilometers away. Concerning the relevance of the instrument, many scholars (Varese, 2011; Buonanno and Pazzona, 2014; Scognamiglio, 2018) have argued that this policy represented a crucial boost to mafia transplantation outside its regions of origin.

From an empirical point of view, we use census data at the municipality level over a 40 years time window and we run a first-difference estimation where the outcome variable ΔE_m is the employment growth between 1971 and 2011 in municipality m. The endogenous

---

[25]In 1982 the law was amended, setting some restrictions on the characteristics of the destination town (e.g., forced relocation had to be ordered in towns with no more than 5,000 inhabitants and sufficiently far away from metropolitan areas, so as to ensure an effective control)

variable of interest is the share of infiltrated firms in 2011 at the municipality level as inferred from our indicator. We argue that the latter is to be considered a variation as well, because the presence of the 'ndrangheta in the Center-North dates back to the 1980s (Section 2). Thus, let $N_{m,2011}$ be the total number of firms in municipality m in year 2011 and NDR_{it} our firm-level indicator of infiltration, we can write:

$$\Delta NDR_m = \frac{\sum_{i\in m} NDR_{i,2011}}{N_{m,2011}} \tag{2}$$

In a second specification, we further augment our local indicator of 'ndrangheta penetration so as to also take into account potential spatial spillovers i.e., the possibility that the level of economic growth in municipality m might be affected also by the presence of the 'ndrangheta in the neighbor municipalities. Our augmented indicator of 'ndrangheta presence at the local level $\Delta \widehat{NDR}_m$ will thus be a weighted average of the share of infiltrated firms in any municipality n, with more weight being given to municipalities that are larger (as proxied by the total number of firms in n, N_n) and closer to municipality m. As in (2), the level of 2011 is interpreted as a variation relative to 1971.

$$\Delta \widehat{NDR}_m = \frac{\sum_{n\in N} NDR_n \times \frac{N_{n,2011}}{1+distance_{m,n}}}{\sum_{n\in N} \frac{N_{n,2011}}{1+distance_{m,n}}} \tag{3}$$

Our instrumental variable, finally, will be the minimum (log) distance between municipality m and a municipality where at least one 'ndrangheta affiliate was forced to resettle ($distance_m$). Figure 11 shows the distribution of such variable over the area.

[Figure 11]

The resulting system of simultaneous equations that we estimate through a two stage least squares regression model reads as follows:

$$\Delta E_m = \alpha + \beta \ \Delta NDR_m + \epsilon_m$$
$$\Delta NDR_m = a + b \ \log(distance_m) + u_m \tag{4}$$

The results are reported in Table 9, Panel A contains those that employ ΔNDR_m as proxy of local infiltration and Panel B contains those based on the augmented indicator

$\Delta \widehat{NDR}_m$ to account for geographical spillovers.

[Table 9]

First, note that all the results reported in Panel A and Panel B are qualitatively very similar, thus suggesting that the two measures both capture well the presence of mafia in the area. The OLS results reported in the first column show a negative and significant correlation between the local penetration of infiltrated firms and employment growth at the municipal level. In column (2) we estimate the reduced form of the system of equations (4) and find that in municipalities that were located farther away from a forced resettlement locations employment grew more over the period 1971-2011. In column (3) we show that our instrument has sufficient explanatory power and well predicts the location of the infiltrated firms, thus confirming the previous evidence on the relationship between forced resettlements and mafia infiltration.[26] In the second stage estimation, finally, we find a strong negative effect of the 'ndrangheta on long-term employment growth (column 4). The magnitude of the estimated coefficients is sizable: in our preferred specification, which takes into account the possible spillovers from the neighboring municipalities, moving from a municipality at the bottom decile of the extent of 'ndrangheta penetration to one at the top decile leads to a decrease in employment of about 28%.

Crucially, the different motivations driving infiltrations might also affect the local economy differently: according to our results by sectors (columns 5 and 6), the negative effects are much larger in activities where it is more likely that the 'ndrangheta enters to make business.

7   Concluding remarks

Criminal organizations hold a growing share of economic activity in many countries in the world and are progressively expanding their business outside their areas of origin, penetrating legitimate markets in areas with no tradition of mafia settlements.

This paper analyzed the impact of organized crime expansion looking at the case of 'ndrangheta infiltrations into firms located in the Center and North of Italy.

---

[26]See also Figure A.5 in the Appendix for graphical evidence of the correlation.

In this setting, we first constructed a proxy for 'ndrangheta infiltrations and provided evidence on which firms are more likely to be infiltrated and at what stage. Our results showed that the 'ndrangheta tends to enter firms in economic and financial distress and prefers sectors that operate in closer relation with the public sector and that are more prone to money laundering activities.

We then analyzed the effects of the entry of organized crime on the firm's own performance. Results showed that infiltrations improved firms performance relative to the pre-treatment period by significantly increasing their revenues. We show that this finding captures two different underlying mechanisms: in some cases it just reflects over-invoicing for money laundering purposes, while in other cases it is a real gain of a dominant market position likely obtained exploiting the coercive power of the criminal organization or the availability of low cost capital.

To estimate the effects of the 'ndrangheta penetration on the local economy, we finally adopt a long-run perspective and use a first-difference strategy at the municipality level over a 40-years-long period to estimate the impact on the growth of employment. To address the potential endogenous sorting of the 'ndrangheta, we exploit an instrumental variable approach that draws on the historical data about the forced settlements of the 'ndrangheta affiliates in the Center and North from the 1970s on. Our results show a large and significant negative effect of 'ndrangheta penetration on the long-run local economic growth which is in line with the (scant) existing evidence. The negative impact is larger in sectors where it is more likely that the 'ndrangheta enters to invest and make profits, thus displacing the competitors, rather than to launder money.

8 Figures

Figure 1: Year and firm's age at infiltration
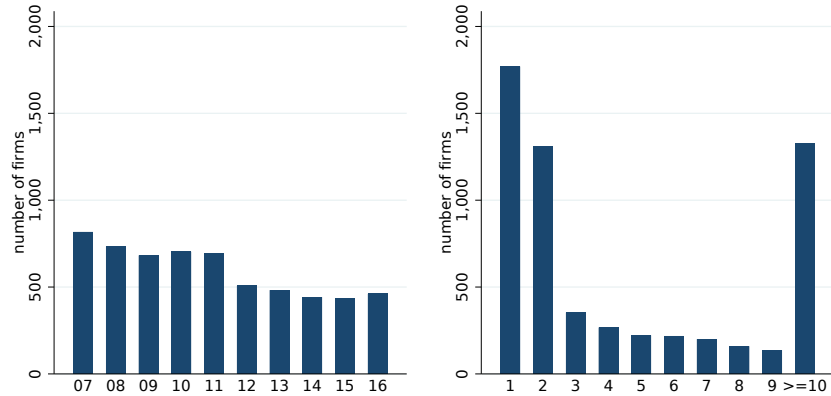
Notes: Distribution of firms classified as infiltrated from 2007 onwards, by year of infiltration (left panel) and by firm's age at infiltration (right panel).

Figure 2: Number of alleged mafiosi and type of infiltration
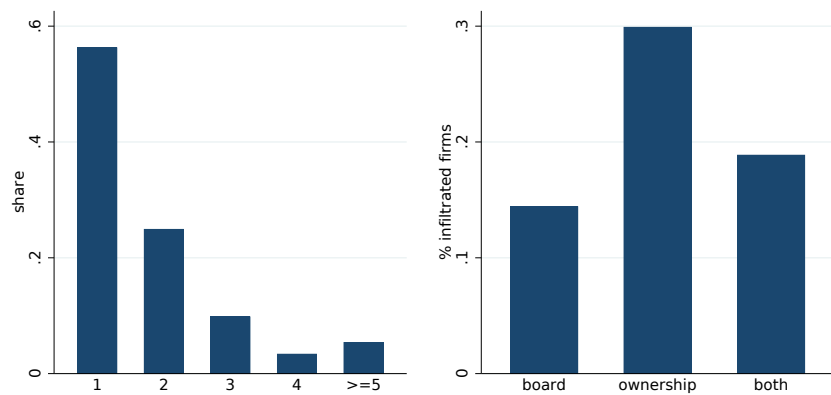
Notes: Distribution of firms classified as infiltrated from 2007 onwards by the number of alleged mafiosi among its owners or directors (left panel) and incidence of infiltrated firms (over total firms) by type of infiltration (right panel).

31

Figure 3: Geographical distribution of treated firms
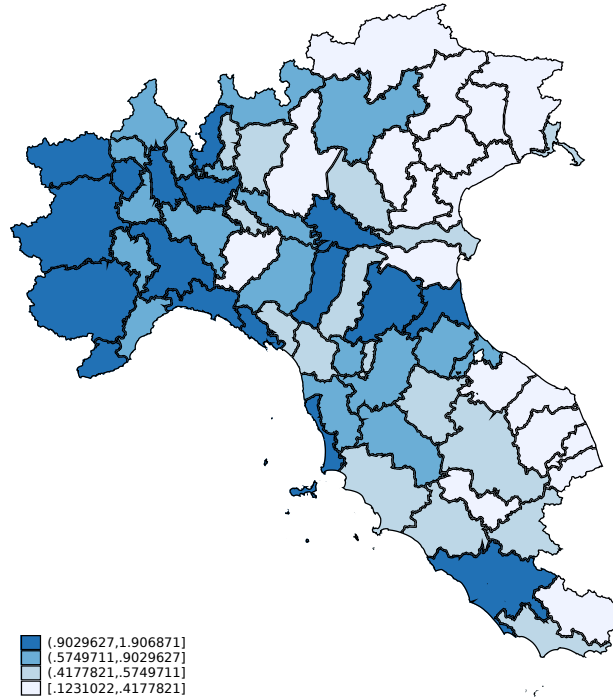
Notes: Number of firms classified as infiltrated over total number of firms per province, average 2006-2015, percentage values.

