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Regional Quality and Impaired Firms: Evidence from Italy*

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Abstract

Using a rich dataset on Italian firms we analyze how regional quality affects firm's efficiency and financing conditions in the long-run. We document a regionally unequal economy in terms of economic performance and crime rates. We first identify the inefficient companies, also known as *zombies*, receiving financial assistance as those paying an implicit interest rate lower than the prime rate. Then, we decompose such firms in two groups: the real impaired firms struggling to repay their loans, and those which are not repaying their debts even if financially they can afford to do so. Weak institutions represent one channel through which firm's profitability and market conditions can be affected. Thus, regions and provinces with a high presence of bad loans and criminal activities are displaying a higher concentration of impaired companies with respect to other areas. Industries with a high share of inefficient firms are most likely experiencing a depressed market and low productivity. The results of the study highlight that regional quality can have an adverse impact on firm's efficiency, and crime can increase the performance of the existing companies. Moreover, we confirm the presence of an opaque lending system and a perverse allocation of resources.

Keywords: Institutional quality, impaired firms, bad loans, crime, panel model.

JEL: O43, E51, G33.

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1 Introduction

Since the seminal contribution of Acemoglu et al. (2001), there is wide consensus that institutional differences are playing a key role in explaining long-term economic growth differentials. The existing empirical contributions on growth and convergence paved the way for an intensive discussion on the relationship between institutions, efficiency and long-run income (Acemoglu et al., 2001, 2012, and 2014). Nevertheless, in the academic literature, the notion of institutions is often not clearly defined, thus making the concept rather broad. It is therefore important to understand what types of institutions are most significant for the purposes of this research study. One role of the institutions is for instance that of facilitating contracting between lenders and borrowers or between different firms (Acemoglu, 2009). This negotiation is possible if the level and quality of the existing institutions is appropriately affecting firm performance in the long-run. The traditional approach argues that the quality of institutions encourage productive against unproductive activities of entrepreneurs (Baumol, 1990, Bowen and Clercq, 2008). Moreover, recent theoretical and empirical studies contribute with expectations and stable environment in which firms organize their activities more efficiently and invest more confidently with direct impact on labor productivity or gross profits (Yasar et al., 2011).

There are numerous channels through which institutions are impacting long-run development (Acemoglu et al., 2001 and 2014). One channel can be related to corruption, inefficient laws and their enforcement, lack of competition and economic uncertainty that current and potential investors face. In relation to this, crime may represent the most important cost for entrepreneurs and the local community at large. According to Cullen and Levitt (1999), crime can generate indirect effects on the local economic conditions of a country. Among the different criminal activities that might affect the development of an economy, organized crime has also profound economic consequences and, even if less investigated, it is commonly perceived as a barrier also to the development of high-income economies like

Italy (Pinotti, 2012). Another relevant effect of crime can be observed at the regional level. High-crime regions are making the quality of borrowers more difficult to assess, considering the fragility of borrowers and the scarcity of information possessed by banks to evaluate credit risk. Therefore, financial institutions might be less disposed to engage in lending activities in high-crime areas since they cannot fully incorporate the default risk in the interest rate (Bonaccorsi di Patti, 2009).

Our research is contributing to the existing literature in several ways. Firstly, the aim of the following study is to analyze how regional quality is affecting firm performance. A rich dataset at firm-level allows a detailed investigation on regional developments and firm operating characteristics. Within this framework, regional quality should support structural changes and thereby facilitate long-term growth. Secondly, weak institutions represent one channel through which firm's profitability, market conditions and in general the efficiency and performance of both existing and new incoming firms can be affected. Thirdly, an additional motivation is related to the potential connection, so far less investigated, between the financial situation of firms and the presence of organized crime, where regions and provinces with a high presence of criminal activities are displaying a high concentration of impaired companies, especially the group of *cheaters*. Hence, it is affecting the socio-economic and lending conditions, together with the development of different firms' behaviors dependent on higher or lower institutional quality. The results of our analysis show that there is an adverse effect of regional quality on firm efficiency, corresponding to several effects. One hypothesis is related to the fact that, low regional quality can imply high entry barriers and the resulting lack of competition can provide monopoly rents to the incumbent firms. In the context of the Italian framework, regional quality is measured through organized crime both at the regional and provincial level. A second hypothesis allows us to argue that organized crime can improve the financial performance of local firms in the short-run. A final hypothesis relates to the behavior of firms and debtors which may be