Figure 4: Presence of organized crime groups
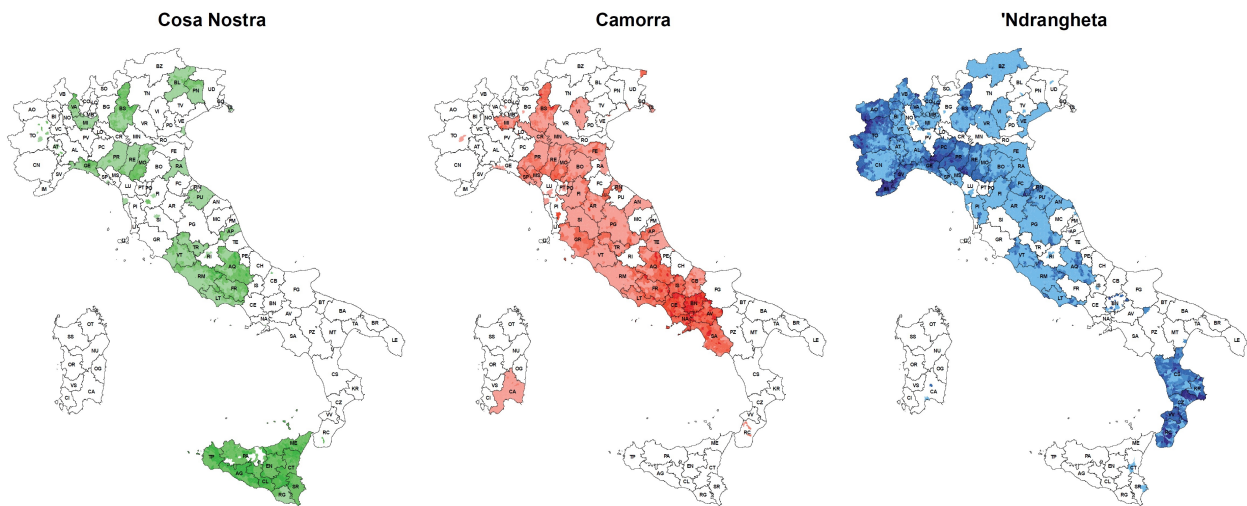
Notes: Transcrime Index based on: (1) murders and attempted murders of organized crime, (2) people reported for organized crime, (3) municipalities and public administrations dissolved for organized crime infiltration, (4) goods confiscated from organized crime, (5) active groups of organized crime reported in the DIA and DNA reports. Darker colors indicate higher presence of the mafia organization. **Source:** Transcrime (2015)

Figure 5: Sectoral distribution of treated firms
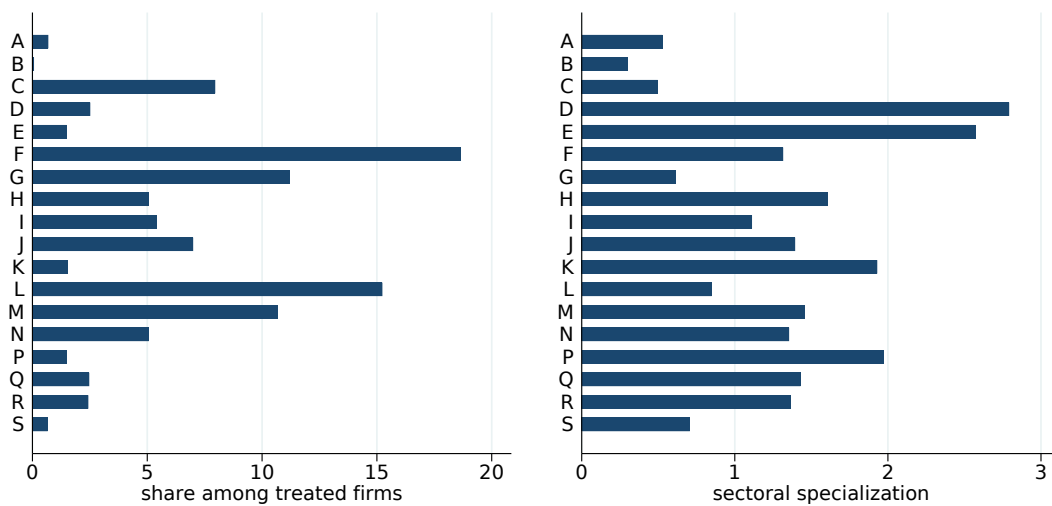
Notes: Sectoral distribution (i.e. the share of infiltrated firms by sector) and sectoral specialization of infiltrated firms (i.e. the ratio between the share of the sector among infiltrated firms and the share of the sector among all firms). Sectors include: A = Agriculture, forestry and fishing; B = Mining and quarrying; C = Manufacturing; D = Electricity, gas, etc.; E = water, waste, etc.; F = Construction; G = Wholesale and retail trade; H = Transportation and storage; I = Accommodation and food service activities; J = Information and communication; K = Finance and insurance; L = Real estate; M = Professional business services; N = Administrative and support activities; P = Education; Q = Health; R = Arts, entertainment and recreation; other = residual sectors.

Figure 6: Sectoral distribution of treated firms and sector characteristics
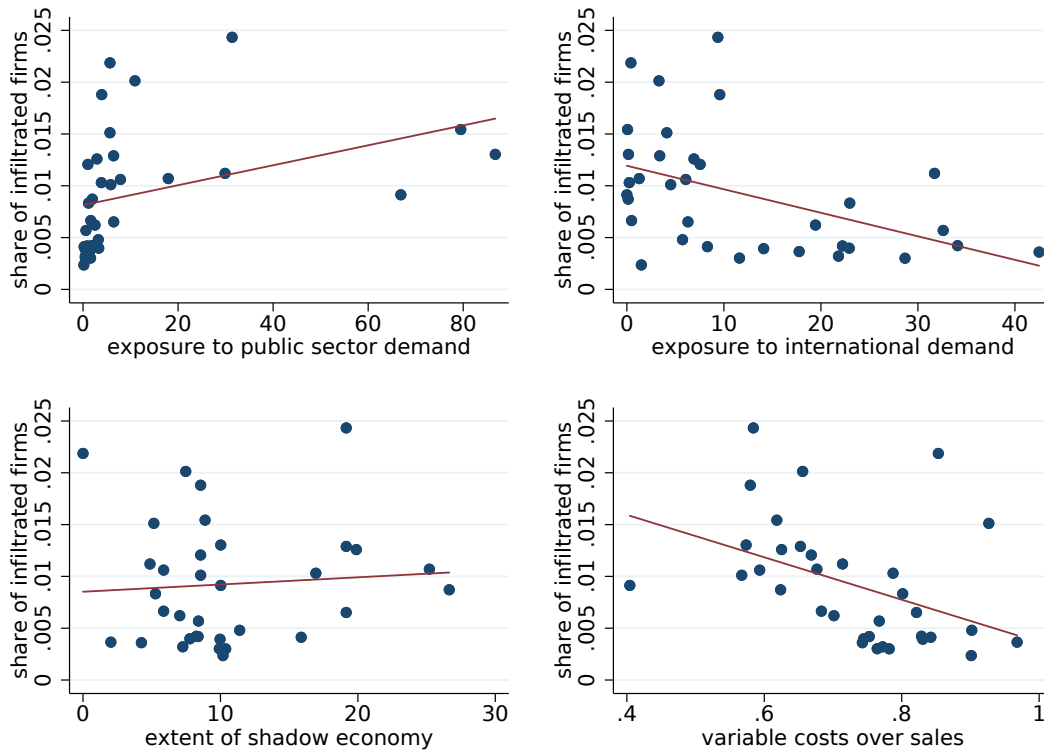
Notes: Sectoral distribution (i.e. the share of infiltrated firms by sector) and sector characteristics. Exposure to public sector demand is computed on the basis of the input-output matrix; exposure to international demand and extent of the shadow economy are drawn from Istat; the incidence of the production (variable) costs over sales is obtained with the balance sheet data drawn from CADS.

Figure 7: Sectoral distribution of infiltrated and confiscated firms
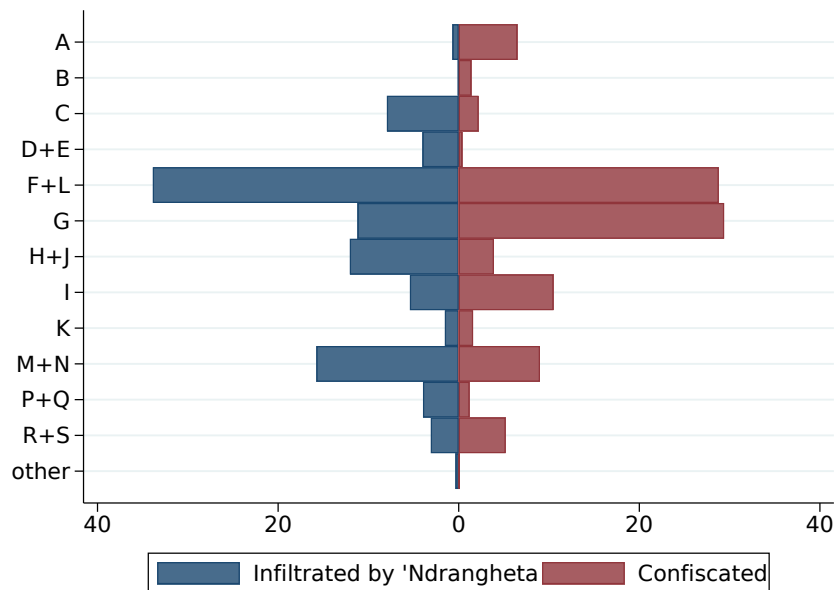
Notes: Sectoral distribution (i.e. the share of firms by sector) of firms infiltrated by the 'ndrangheta and confiscated to all mafias. Figures for confiscated firms are drawn from Riccardi (2014). Sectors include: A = Agriculture, forestry and fishing; B = Mining and quarrying; C = Manufacturing; D = Electricity, gas, etc.; E = water, waste, etc.; F = Construction; G = Wholesale and retail trade; H = Transportation and storage; I = Accommodation and food service activities; J = Information and communication; K = Finance and insurance; L = Real estate; M = Professional business services; N = Administrative and support activities; P = Education; Q = Health; R = Arts, entertainment and recreation; other = residual sectors.

Figure 8: Dynamics of balance sheet data *before* infiltration.
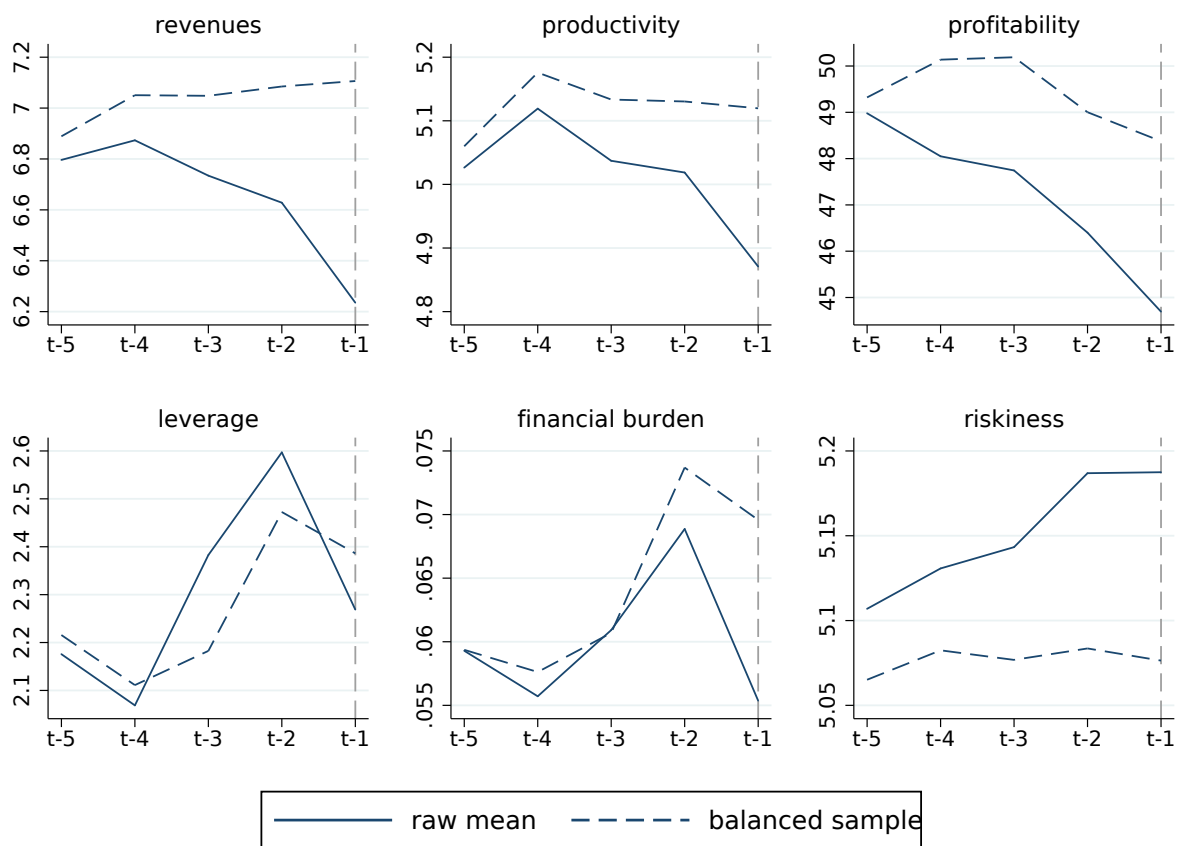
Notes: t denotes the year in which the 'ndrangheta infiltration takes place. The outcome variables considered are: (log) revenues, (log) labor productivity, profitability (percentiles of Returns On Assets), leverage, financial burden and credit riskiness (an index constructed by CADS and used by banks for giving credit to firms). The solid line represents the raw mean of the outcome variables in the treatment group before infiltration; the dashed line is obtained by imposing that all firms must be observed in all the five years before infiltration to account for compositional effects.

36

Figure 9: Leads and lags on the effects of infiltration.
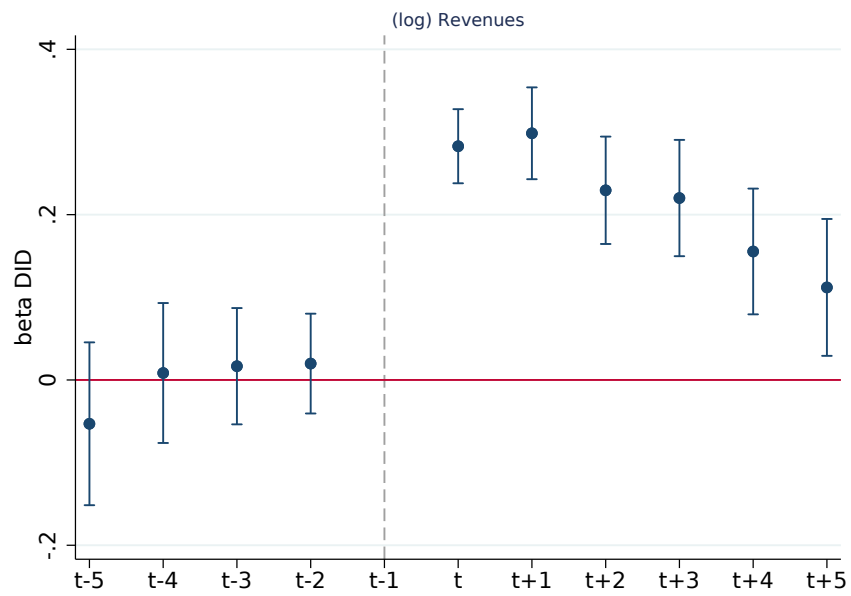
Notes: Each point is the point estimate of the treatment effect in different years before and after the treatment (leads and lags); vertical bands are the corresponding 95% confidence intervals. $t-1$ is the reference category. The specification includes firm-, province-year and sector-year fixed effects.

37

Figure 10: Synthetic control results
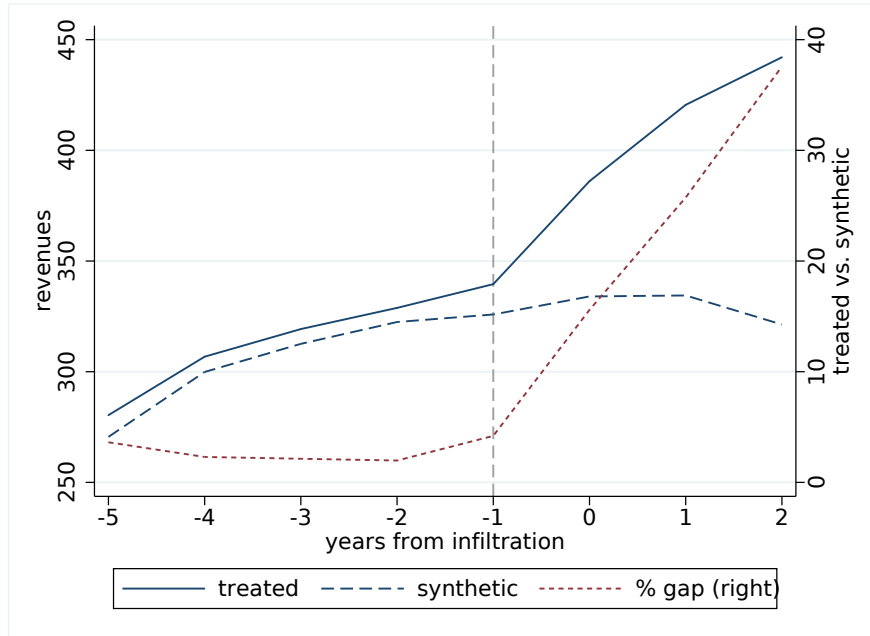
Notes: Level of revenues (thousand euro) in the treated and synthetic control units (left axis). Difference in (log) revenues between treated and synthetic control units (right axis); t denotes the year from 'ndrangheta infiltration.

Figure 11: Distance to municipalities of forced settlements.
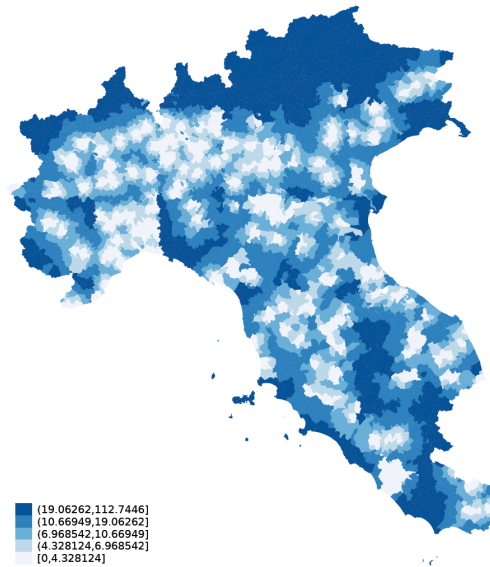
Notes: Distribution of the euclidean distance between municipalities in the Center North and the closest municipality in which some 'ndrangheta affiliates were forced to resettle in the 1970s under Law 575/1965.

9 Tables

Table 1: Correlation between municipality-sector distribution of infiltrated and confiscated firms

	(1)	(2)	(3)	(4)
Dependent variable:		NDR_{ms}		
Share of confiscated firms$_{ms}$	1.200***	0.984***	1.200***	0.978***
	(0.144)	(0.125)	(0.144)	(0.125)
Municipality FE		Yes		Yes
Sector FE			Yes	Yes
R^2	0.580	0.648	0.580	0.649
Observations	39,345	39,107	39,345	39,107

Notes: NDR$_{ms}$ is the share of infiltrated firms in municipality m and sector s in the period 2006-2016 over the total number of infiltrated firms in the same period ($\frac{\sum NDR_{ims}}{\sum NDR_i}$). Symmetrically, *Share of confiscated firms$_{ms}$* is the number of confiscated firms in municipality m and sector s in the period 2006-2016 over the total number of confiscated firms in the same period. Data on confiscated firms are drawn from Ministry of Interior (ANBSC). Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 2: Descriptive statistics: control and treated units *before* infiltration

	(1) Control	(2) Treated	(3) Δ_1	(4) Δ_2
(log) revenues	5.826	6.366	-0.539***	0.434***
(log) capital	3.695	3.828	-0.133***	0.601***
(log) labor cost	2.833	3.244	-0.411***	0.390***
Leverage	2.402	2.389	0.013	0.186*
Financial burden	0.059	0.062	-0.003**	0.006***
(log) labor productivity	4.758	4.936	-0.179***	0.184***
ROA (percentile)	50.114	46.637	3.477***	1.941***
Score (credit riskiness)	5.205	5.250	-0.045***	-0.269***
Firm's age	13.378	10.788	2.590***	6.622***