different in regions with distinct institutional quality. Despite comparably high profitability levels, many debtors do not repay their loans. Thus, the results obtained indicate that, the debtors may use illegal methods to enforce repayment in regions and provinces with high levels of organized-crime activities. This makes strategic insolvencies and strategic debt arrears prohibitively costly. At the same time, we can see that, the level of real insolvencies is high also in bad-quality regions. This would imply that high crime rates can also increase the social costs of real insolvencies to extremely high levels and affect long-term regional growth. The benchmark for efficiency at firm-level is provided by the implicit interest rate, which is calculated to identify companies paying lower than the market prime rate (labelled as the so called *zombie* firms). Extending the literature of Caballero et al. (2008) inefficient firms are classified by assessing whether loan conditions are significantly above the market level (that is, whether loans have artificially low implicit interest rates), rather than looking at their productivity. A possible way firms could use to receive such favorable lending conditions is through the *evergreening* of old loans¹. If instead inefficient companies are identified via their operating characteristics, the industries dominated by such firms would have low profitability and growth. Therefore, the existence of highly inefficient firms is a side effect of inefficient regional and provincial institutions. The aim of this research is to identify such *zombie* companies at the regional level, and document the existence of shares of firms which are inefficient. To the best of our knowledge, we are the first to provide such outcome. The focus of this study is on the Italian case since it represents one of the most regionally unequal economy in Europe in terms of economic performance and crime rates. Moreover, the regional differences in institutional quality, proxied by bad loans and criminal activities, are particularly high. Building on Caballero et al. (2008), it is possible to identify some parallels between the Japanese experience in the early 1990s and the current developments at the regional and provincial level in Italy. From a macroeconomic standpoint

¹ The term *evergreening* refers to the practice of giving to a company a fresh loan in order to repay an old one.

the existence of highly inefficient firms is certainly sub-optimal; however, the presence of some economic players might explain the interests in keeping these *zombies* alive.

The paper is structured as follows. The next section provides additional insights into the literature pertaining to institutional quality, crime and zombie lending. Then, section 3 provides data and descriptive statistics, section 4 relates to the model specification and section 5 delivers the estimation results. Finally, section 6 provides some concluding remarks.

2 Literature review

The social, economic, legal and political organization of a society, that is, its institutions, is a primary determinant of economic performance (Acemoglu and Johnson, 2005). Different channels are also playing a role in determining the decision making process of the economic agents involved. Contrary to the past, the influence of institutions on countries' or firms' performance is strongly present more than ever. Though the contemporary literature is still questioning the different routes through which institutions can affect the decisions of the individuals, like potential entrepreneurs facing security risks, there are empirical contributions gauging the quality of these institutions in relation to the functioning of the public sector, the efficiency of bureaucracy and corruption among others. Towards this line of reasoning, Acemoglu and Johnson (2005) include “contracting institutions” on one side and “property rights institutions” on the other side. The first refers to the links between the efficiency of an organization and the type of contracts written and enforced. The second emphasizes the protection against government expropriation where property rights institutions are linked to the distribution of political power in the society. Following this theoretical background and extending current knowledge, one could consider the impact of crime as having an adverse effect on growth performances. Focusing on how regional quality affects firm productivity in the long-run, available studies are investigating the link between