Notes: Columns (1) and (2) report mean values for non infiltrated and infiltrated firms *before* infiltration, respectively. Δ_1 is the raw difference in means between (1) and (2); Δ_2 is the difference controlling for province-year fixed effects, sector-year fixed effects and firm size. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Effects of infiltration on firm's performance. DID estimates

	(1)	(2)	(3)	(4)
Dependent variable:	(log) Revenues			
NDR$_{it}$	0.281***	0.278***	0.235***	0.236***
	(0.024)	(0.024)	(0.024)	(0.024)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Province-Year FE		Yes		Yes
Sector-Year FE			Yes	Yes
R^2	0.847	0.847	0.848	0.848
Observations	6,115,896	6,115,896	6,115,896	6,115,896

Notes: Robust standard errors clustered at firm level in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Robustness checks: variable definition

	(1)	(2)	(3)	(4)	(5)
Dependent variable:			(log) Revenues		
NDR_{it} (surname only)	0.299***				
	(0.011)				
NDR_{it} (surname + province)		0.214***			
		(0.029)			
NDR_{it} (rare surname)			0.293***		
			(0.039)		
NDR_{it} (frequent surname)			0.202***		
			(0.031)		
NDR_{it} (low intensity)				0.186***	
				(0.026)	
NDR_{it} (high intensity)				0.482***	
				(0.059)	
NDR_{it} (director)					0.186***
					(0.047)
NDR_{it} (owner)					0.295***
					(0.023)
Firm FE	Yes	Yes	Yes	Yes	Yes
Province-Year FE	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes
R^2	0.848	0.848	0.848	0.848	0.848
Observations	6,115,896	6,115,896	6,115,896	6,115,896	6,115,896

Notes: The table shows the results using different definition of the 'ndrangheta infiltration. Robust standard errors clustered at firm level in parenthesis. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

41

Table 5: Robustness checks: other changes in the governance

	(1)	(2)	(3)	(4)	(5)
Dependent variable:			(log) Revenues		
Other CAL$_{it}$	0.047***				
	(0.011)				
BAS$_{it}$ (placebo)		0.031			
		(0.043)			
SAR$_{it}$ (placebo)			−0.020		
			(0.044)		
NDR$_{it}$				0.231***	0.232***
				(0.025)	(0.026)
N owners & directors				0.000*	
				(0.000)	
Firm FE	Yes	Yes	Yes	Yes	Yes
Province-Year FE	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes
Sample restriction					PSM
R^2	0.848	0.848	0.848	0.848	0.895
Observations	6,115,896	6,115,896	6,115,896	6,115,896	39,453

Notes: The table shows the results using other measure of change in the governance of the firm, with the entry of, respectively, people born in Calabria but with a surname that is not included in the APC list, two placebo exercises with individuals born in Basilicata and Calabria, a control for the number of owners and directors (to capture variation over time of board of the firms and/or of its shareholders) and, finally, a regression on a restricted sample selected with the propensity score matching (PSM). Robust standard errors clustered at firm level in parenthesis. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 6: Descriptive statistics: treated and synthetic control units *before* infiltration $(t-1)$.

	(1)	(2)	(3)
	Treated	Synthetic	Δ
(log) revenues	7.519	7.391	0.128
(log) capital stock	5.643	5.549	0.094
(log) labor cost	5.267	5.045	0.222
Leverage	1.806	1.503	0.303
Financial burden	0.055	0.048	0.007
(log) labor productivity	5.156	5.050	0.106
ROA (percentile)	54.421	55.274	-0.853
Score (credit riskiness)	4.831	4.840	-0.009
Firm's age	19.142	19.631	-0.489
N	802	18,901	

Notes: Columns (1) and (2) report mean values for infiltrated firms and for their corresponding synthetic control units; Δ is the difference in means between the two columns. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Effects of infiltration on other firm outcomes. DID estimates

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Labor	Capital	Leverage	ROA	Exit
NDR_{it}	0.207***	0.026	-0.014	1.924***	0.024***
	(0.028)	(0.028)	(0.133)	(0.472)	(0.003)
Firm FE	Yes	Yes	Yes	Yes	Yes
Province-Year FE	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes
Sample restriction					PSM
R^2	0.898	0.894	0.576	0.518	0.256
Observations	6,031,038	6,115,896	6,115,896	5,967,918	39,453

Notes: The table shows the results using different firm outcomes. The results on exit are based on the subsample of firms built using propensity score matching (to address the fact that infiltrated firms cannot exit the market before being infiltrated). Robust standard errors clustered at firm level in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Effects of infiltration on firm's performance by sector. DID estimates

Dependent variable (log):	(1) Revenues	(2) Labor	(3) Capital	(4) Revenues	(5) Labor	(6) Capital
Sector		Business			Illicit	
NDR_{it}	0.195***	0.277***	0.044	0.263***	0.169***	0.011
	(0.044)	(0.051)	(0.051)	(0.029)	(0.035)	(0.034)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Province-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.774	0.899	0.902	0.870	0.880	0.889
Observations	1,991,262	1,961,559	1,991,262	4,074,607	4,020,235	4,074,607

Notes: The table shows the results using different firm outcomes. See discussion in Section 5.4 for the sectoral partition. Robust standard errors clustered at firm level in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9: Long-run effects of 'ndrangheta penetration. OLS and IV estimates.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	ΔE_m	ΔE_m	ΔNDR_m	ΔE_m	ΔE_m	ΔE_m
Sector	All				Business	Illicit
Panel A						
ΔNDR_m	-0.029^{**}			-0.440^{**}	-0.828^{**}	-0.483^{***}
	(0.011)			(0.193)	(0.388)	(0.187)
$\log(distance_m)$		0.068^{**}	-0.155^{***}			
		(0.029)	(0.026)			
First stage F-stat				34.37	34.16	34.37
R^2	0.007	0.033	0.019	-1.480	-0.593	-1.540
Observations	4,916	4,916	4,916	4,916	4,809	4,916
Panel B						
$\Delta \widehat{NDR}_m$	-0.606^{***}			-0.915^{**}	-1.717^{**}	-1.006^{**}
	(0.076)			(0.424)	(0.847)	(0.418)
$\log(distance_m)$		0.068^{**}	-0.075^{***}			
		(0.029)	(0.019)			
First stage F-stat				15.95	15.92	15.95
R^2	0.099	0.033	0.143	0.074	-0.061	0.077
Observations	4,916	4,916	4,916	4,916	4,809	4,916

Notes: ΔE_m is the variation between 1971 and 2011 in employment in municipality m. ΔNDR_m is the variation between 1971 and 2011 in the share of infiltrated firms in municipality m. $\Delta \widehat{NDR}_m$ is the variation between 1971 and 2011 in the share of infiltrated firms in municipality m and its surroundings, weighted by the ratio between the size of the municipality - as measured by the number of firms - and the distance from m. $\log(distance_m)$ is the (log) distance between municipality m and the closest municipality of forced resettlement of 'ndrangheta affiliates. In column (1) we report the OLS estimates; in column (2) the reduced form estimates; in column (3) the first stage estimates (note that the outcome variable for Panel B will be $\Delta \widehat{NDR}_m$); in columns (4) (5) and (6) the second stage IV estimates, overall and by sectoral partition. See discussion in Section 5.4 for the sectoral partition. Robust standard errors clustered at firm level in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

References

Abadie, A., A. Diamond, and J. Hainmueller (2010). Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of Californias Tobacco Control Program. *Journal of the American Statistical Association 105*(490), 493–505.

Abadie, A. and J. Gardeazabal (2003). The Economic Costs of Conflict: A Case Study of the Basque Country. *American Economic Review 93*(1), 113–132.

Acemoglu, D., G. De Feo, and G. D. De Luca (2019). Weak States: Causes and Consequences of the Sicilian Mafia. *The Review of Economic Studies*.

Acemoglu, D., S. Johnson, A. Kermani, J. Kwak, and T. Mitton (2016). The Value of Connections in Turbulent Times: Evidence from the United States. *Journal of Financial Economics 121*(2), 368–391.

Acemoglu, D., J. A. Robinson, and R. J. Santos (2013). The Monopoly Of Violence: Evidence From Colombia. *Journal of the European Economic Association 11*(1), 5–44.

Alesina, A., S. Piccolo, and P. Pinotti (2018). Organized Crime, Violence, and Politics. *Review of Economic Studies 86*(2), 457–499.

Autor, D. (2003). Outsourcing at will: The contribution of unjust dismissal doctrine to the growth of employment outsourcing. *Journal of Labor Economics 21*(1), 1–42.

Bandiera, O. (2003). Land Reform, the Market for Protection, and the Origins of the Sicilian Mafia: Theory and Evidence. *Journal of Law, Economics and Organization 19*(1), 218–244.

Barone, G. and G. Narciso (2015). Organized Crime and Business Subsidies: Where Does the Money Go? *Journal of Urban Economics 86*(C), 98–110.

Buonanno, P., R. Durante, G. Prarolo, and P. Vanin (2015). Poor Institutions, Rich Mines: Resource Curse in the Origins of the Sicilian Mafia. *Economic Journal 125*, F175–F202.

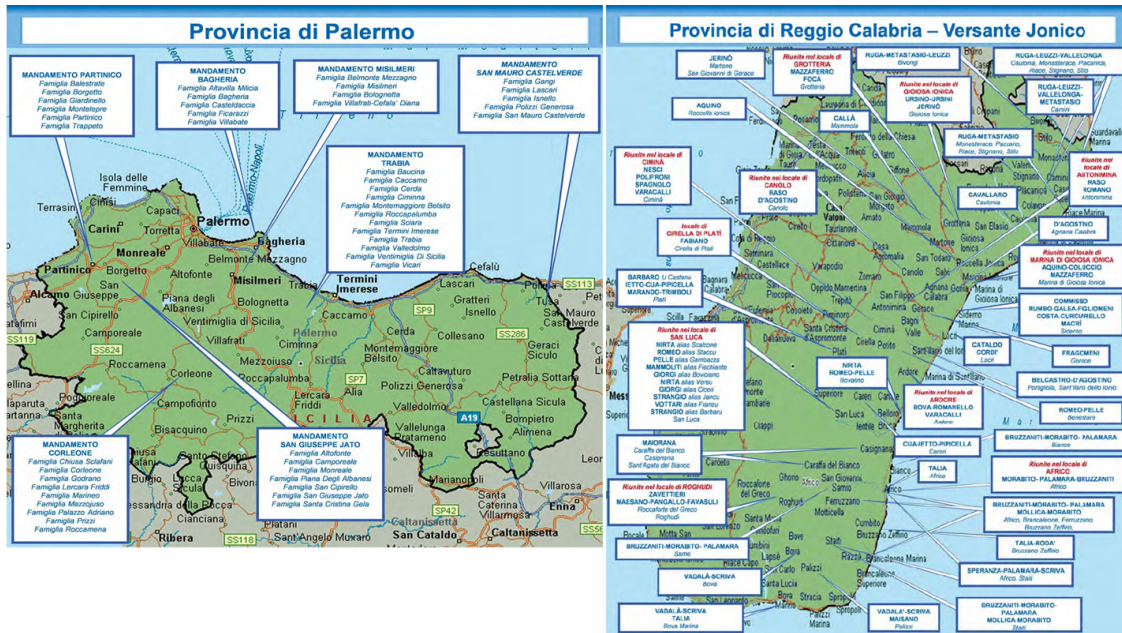Buonanno, P. and M. Pazzona (2014). Migrating mafias. *Regional Science and Urban Economics 44*(C), 75–81.