crime and economic performance. The seminal study of Becker (1968) on the determinants and effects of crime led the way to a number of relevant contributions. According to Detotto and Otranto (2010), crime discourages domestic and foreign direct investments, reduces competitiveness of firms and generates inefficiencies via a misallocation of resources. Barone et al. (2013) provide evidence that the presence of mafia-type organizations in the Italian municipalities increases the likelihood of obtaining funding by 64% and raises by more than one standard deviation the amount of subsidies to businesses. Bonaccorsi di Patti (2009) investigates the relationship between access to credit and local crime rates, showing that firms located in high-crime areas pay interest rates that are around 30 basis points higher than those paid by similar firms in low-crime areas. Caballero et al. (2008) find that misdirected bank lending has adverse effects on the economy, confirming that *zombie*-dominated industries have more depressed job creation and destruction, and lower productivity. Following the aforementioned, this research is related to three strands of literature. First, it is contributing to the existing knowledge on institutions and growth, considering that bank lending is a key element in the development process of firms and that institutional quality affects firm performance in the long-run. Acemoglu et al. (2001) used the property rights index as a measure of institutional quality to show the protection against expropriation. Instead, the economic freedom index sheds light into the discussion of institutions by presenting individual component indices (e.g. freedom from corruption, property rights, fiscal and business freedom and trade freedom). Alternatively, other studies are concentrating on institutional weaknesses that restrict free market, growth and entrepreneurship. These aspects include for example the size of the shadow economy (Schneider, 2013, Schneider et al., 2010), top marginal tax rate and labor market restrictions. Second, this research is linked to a more recent and less investigated literature on the effects of crime rates on firm efficiency at the regional and provincial level. Using data on 300,000 bank-firm relationships for the year 2000 Bonaccorsi di Patti (2009) provides evidence that

where crime rate is higher borrowers are going to pay higher interest rates than those in low-crime areas. Barone et al. (2013), measuring organized crime with an innovative and confidential dataset of the Italian Ministry of Interior, test whether organized crime diverts public funding. Following a third strand of literature, our paper further explores the phenomenon of zombie lending in Italy, providing evidence on the presence of inefficient companies receiving bad loans. Inefficient firms are identified as those paying an interest rate lower than the market price interest rate (prime rate). Fidrmuc and Siddiqui (2015) analyze the levels of inefficiency in 7 Central and Eastern European Countries (CEECs), focusing on the inefficient use of assets by firms facing debt-servicing difficulties. These companies are not declared bankrupt due to weak insolvency frameworks. If a firm is in financial distress, defined by an interest coverage ratio above 1, it will use internal resources to repay credits. In the long run, such *zombie* firms will starve slowly to death and their assets will eventually be fully wasted. Höwer (2016) investigates the effect of bank characteristics and bank relationships when firms are financially distressed. His results highlight that high shares of non-performing clients provide negative incentives. Peek and Rosengren (2003) show that the misallocation of bank credit in Japan during the 1990s reflects a general problem with the incentives of banks to continue lending to their most troubled borrowers. The background literature and the results outlined in this study recognize a very similar pattern in Italy as well. A perverse allocation of credit is more likely to happen when the bank's own balance sheet is weak or when the borrower is a member of the same business group (Caballero et al., 2008). The Italian banking-system is mostly characterized by SMEs, which are deeply rooted in the local market, have limited access to the financial market and depend on a territorial family-system based on personal relationships between shareholders and banks. Therefore, at the regional and provincial level, the lending criteria might be affected by specific socio-institutional factors, which are taken into consideration by banks when lending. This background can lead to different firms and debtors' behaviors

in regions with different institutional quality. The Italian context presents also relevant differences in terms of financial development and social capital between firms and banks located in the North and South of the country, altering growth performances (Guiso et al., 2004, 2004). Thus, the following research addresses and expands the existing knowledge on the effects of regional quality on firms' efficiency in the long-run. The results highlight specific differences among the Italian regions with respect to the ratio of bad loans, the share of inefficient companies and the incidence of criminal activities.

3 Data and Descriptive Statistics

This study merges three different data sets. The first source is the comprehensive and harmonized database *Amadeus* of Bureau van Dijk, which contains detailed information on balance sheets, profit and loss accounts, the legal form and the industrial code (Nace, Rev. 2) from a sample of approximately 2 million Italian firms. The focus of the research is on the Italian context because both the 20 main regions and the 110 provinces investigated show large differences in terms of institutional quality, crime incidence, share of bad loans and share of *zombie* firms. Moreover, Italy is characterized by a segmented financial system with Southern regions showing an underdeveloped banking sector compared to the North (Moretti, 2013). The analyzed unbalanced panel of data spans over a period of 7 years, from 2007 to 2013 and refers to non-financial listed and unlisted firms, thus including small, medium and big enterprises and all relevant sectors of the Italian economy (manufacturing, construction, retail and agriculture among others).

The following information are available for each firm: operating revenue (*rev*), total assets (*totasset*), long-term debt (*ltdebt*), loans (*loans*), current liabilities (*cliab*), financial expenses (*finexp*) and earnings before interest, taxes, depreciation and amortization (*ebit*). Using these inputs for each firm, *i*, in year *t*, it is possible to define the implicit interest rate (*iir*) as

$$iir_{it} = \frac{finexp_{it}}{ltdebt_{it}}, \quad (1)$$

The implicit interest rate (*iir*) at firm level represents the key variable which will be used to identify poorly performing firms carrying high debts. These companies can be classified and thus defined as *zombies* based on whether they are receiving subsidies² or based on the level of their profitability. In the first scenario, such companies are highly indebted and receive assistance from the creditors, while in the second situation firms with low profitability would be forced to leave the market (Caballero, Hoshi, and Kashyap, 2008). Following the first line of argumentation, *zombie* firms are typically those paying a lower interest rate with respect to their debts. The implicit interest rate (*iir*) is a measure of credit subsidies (financial assistance), which are those given by banks to inefficient borrowers, e.g. by evergreening of previous loans.

The *zombie* firms are thus detected as those firms paying an implicit interest rate (*iir*) lower than the market prime rate (*pir*)³. The interest rate expected for the best borrowers, (*pir*), is collected for the years from 2007 to 2013; then, a lower bound rate (*iir*) is calculated to infer cases where subsidies are present (Caballero et al., 2008). Figure 1 provides a measure of the implicit interest rate with relative density. Next, it is possible to generate a value related to the interest rate gap, computed as $gap_{it} = (iir_{it} - pir_{it})$. The interest rate gap (*gap*) is used to identify the set of highly inefficient firms existing in the 110 Italian provinces and consequently in the 20 regions, whenever ($gap_{it} < 0$). Therefore, the *zombies* can be analyzed, more formally, with respect to variables defined for firm *i*, and year *t* when

$$zombie_{it} \begin{cases} 1 & \text{if } iir_{it} < pir_{it}. \\ 0 & \text{otherwise} \end{cases} \quad (2)$$

We analyze the emergence of firms which are not repaying their debts at market conditions using standard and panel probit models, used to model binary (0/1) outcome variables. The details of these models are further explained in Section 4.1.

² The term *subsidy* is interpreted, from Caballero et al. (2008), as a form of financial assistance, such as loans received by highly indebted firms from their banking counterparts.

³ The *prime rate* (*pir*) is the interest rate that commercial banks charge to their most creditable borrowers.

Several firm control variables are included as well in the set of data to capture differences in the demand for credit and in the solvency of the borrower. Cash and debt to total assets ratios are taken as basic control variables, which are available at firm level.

The second source of data is the Italian National Institute of Statistics (*Istat*), which collects and publishes statistics on criminal activities across the Italian municipalities, regions and provinces. The variables related to crime refer to the ratio of the total number of offenses occurred in the 110 Italian provinces, which were reported by the police forces to the judicial authority. Data are expressed per 100,000 inhabitants and refer to the period 2010-2013. As from the *Istat* dataset, crime rates are computed for total offences and are representing various types of crime. However, for now, only data related to *money laundering*, *criminal association* and *mafia association* are taken into consideration at the provincial level, since these three categories are mostly related to organized crime, which is mostly relevant for economic productivity. In particular, as the results of this study confirm, construction, real estate activities, accommodation and food service activities, wholesale and retail trade are the sectors concentrating most of the organized crime investments in Italy. Therefore, they represent cash-intensive sectors facilitating money laundering (Savona and Riccardi, 2015).