Ciconte, E. (2008). *'Ndrangheta.* Rubbettino.

Dalla Chiesa, F., M. Bedetti, F. Cabras, I. Meli, and R. Nicolini (2014). Primo rapporto trimestrale sulle aree settentrionali per la presidenza della commissione parlamentare di inchiesta sul fenomeno mafioso. Research report, Osservatorio sulla Criminalita' Organizzata.

Daniele, G. and B. Geys (2015). Organized Crime, Institutions and Political Quality: Empirical Evidence from Italian Municipalities. *Economic Journal 125*(586), 233–255.

De Feo, G. and G. D. De Luca (2017). Mafia in the Ballot Box. *American Economic Journal: Economic Policy 9*(3), 134–167.

Dimico, A., A. Isopi, and O. Olsson (2017). Origins of the Sicilian Mafia: The Market for Lemons. *Journal of Economic History 77*(4), 1083–1115.

Europol (2013). Threat assessment. italian organised crime. Research report, Europol.

Gagliarducci, S. and M. Manacorda (2019). Politics in the family. nepotism and hiring decisions of italian firms. *American Economic Journal: Applied Economics*.

Gambetta, D. (1993). *The Sicilian Mafia: The Business of Private Protection.* Harvard University Press.

Gambetta, D. and P. Reuter (1995). *Conspiracy Among the Many: the Mafia in Legitimate Industries*, pp. 99–120. The Economics of Organized Crime. Cambridge University Press.

Gratteri, N. and A. Nicaso (2009). *Fratelli di sangue. Storie, boss e affari della 'ndrangheta, la mafia piu' potente del mondo.* Mondadori.

Gratteri, N. and A. Nicaso (2016). *Oro bianco. Storie di uomini, traffici e denaro dall'impero della cocaina.* Mondadori.

Grogger, J. (1995). The effect of arrests on the employment and earnings of young men. *Quarterly Journal of Economics 110*(1), 51–71.

Guadalupe, M., O. Kuzmina, and C. Thomas (2012). Innovation and Foreign Ownership. *American Economic Review 102*(7), 3594–3627.

Kling, J. R. (2006). Incarceration Length, Employment, and Earnings. *American Economic Review 96*(3), 863–876.

Peri, G. (2004). Socio-Cultural Variables and Economic Success: Evidence from Italian Provinces 1951-1991. *B.E. Journal of Macroeconomics 4*(1), 1–36.

Pinotti, P. (2015a). The causes and consequences of organised crime: Preliminary evidence across countries. *Economic Journal 125*(586), 158–174.

Pinotti, P. (2015b). The economic costs of organised crime: Evidence from southern italy. *Economic Journal 125*(586), 203–232.

Riccardi, M. (2014). *When Criminals Invest in Businesses: Are We Looking in the Right Direction? An Exploratory Analysis of Companies Controlled by Mafias*, pp. 197–206. Organized Crime, Corruption and Crime Prevention. Springer International Publishing.

Scognamiglio, A. (2018). When the mafia comes to town. *European Journal of Political Economy 55*, 573–590.

Sergi, A. and A. Lavorgna (2016). *'Ndrangheta. The Glocal Dimensions of the Most Powerful Italian Mafia.* Palgrave Macmillan.

Transcrime (2015). Gli investimenti delle mafie. Progetto pon sicurezza, 2007-2013, Transcrime and Universita' Cattolica del Sacro Cuore Milano.

UNICRI (2016). Organized crime and the legal economy. Technical report, United Nations Interregional Crime and Justice Research Institute.

UNODC (2010). The globalization of crime. a transnational organized crime threat assessment. Research report, United Nations Office on Drugs and Crime.

UNODC (2011). Estimating illicit financial flows resulting from drug trafficking and other transnational organized crimes. Research report, United Nations Office on Drugs and Crime.

Varese, F. (2006). How mafias migrate: the case of the 'ndrangheta in northern italy. *Law and Society Review 40*(2), 411–444.

Varese, F. (2011). *Mafias on the move: how organized crime conquers new territories.* Princeton University Press.
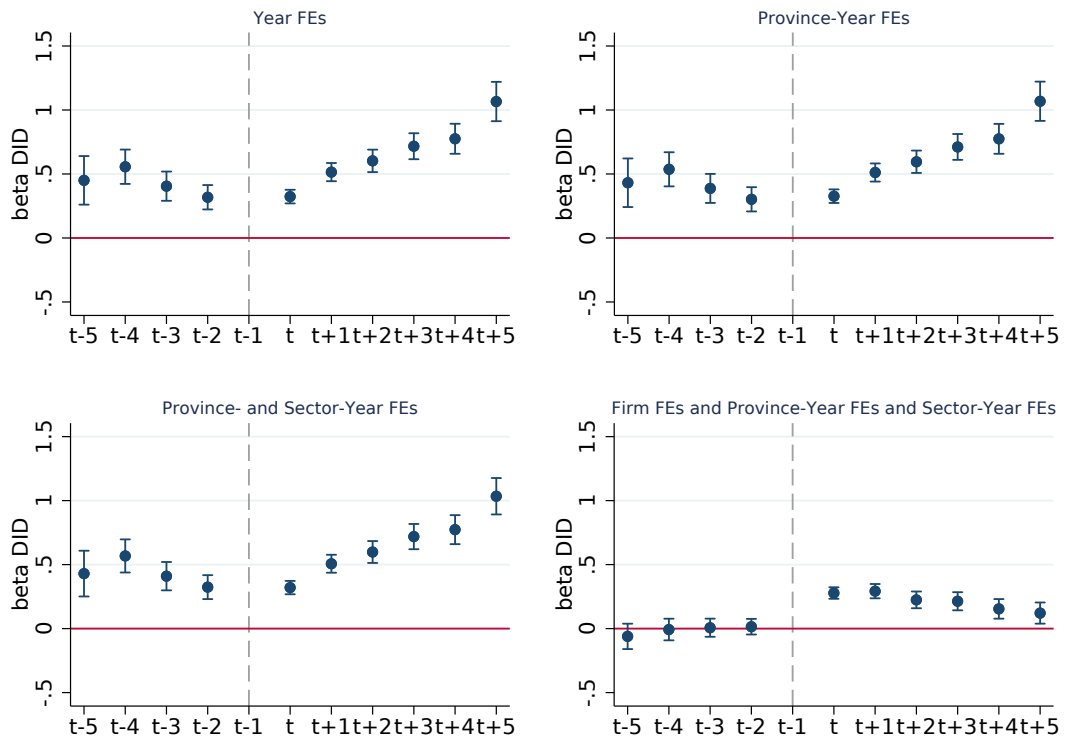
A   Additional Figures and Tables

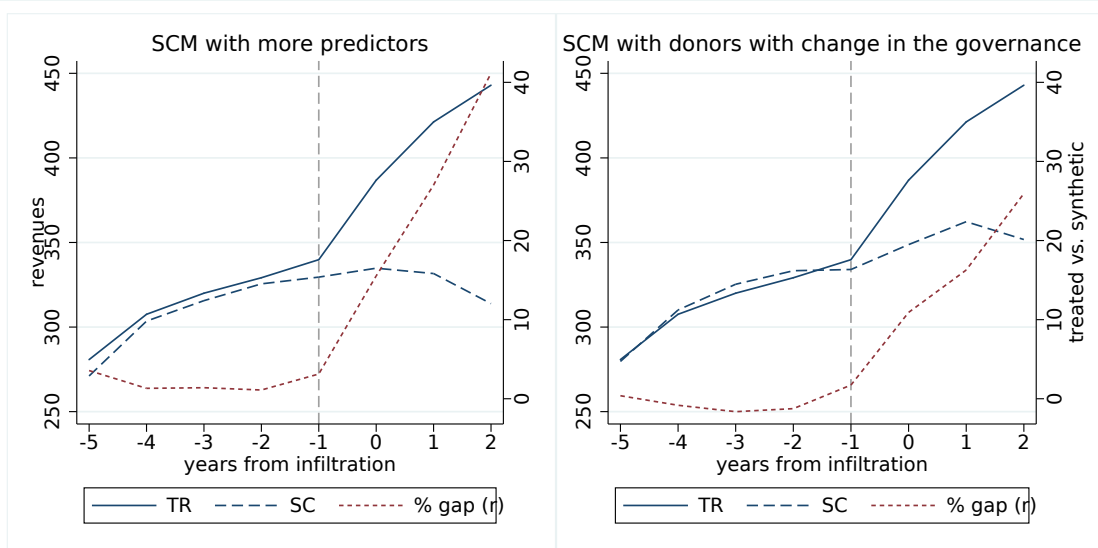**Figure A.1:** Clans of the Sicilian Cosa Nostra and of 'ndrangheta in their area of origin

Source: Anti-Mafia Investigation Directorate

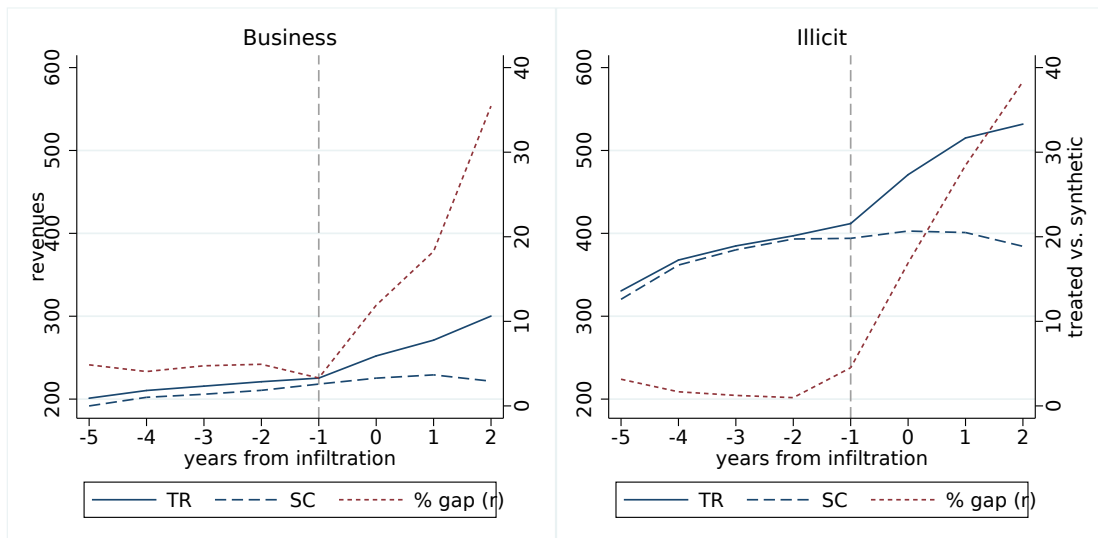**Figure A.2:** Leads and lags of the DID effect of infiltration.

51

**Figure A.3:** Synthetic Control robustness: different specifications

Notes: Extended model includes ROA, leverage and credit score amongst predictors. Restricted sample considers only firms that had a change in governance in t amongst donors.

Figure A.4: Synthetic Control results by sector

Notes: Results by sector; t denotes the year from 'ndrangheta infiltration.

Figure A.5: Correlation between extent of 'ndrangheta infiltration and forced resettlement
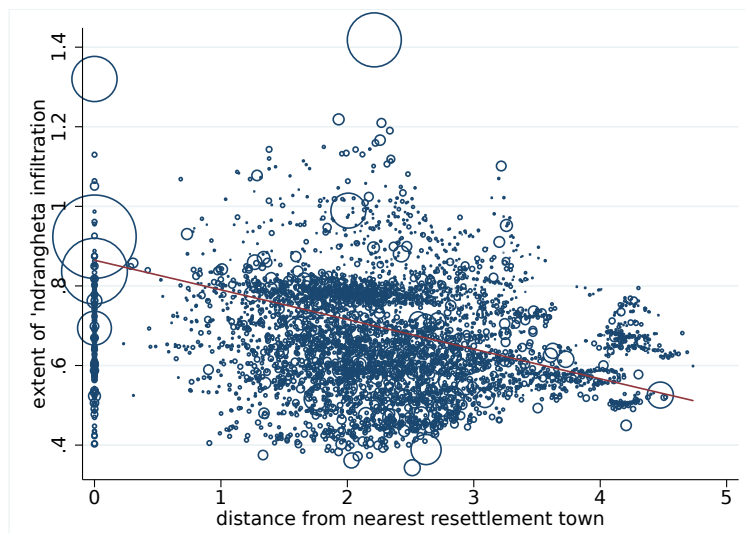
Notes: Scatter plot and linear fit at the municipality level of the relation between the extent of 'ndrangheta infiltration in a given municipality and its distance from the nearest town where some alleged 'ndrangheta affiliate was forced to resettle. The size of the dots represents the 1971 population size of the municipality.

B Misclassification error

Let $N\tilde{D}R_i = 0, 1$ be the real 'ndrangheta affiliation status and call a the probability of classifying an infiltrated firm as a non-infiltrated one and b the probability of classifying a non-infiltrated as infiltrated:

$$
\begin{aligned}
a &= Pr(NDR_i = 0 | N\tilde{D}R_i = 1) \\
b &= Pr(NDR_i = 1 | N\tilde{D}R_i = 0)
\end{aligned}
\tag{B.1}
$$

then the coefficient we estimate through OLS is:

$$
\hat{\beta}_{OLS} = (1 - a - b)\beta
\tag{B.2}
$$

This implies that OLS estimates will converge in probability to a value between $-\beta$ and β. Moreover, as long as both errors are below 0.5, i.e. it is truly more likely that a person working in a firm of central and northern Italy is associated to 'ndrangheta if she is born in Calabria and carries a family name of one of the clans operating in the area than if she is either born somewhere else or has a different family name ($a < 0.5$); it is truly more likely that someone who is not born in Calabria and whose family name is not one of those identified by the Antimafia department is not affiliated to 'ndrangheta than it is someone with the specified characteristics ($b < 0.5$).

$$
\begin{aligned}
Pr(N\tilde{D}R_i \mid \text{Surname}_i \in \text{APC } and \text{ R}_i = \text{Calabria}) &> \\
Pr(N\tilde{D}R_i \mid \text{Surname}_i \notin \text{APC } or \text{ R}_i \neq \text{Calabria})
\end{aligned}
\tag{B.3}
$$

$$
\begin{aligned}
Pr(N\tilde{D}R_i = 0 \mid \text{Surname}_i \notin \text{APC } or \text{ R}_i \neq \text{Calabria}) &> \\
Pr(N\tilde{D}R_i = 0 \mid \text{Surname}_i \in \text{APC } and \text{ R}_i = \text{Calabria})
\end{aligned}
\tag{B.4}
$$

where R_i is the region of birth of individual i, $Surname_i$ her last name and APC is the list of the Anti-mafia Parliamentary Commission containing the 'ndrangheta clans in the Center and North (APC).

Under monotonicity conditions (B.3) and (B.4) the estimated effect of 'ndrangheta will have the correct sign and a magnitude that is lower than the true parameter of interest.

Thus, under such circumstances, the effect we will estimate will need to be interpreted as *lower bound* of the real one.[27]

---

[27]For a similar discussion see also Gagliarducci and Manacorda (2019).

RECENTLY PUBLISHED "TEMI" (*)

N. 1213 – *A regression discontinuity design for categorical ordered running variables with an application to central bank purchases of corporate bonds*, by Fan Li, Andrea Mercatanti, Taneli Mäkinen and Andrea Silvestrini (March 2019).

N. 1214 – *Anything new in town? The local effects of urban regeneration policies in Italy*, by Giuseppe Albanese, Emanuele Ciani and Guido de Blasio (April 2019).

N. 1215 – *Risk premium in the era of shale oil*, by Fabrizio Ferriani, Filippo Natoli, Giovanni Veronese and Federica Zeni (April 2019).

N. 1216 – *Safety traps, liquidity and information-sensitive assets*, by Michele Loberto (April 2019).

N. 1217 – *Does trust among banks matter for bilateral trade? Evidence from shocks in the interbank market*, by Silvia Del Prete and Stefano Federico (April 2019).

N. 1218 – *Monetary policy, firms' inflation expectations and prices: causal evidence from firm-level data*, by Marco Bottone and Alfonso Rosolia (April 2019).

N. 1219 – *Inflation expectations and firms' decisions: new causal evidence*, by Olivier Coibion, Yuriy Gorodnichenko and Tiziano Ropele (April 2019).

N. 1220 – *Credit risk-taking and maturity mismatch: the role of the yield curve*, by Giuseppe Ferrero, Andrea Nobili and Gabriele Sene (April 2019).

N. 1221 – *Big-city life (dis)satisfaction? The effect of living in urban areas on subjective well-being*, by David Loschiavo (June 2019).

N. 1222 – *Urban agglomerations and firm access to credit*, by Amanda Carmignani, Guido de Blasio, Cristina Demma and Alessio D'Ignazio (June 2019).

N. 1223 – *The international transmission of US tax shocks: a proxy-SVAR approach*, by Luca Metelli and Filippo Natoli (June 2019).

N. 1224 – *Forecasting inflation in the euro area: countries matter!*, by Angela Capolongo and Claudia Pacella (June 2019).

N. 1225 – *Domestic and global determinants of inflation: evidence from expectile regression*, by Fabio Busetti, Michele Caivano and Davide Delle Monache (June 2019).

N. 1226 – *Relative price dynamics in the Euro area: where do we stand?*, by Pietro Cova and Lisa Rodano (June 2019).

N. 1227 – *Optimally solving banks' legacy problems*, by Anatoli Segura and Javier Suarez (June 2019).

N. 1228 – *Il mercato degli affitti nelle città italiane: un'analisi basata sugli annunci online*, di Michele Loberto (Luglio 2019).

N. 1229 – *Using credit variables to date business cycle and to estimate the probabilities of recession in real time*, by Valentina Aprigliano and Danilo Liberati (July 2019).

N. 1230 – *Disinflationary shocks and inflation target uncertainty*, by Stefano Neri and Tiziano Ropele (July 2019).

N. 1231 – *Exchange rate dynamics and unconventional monetary policies: it's all in the shadows*, by Andrea De Polis and Mario Pietrunti (July 2019).