The third source of data is the Bank of Italy, which tracks the flows of new bad loans (*sofferenze*) by customer region from the reported banking institutions to all resident sectors of the economy with the exception of monetary financial institutions. Data on new bad loans are available for all Italian regions for the period 2010-2014 and are averaged to create yearly flows. One of the unknowns weighing down the Italian recovery, especially for SMEs, consists in the large stock of bad debts and, more broadly, non-performing loans (NPLs) which Italian banks have accumulated over the crisis' years. The stock of bad debts held by domestic banks soared from euro 43 billion at the end of 2008 to euro 184 billion as of March 2015. The stock of NPLs is higher in Italy than in all other European Union nations, except for Cyprus, Greece and Ireland (Cerved, 2015). NPLs in Italy cover four

categories: “bad debt” (loans in a state of insolvency), “substandard”, “past due” and “restructured” loans. The worst NPL category is the so called *sofferenze* or “bad debt” (IMF, 2015).⁴ The definition and the descriptive statistics of the main dependent and independent variables are provided in Table 1. The dependent variable that we use to identify the inefficient firms is denoted as *zombies*. Financially impaired companies can either survive or close down their activity. However, one point highlighted from the results of our study is that, many of these zombie companies are actually still financially active. Therefore, to improve the investigation, we decompose the *zombies* into two groups: *real zombies* and *cheaters*. On one hand, the truly struggling firms are those which are not able to repay their loans (*real zombies*) and thus are generating losses. On the other hand, the lying companies are not repaying their debts even if financially they could afford to do so. These firms are called *cheaters* since they are craftily adopting strategic insolvency. The two models are further explained in Sections 4.2 and 4.3. For instance, Guiso et al. (2009) study the American households’ propensity to default when the value of their mortgage exceeds the value of their house even if they can afford to pay. They call this strategic default and they find that 26% of the existing defaults in the United States are strategic. Table 2 provides the descriptive statistics of the presence of mafia association, bad loans, the share of *zombies*, the *real zombies* and the *cheaters*, for all Italian regions, and is clearly highlighting the key role played by the *cheaters*. Mafia association is the only reference to organized crime included as being statistically significant over the probability of inefficient firms. In line with the

⁴ According to the Italian regulation, the classification of NPLs includes four categories: 1) “bad loans” are exposures to an insolvent counterparty (even if insolvency is not legally ascertained) or in equivalent situations, regardless of any loss estimate made by the bank and irrespective of any possible collateral or guarantee; 2) “substandard loans” are exposures to counterparty facing temporary difficulties – defined on the basis of objective factors – that is expected to be overcome within a reasonable period of time; 3) “restructured loans” are exposures in which a pool of banks or an individual bank, as a result of the deterioration of the borrower’s financial situation, agree to change the original conditions (rescheduling deadlines; reduction of interest rate), giving rise to a loss; 4) “past due” are exposures other than those classified as bad loans, substandard or restructured exposures that are past due for more than 90 days on a continuous basis. Source: Bank of Italy Asset Quality Review 2012-2013 https://www.bancaditalia.it/media/approfondimenti/2013/analisi-prestiti-deteriorati/Asset_quality_review.pdf?language_id=1.