N. 1232 – *Risky bank guarantees*, by Taneli Mäkinen, Lucio Sarno and Gabriele Zinna (July 2019).

2017

AABERGE, R., F. BOURGUIGNON, A. BRANDOLINI, F. FERREIRA, J. GORNICK, J. HILLS, M. JÄNTTI, S. JENKINS, J. MICKLEWRIGHT, E. MARLIER, B. NOLAN, T. PIKETTY, W. RADERMACHER, T. SMEEDING, N. STERN, J. STIGLITZ, H. SUTHERLAND, *Tony Atkinson and his legacy,* Review of Income and Wealth, v. 63, 3, pp. 411-444, **WP 1138 (September 2017).**

ACCETTURO A., M. BUGAMELLI and A. LAMORGESE, *Law enforcement and political participation: Italy 1861-65,* Journal of Economic Behavior & Organization, v. 140, pp. 224-245, **WP 1124 (July 2017).**

ADAMOPOULOU A. and G.M. TANZI, *Academic dropout and the great recession,* Journal of Human Capital, V. 11, 1, pp. 35–71, **WP 970 (October 2014).**

ALBERTAZZI U., M. BOTTERO and G. SENE, *Information externalities in the credit market and the spell of credit rationing,* Journal of Financial Intermediation, v. 30, pp. 61–70, **WP 980 (November 2014).**

ALESSANDRI P. and H. MUMTAZ, *Financial indicators and density forecasts for US output and inflation,* Review of Economic Dynamics, v. 24, pp. 66-78, **WP 977 (November 2014).**

BARBIERI G., C. ROSSETTI and P. SESTITO, *Teacher motivation and student learning,* Politica economica/Journal of Economic Policy, v. 33, 1, pp.59-72, **WP 761 (June 2010).**

BENTIVOGLI C. and M. LITTERIO, *Foreign ownership and performance: evidence from a panel of Italian firms,* International Journal of the Economics of Business, v. 24, 3, pp. 251-273, **WP 1085 (October 2016).**

BRONZINI R. and A. D'IGNAZIO, *Bank internationalisation and firm exports: evidence from matched firm-bank data,* Review of International Economics, v. 25, 3, pp. 476-499 **WP 1055 (March 2016).**

BRUCHE M. and A. SEGURA, *Debt maturity and the liquidity of secondary debt markets,* Journal of Financial Economics, v. 124, 3, pp. 599-613, **WP 1049 (January 2016).**

BURLON L., *Public expenditure distribution, voting, and growth,* Journal of Public Economic Theory,, v. 19, 4, pp. 789–810, **WP 961 (April 2014).**

BURLON L., A. GERALI, A. NOTARPIETRO and M. PISANI, *Macroeconomic effectiveness of non-standard monetary policy and early exit. a model-based evaluation,* International Finance, v. 20, 2, pp.155-173, **WP 1074 (July 2016).**

BUSETTI F., *Quantile aggregation of density forecasts,* Oxford Bulletin of Economics and Statistics, v. 79, 4, pp. 495-512, **WP 979 (November 2014).**

CESARONI T. and S. IEZZI, *The predictive content of business survey indicators: evidence from SIGE,* Journal of Business Cycle Research, v.13, 1, pp 75–104, **WP 1031 (October 2015).**

CONTI P., D. MARELLA and A. NERI, *Statistical matching and uncertainty analysis in combining household income and expenditure data,* Statistical Methods & Applications, v. 26, 3, pp 485–505, **WP 1018 (July 2015).**

D'AMURI F., *Monitoring and disincentives in containing paid sick leave,* Labour Economics, v. 49, pp. 74-83, **WP 787 (January 2011).**

D'AMURI F. and J. MARCUCCI, *The predictive power of google searches in forecasting unemployment,* International Journal of Forecasting, v. 33, 4, pp. 801-816, **WP 891 (November 2012).**

DE BLASIO G. and S. POY, *The impact of local minimum wages on employment: evidence from Italy in the 1950s,* Journal of Regional Science, v. 57, 1, pp. 48-74, **WP 953 (March 2014).**

DEL GIOVANE P., A. NOBILI and F. M. SIGNORETTI, *Assessing the sources of credit supply tightening: was the sovereign debt crisis different from Lehman?,* International Journal of Central Banking, v. 13, 2, pp. 197-234, **WP 942 (November 2013).**

DEL PRETE S., M. PAGNINI, P. ROSSI and V. VACCA, *Lending organization and credit supply during the 2008–2009 crisis,* Economic Notes, v. 46, 2, pp. 207–236, **WP 1108 (April 2017).**

DELLE MONACHE D. and I. PETRELLA, *Adaptive models and heavy tails with an application to inflation forecasting,* International Journal of Forecasting, v. 33, 2, pp. 482-501, **WP 1052 (March 2016).**

FEDERICO S. and E. TOSTI, *Exporters and importers of services: firm-level evidence on Italy,* The World Economy, v. 40, 10, pp. 2078-2096, **WP 877 (September 2012).**

GIACOMELLI S. and C. MENON, *Does weak contract enforcement affect firm size? Evidence from the neighbour's court,* Journal of Economic Geography, v. 17, 6, pp. 1251-1282, **WP 898 (January 2013).**

LOBERTO M. and C. PERRICONE, *Does trend inflation make a difference?,* Economic Modelling, v. 61, pp. 351–375, **WP 1033 (October 2015).**

MANCINI A.L., C. MONFARDINI and S. PASQUA, *Is a good example the best sermon? Children's imitation of parental reading,* Review of Economics of the Household, v. 15, 3, pp 965–993, **WP No. 958 (April 2014).**

MEEKS R., B. NELSON and P. ALESSANDRI, *Shadow banks and macroeconomic instability,* Journal of Money, Credit and Banking, v. 49, 7, pp. 1483–1516, **WP 939 (November 2013).**

MICUCCI G. and P. ROSSI, *Debt restructuring and the role of banks' organizational structure and lending technologies,* Journal of Financial Services Research, v. 51, 3, pp 339–361, **WP 763 (June 2010).**

MOCETTI S., M. PAGNINI and E. SETTE, *Information technology and banking organization,* Journal of Journal of Financial Services Research, v. 51, pp. 313-338, **WP 752 (March 2010).**

MOCETTI S. and E. VIVIANO, *Looking behind mortgage delinquencies,* Journal of Banking & Finance, v. 75, pp. 53-63, **WP 999 (January 2015).**

NOBILI A. and F. ZOLLINO, *A structural model for the housing and credit market in Italy,* Journal of Housing Economics, v. 36, pp. 73-87, **WP 887 (October 2012).**

PALAZZO F., *Search costs and the severity of adverse selection,* Research in Economics, v. 71, 1, pp. 171-197, **WP 1073 (July 2016).**

PATACCHINI E. and E. RAINONE, *Social ties and the demand for financial services,* Journal of Financial Services Research, v. 52, 1–2, pp 35–88, **WP 1115 (June 2017).**

PATACCHINI E., E. RAINONE and Y. ZENOU, *Heterogeneous peer effects in education,* Journal of Economic Behavior & Organization, v. 134, pp. 190–227, **WP 1048 (January 2016).**

SBRANA G., A. SILVESTRINI and F. VENDITTI, *Short-term inflation forecasting: the M.E.T.A. approach,* International Journal of Forecasting, v. 33, 4, pp. 1065-1081, **WP 1016 (June 2015).**

SEGURA A. and J. SUAREZ, *How excessive is banks' maturity transformation?,* Review of Financial Studies, v. 30, 10, pp. 3538–3580, **WP 1065 (April 2016).**

VACCA V., *An unexpected crisis? Looking at pricing effectiveness of heterogeneous banks,* Economic Notes, v. 46, 2, pp. 171–206, **WP 814 (July 2011).**

VERGARA CAFFARELI F., *One-way flow networks with decreasing returns to linking,* Dynamic Games and Applications, v. 7, 2, pp. 323-345, **WP 734 (November 2009).**

ZAGHINI A., *A Tale of fragmentation: corporate funding in the euro-area bond market,* International Review of Financial Analysis, v. 49, pp. 59-68, **WP 1104 (February 2017).**

2018

ACCETTURO A., V. DI GIACINTO, G. MICUCCI and M. PAGNINI, *Geography, productivity and trade: does selection explain why some locations are more productive than others?,* Journal of Regional Science, v. 58, 5, pp. 949-979, **WP 910 (April 2013).**

ADAMOPOULOU A. and E. KAYA, *Young adults living with their parents and the influence of peers,* Oxford Bulletin of Economics and Statistics, v. 80, pp. 689-713, **WP 1038 (November 2015).**

ANDINI M., E. CIANI, G. DE BLASIO, A. D'IGNAZIO and V. SILVESTRINI, *Targeting with machine learning: an application to a tax rebate program in Italy,* Journal of Economic Behavior & Organization, v. 156, pp. 86-102, **WP 1158 (December 2017).**

BARONE G., G. DE BLASIO and S. MOCETTI, *The real effects of credit crunch in the great recession: evidence from Italian provinces,* Regional Science and Urban Economics, v. 70, pp. 352-59, **WP 1057 (March 2016).**

BELOTTI F. and G. ILARDI *Consistent inference in fixed-effects stochastic frontier models,* Journal of Econometrics, v. 202, 2, pp. 161-177, **WP 1147 (October 2017).**

BERTON F., S. MOCETTI, A. PRESBITERO and M. RICHIARDI, *Banks, firms, and jobs,* Review of Financial Studies, v. 31, 6, pp. 2113-2156, **WP 1097 (February 2017).**

BOFONDI M., L. CARPINELLI and E. SETTE, *Credit supply during a sovereign debt crisis,* Journal of the European Economic Association, v. 16, 3, pp. 696-729, **WP 909 (April 2013).**

BOKAN N., A. GERALI, S. GOMES, P. JACQUINOT and M. PISANI, *EAGLE-FLI: a macroeconomic model of banking and financial interdependence in the euro area,* Economic Modelling, v. 69, C, pp. 249-280, **WP 1064 (April 2016).**

BRILLI Y. and M. TONELLO, *Does increasing compulsory education reduce or displace adolescent crime? New evidence from administrative and victimization data,* CESifo Economic Studies, v. 64, 1, pp. 15–4, **WP 1008 (April 2015).**

BUONO I. and S. FORMAI *The heterogeneous response of domestic sales and exports to bank credit shocks,* Journal of International Economics, v. 113, pp. 55-73, **WP 1066 (March 2018).**

BURLON L., A. GERALI, A. NOTARPIETRO and M. PISANI, *Non-standard monetary policy, asset prices and macroprudential policy in a monetary union,* Journal of International Money and Finance, v. 88, pp. 25-53, **WP 1089 (October 2016).**

CARTA F. and M. DE PHLIPPIS, *You've Come a long way, baby. Husbands' commuting time and family labour supply,* Regional Science and Urban Economics, v. 69, pp. 25-37, **WP 1003 (March 2015).**

CARTA F. and L. RIZZICA, *Early kindergarten, maternal labor supply and children's outcomes: evidence from Italy,* Journal of Public Economics, v. 158, pp. 79-102, **WP 1030 (October 2015).**

CASIRAGHI M., E. GAIOTTI, L. RODANO and A. SECCHI, *A "Reverse Robin Hood"? The distributional implications of non-standard monetary policy for Italian households,* Journal of International Money and Finance, v. 85, pp. 215-235, **WP 1077 (July 2016).**

CECCHETTI S., F. NATOLI and L. SIGALOTTI, *Tail co-movement in inflation expectations as an indicator of anchoring,* International Journal of Central Banking, v. 14, 1, pp. 35-71, **WP 1025 (July 2015).**