existing literature, mafia association is playing an important role in Southern regions. Calabria (0.686), Campania (0.593), Sicilia (0.351) and Puglia (0.120) register the highest presence of mafia criminal association per 100,000 inhabitants. Likewise, the regions with the top stock of bad loans are mostly concentrated in the South, Calabria (7.895), Basilicata (5.425), Sicilia (6.127), Campania (4.066) and Molise (6.638). Data on the share of *zombies* are not following, surprisingly, a clear geographical pattern, rather a mixed picture. Highly inefficient companies are in fact also located in Northwestern regions (Liguria, Lombardia, and Valle D'Aosta) beside the South (Calabria and Campania) and the Islands (Sardegna and Sicilia). After breaking up the *zombies* in two groups, we can observe their exact location within the Italian territory. For instance, observing the *real zombies* and the *cheaters*, we can clearly identify that the first are mostly located in the Islands and the Center, while the second are more spread among the Center and Northwest of Italy. Interestingly, in both cases, Valle D'Aosta registers the highest share of *real zombies* and *cheaters*. From this initial analysis we can already state that, among the overall identified *zombies*, the results are driven by the *cheaters*, which are the inefficient companies that could most likely repay their debts. Moreover, Table 2 was further extended at the provincial level to grasp in details the local geographical presence of the observed impaired firms. The data are reported in Table A1 in the Appendix, while Table A2 reports the aggregated data on the macro-regions, and Table A3 reports the presence of impaired companies by economic sector (Nace codes). The following statistics are also clearly depicted in Figure 2 which maps the *zombies*, bad loans and mafia association across Italy, highlighting the well-known North vs. South divide, with southern corporations performing relatively worse with respect to northern ones. However, the map shows a strong presence of impaired companies also in some Northwestern regions. With respect to bad loans, the North vs. South divide is even more emphasized, confirming the existing differences in terms of financial development and social capital (Guiso et al., 2004, 2004). The presence of mafia association is mapped as well.

These basic statistics allow us to confirm the thesis of Barone et al. (2013) which provides evidence that the presence of organized crime in the Italian municipalities increases the likelihood of obtaining funding by 64%. In terms of differences in financial development and access to credit, our proposition is also in line with Bonaccorsi di Patti (2009) who shows that firms located in high-crime areas pay interest rates higher than those paid by firms located in low-crime areas.

4 Probit and Panel Probit Regression

4.1 Model Specification

We use probit models to estimate the effects of regional quality on firms' performance and efficiency, by identifying highly inefficient firms and measuring institutional quality. In order to do this, the implicit interest rate (*iir*) is used as key variable identifying firms facing debt-servicing difficulties.

A probit regression is first estimated to find out which variables, especially institutional quality, are the most important determinants of firm efficiency.

The probability of a *zombie* firm i , struggling financially, in year t , $P(\text{zombies}_{it} = 1)$, is regressed on a set of institutional and control variables

$$P(\text{zombies}_{it} = 1) = \beta_1 \text{cash}_{it} + \beta_2 \text{debt}_{it} + \gamma \text{crime}_{pt} + \delta \text{badloans}_{rt} + \theta_s + \rho_r + \tau_t + \varepsilon_{it} , \quad (3)$$

where *cash* and *debt* to asset ratios are taken as basic control variables available at firm level; *crime* controls for mafia association, other criminal association activities (as a placebo test), and money laundering, all available for the set of 110 provinces; *badloans* is available at the regional level and is computed as a share to total loans. The probit model controls also for sector specific effects, θ_s , region specific shock effects, ρ_r and time fixed effects denoted by τ_t , which control for unobserved effects different across regions but equal across periods of time. ε_{it} represents the usual error term for firm i , and year t . This model is thus in line with our first hypothesis in which low regional quality can imply high entry barriers and a resulting lack of competition can provide monopoly rents to the incumbent firms. Table 3 provides the results of the following specification.

In addition, a panel probit regression is also estimated on a set of institutional and control variables as follows:

$$P(\text{zombies}_{it} = 1) = \beta_1 \text{cash}_{it} + \beta_2 \text{debt}_{it} + \gamma \text{crime}_{pt} + \delta \text{badloans}_{rt} + \mu_i + \tau_t + \varepsilon_{it} . \quad (4)$$

Also in this case, we use *cash*, *debt*, *crime* and *badloans* as basic control variables, but differently than before, we are now controlling for some firm specific random effects, μ_i , plus the time fixed effects, τ_t . The results on this regression are reported in Table 6.

4.2 Financially Impaired Firms and Profitability

At the firm level, we have identified the *zombies* as those paying an implicit interest rate (*iir*) lower than the market prime rate (*pir*), following Caballero et al. (2008). Furthermore, we decompose the *zombies* in two groups (real *zombies* and *cheaters*), since we noted that the *zombies* are actually still financially active. The real *zombies* are firms not repaying their loans and thus generating losses, while the *cheaters* are those companies lying about their financial conditions and instead of paying back their debts they are adopting strategic insolvency, thus, most likely, underreporting their real conditions.