CIANI E. and C. DEIANA, *No Free lunch, buddy: housing transfers and informal care later in life,* Review of Economics of the Household, v.16, 4, pp. 971-1001, **WP 1117 (June 2017).**

CIPRIANI M., A. GUARINO, G. GUAZZAROTTI, F. TAGLIATI and S. FISHER, *Informational contagion in the laboratory,* Review of Finance, v. 22, 3, pp. 877-904, **WP 1063 (April 2016).**

DE BLASIO G, S. DE MITRI, S. D'IGNAZIO, P. FINALDI RUSSO and L. STOPPANI, *Public guarantees to SME borrowing. A RDD evaluation,* Journal of Banking & Finance, v. 96, pp. 73-86, **WP 1111 (April 2017).**

GERALI A., A. LOCARNO, A. NOTARPIETRO and M. PISANI, *The sovereign crisis and Italy's potential output,* Journal of Policy Modeling, v. 40, 2, pp. 418-433, **WP 1010 (June 2015).**

LIBERATI D., *An estimated DSGE model with search and matching frictions in the credit market,* International Journal of Monetary Economics and Finance (IJMEF), v. 11, 6, pp. 567-617, **WP 986 (November 2014).**

LINARELLO A., *Direct and indirect effects of trade liberalization: evidence from Chile,* Journal of Development Economics, v. 134, pp. 160-175, **WP 994 (December 2014).**

NUCCI F. and M. RIGGI, *Labor force participation, wage rigidities, and inflation,* Journal of Macroeconomics, v. 55, 3 pp. 274-292, **WP 1054 (March 2016).**

RIGON M. and F. ZANETTI, *Optimal monetary policy and fiscal policy interaction in a non_ricardian economy,* International Journal of Central Banking, v. 14 3, pp. 389-436, **WP 1155 (December 2017).**

SEGURA A., *Why did sponsor banks rescue their SIVs?,* Review of Finance, v. 22, 2, pp. 661-697, **WP 1100 (February 2017).**

2019

ALBANESE G., M. CIOFFI and P. TOMMASINO, *Legislators' behaviour and electoral rules: evidence from an Italian reform,* European Journal of Political Economy, v. 59, pp. 423-444, **WP 1135 (September 2017).**

ARNAUDO D., G. MICUCCI, M. RIGON and P. ROSSI, *Should I stay or should I go? Firms' mobility across banks in the aftermath of the financial crisis,* Italian Economic Journal / Rivista italiana degli economisti, v. 5, 1, pp. 17-37, **WP 1086 (October 2016).**

BASSO G., F. D'AMURI and G. PERI, *Immigrants, labor market dynamics and adjustment to shocks in the euro area,* IMF Economic Review, v. 67, 3, pp. 528-572, **WP 1195 (November 2018).**

BUSETTI F. and M. CAIVANO, *Low frequency drivers of the real interest rate: empirical evidence for advanced economies,* International Finance, v. 22, 2, pp. 171-185, **WP 1132 (September 2017).**

CAPPELLETTI G., G. GUAZZAROTTI and P. TOMMASINO, *Tax deferral and mutual fund inflows: evidence from a quasi-natural experiment,* Fiscal Studies, v. 40, 2, pp. 211-237, **WP 938 (November 2013).**

CARDANI R., A. PACCAGNINI and S. VILLA, *Forecasting with instabilities: an application to DSGE models with financial frictions,* Journal of Macroeconomics, v. 61, **WP 1234 (September 2019).**

CIANI E., F. DAVID and G. DE BLASIO, *Local responses to labor demand shocks: a re-assessment of the case of Italy,* Regional Science and Urban Economics, v. 75, pp. 1-21, **WP 1112 (April 2017).**

CIANI E. and P. FISHER, *Dif-in-dif estimators of multiplicative treatment effects,* Journal of Econometric Methods, v. 8. 1, pp. 1-10, **WP 985 (November 2014).**

CHIADES P., L. GRECO, V. MENGOTTO, L. MORETTI and P. VALBONESI, *Fiscal consolidation by intergovernmental transfers cuts? The unpleasant effect on expenditure arrears,* Economic Modelling, v. 77, pp. 266-275, **WP 985 (July 2016).**

COLETTA M., R. DE BONIS and S. PIERMATTEI, *Household debt in OECD countries: the role of supply-side and demand-side factors,* Social Indicators Research, v. 143, 3, pp. 1185–1217, **WP 989 (November 2014).**

COVA P., P. PAGANO and M. PISANI, *Domestic and international effects of the Eurosystem Expanded Asset Purchase Programme,* IMF Economic Review, v. 67, 2, pp. 315-348, **WP 1036 (October 2015).**

GIORDANO C., M. MARINUCCI and A. SILVESTRINI, *The macro determinants of firms' and households' investment: evidence from Italy,* Economic Modelling, v. 78, pp. 118-133, **WP 1167 (March 2018).**

GOMELLINI M., D. PELLEGRINO and F. GIFFONI, *Human capital and urban growth in Italy,1981-2001,* Review of Urban & Regional Development Studies, v. 31, 2, pp. 77-101, **WP 1127 (July 2017).**

MAGRI S, *Are lenders using risk-based pricing in the Italian consumer loan market? The effect of the 2008 crisis,* Journal of Credit Risk, v. 15, 1, pp. 27-65, **WP 1164 (January 2018).**

MIGLIETTA A, C. PICILLO and M. PIETRUNTI, *The impact of margin policies on the Italian repo market,* The North American Journal of Economics and Finance, v. 50, **WP 1028 (October 2015).**

MONTEFORTE L. and V. RAPONI, *Short-term forecasts of economic activity: are fortnightly factors useful?,* Journal of Forecasting, v. 38, 3, pp. 207-221, **WP 1177 (June 2018).**

MERCATANTI A., T. MAKINEN and A. SILVESTRINI, *The role of financial factors for european corporate investment,* Journal of International Money and Finance, v. 96, pp. 246-258, **WP 1148 (October 2017).**

NERI S. and A. NOTARPIETRO, *Collateral constraints, the zero lower bound, and the debt–deflation mechanism,* Economics Letters, v. 174, pp. 144-148, **WP 1040 (November 2015).**

RIGGI M., *Capital destruction, jobless recoveries, and the discipline device role of unemployment,* Macroeconomic Dynamics, v. 23, 2, pp. 590-624, **WP 871 (July 2012).**

FORTHCOMING

ALBANESE G., G. DE BLASIO and P. SESTITO, *Trust, risk and time preferences: evidence from survey data,* International Review of Economics, **WP 911 (April 2013).**

APRIGLIANO V., G. ARDIZZI and L. MONTEFORTE, *Using the payment system data to forecast the economic activity,* International Journal of Central Banking, **WP 1098 (February 2017).**

ARDUINI T., E. PATACCHINI and E. RAINONE, *Treatment effects with heterogeneous externalities,* Journal of Business & Economic Statistics, **WP 974 (October 2014).**

BRONZINI R., G. CARAMELLINO and S. MAGRI, *Venture capitalists at work: a Diff-in-Diff approach at late-stages of the screening process,* Journal of Business Venturing, **WP 1131 (September 2017).**

BELOTTI F. and G. ILARDI, *Consistent inference in fixed-effects stochastic frontier models,* Journal of Econometrics, **WP 1147 (October 2017).**

CIANI E. and G. DE BLASIO, *European structural funds during the crisis: evidence from Southern Italy,* IZA Journal of Labor Policy, **WP 1029 (October 2015).**

COIBION O., Y. GORODNICHENKO and T. ROPELE, *Inflation expectations and firms' decisions: new causal evidence,* Quarterly Journal of Economics, **WP 1219 (April 2019).**

CORSELLO F. and V. NISPI LANDI, *Labor market and financial shocks: a time-varying analysis,* Journal of Money, Credit and Banking, **WP 1179 (June 2018).**

COVA P., P. PAGANO, A. NOTARPIETRO and M. PISANI, *Secular stagnation, R&D, public investment and monetary policy: a global-model perspective,* Macroeconomic Dynamics, **WP 1156 (December 2017).**

D'AMURI F., *Monitoring and disincentives in containing paid sick leave,* Labour Economics, **WP 787 (January 2011).**

D'IGNAZIO A. and C. MENON, *The causal effect of credit Guarantees for SMEs: evidence from Italy,* Scandinavian Journal of Economics, **WP 900 (February 2013).**

ERCOLANI V. and J. VALLE E AZEVEDO, *How can the government spending multiplier be small at the zero lower bound?,* Macroeconomic Dynamics, **WP 1174 (April 2018).**

FEDERICO S. and E. TOSTI, *Exporters and importers of services: firm-level evidence on Italy,* The World Economy, **WP 877 (September 2012).**

FERRERO G., M. GROSS and S. NERI, *On secular stagnation and low interest rates: demography matters,* International Finance, **WP 1137 (September 2017).**

GERALI A. and S. NERI, *Natural rates across the Atlantic,* Journal of Macroeconomics, **WP 1140 (September 2017).**

GIACOMELLI S. and C. MENON, *Does weak contract enforcement affect firm size? Evidence from the neighbour's court,* Journal of Economic Geography, **WP 898 (January 2013).**

LIBERATI D. and M. LOBERTO, *Taxation and housing markets with search frictions,* Journal of Housing Economics, **WP 1105 (March 2017).**

LOSCHIAVO D., *Household debt and income inequality: evidence from italian survey data,* Review of Income and Wealth, **WP 1095 (January 2017).**

NATOLI F. and L. SIGALOTTI, *Tail co-movement in inflation expectations as an indicator of anchoring,* International Journal of Central Banking, **WP 1025 (July 2015).**

PANCRAZI R. and M. PIETRUNTI, *Natural expectations and home equity extraction,* Journal of Housing Economics, **WP 984 (November 2014).**

PEREDA FERNANDEZ S., *Teachers and cheaters. Just an anagram?,* Journal of Human Capital, **WP 1047 (January 2016).**

RAINONE E., *The network nature of otc interest rates,* Journal of Financial Markets, **WP 1022 (July 2015).**

RIZZICA L., *Raising aspirations and higher education. evidence from the UK's widening participation policy,* Journal of Labor Economics, **WP 1188 (September 2018).**

SEGURA A., *Why did sponsor banks rescue their SIVs?,* Review of Finance, **WP 1100 (February 2017).**