The results on the following models are showing a much stronger effect for the group of firms identified as *cheaters*. In Table 2 we can actually see that the group of lying companies is playing a key role. As part of the information available for each firm, the earnings before interest, taxes, depreciation and amortization (*ebit*) is used to distinguish between the group of firms belonging to the real *zombies* and those belonging to the *cheaters*.

The set of highly inefficient firms (the real ones) existing in the 110 Italian provinces, and consequently in the 20 regions, are those with ($ebit_{it} \leq 0$), the opposite applies for the *cheaters*, with ($ebit_{it} > 0$). Therefore, these two groups of companies, can be identified, more formally, with respect to variables defined for firm *i*, and year *t* when

$$zreal_{it} \begin{cases} 1 & \text{if } iir_{it} < pir_{it} \text{ and } ebit_{it} \leq 0 \\ 0 & \text{otherwise} \end{cases} , \quad (5)$$

$$zcheat_{it} \begin{cases} 1 & \text{if } iir_{it} < pir_{it} \text{ and } ebit_{it} > 0 \\ 0 & \text{otherwise} \end{cases} . \quad (6)$$

4.3 Strategic Insolvency

After decomposing the financially impaired companies in two groups, we repeat the exercise and estimate a standard probit model to show the effects of regional quality on firms' performance and efficiency on the real inefficient firms and *cheaters*. The probability of an impaired company i , in year t is

$$P(zreal_{it} = 1) = \beta_1 cash_{it} + \beta_2 debt_{it} + \gamma crime_{pt} + \delta badloans_{rt} + \theta_s + \rho_r + \tau_t + \varepsilon_{it} , \quad (7)$$

while the probability of a lying company i , in year t is

$$P(zcheat_{it} = 1) = \beta_1 cash_{it} + \beta_2 debt_{it} + \gamma crime_{pt} + \delta badloans_{rt} + \theta_s + \rho_r + \tau_t + \varepsilon_{it} . \quad (8)$$

In both cases, the same control variables apply as for the *zombie* standard model explained above in section 4.1. Tables 4 and 5 provide the results on the following regressions.

In addition, for both groups, we carry on estimating a panel probit model, showing again the probability of an impaired company and a *cheater* as follows:

$$P(zreal_{it} = 1) = \beta_1 cash_{it} + \beta_2 debt_{it} + \gamma crime_{pt} + \delta badloans_{rt} + \mu_i + \tau_t + \varepsilon_{it} , \quad (9)$$

$$P(zcheat_{it} = 1) = \beta_1 cash_{it} + \beta_2 debt_{it} + \gamma crime_{pt} + \delta badloans_{rt} + \mu_i + \tau_t + \varepsilon_{it} . \quad (10)$$

In these two specifications, we employ again *cash*, *debt*, *crime* and *badloans* as basic control variables, but differently than above, we are now controlling for some firm specific random effects, μ_i , plus the time fixed effects, τ_t .

This specification thus allows us to test a second and third hypothesis pertaining to the Italian regional context. The presence of high levels of crime, especially organized crime activities, can improve the financial performance of local firms and act as a buffer in keeping these companies alive, while generating distorting effects on healthy companies. Moreover,

the existence of both groups of firms, being truly struggling (real *zombies*) or just behaving so (*cheaters*), can be explained by the fact that the behavior of such firms may be different according to regional quality, namely different crime levels. Among all, the *cheaters* are most likely under-reporting their financial conditions and in the meantime are using illegal methods to enforce repayment in regions with high-crime levels. Table 7 and 8 are respectively providing the results of these two additional specifications on the real *zombies* and the *cheaters*.

5 Empirical Results

As aforementioned, a set of probit regressions were first estimated for the *zombies*, the real *zombies* and the *cheaters*. Tables 3, 4 and 5 report the following results. In all three cases, the coefficient on mafia association is negative and the effect is especially significant for the *zombies* and the group of the cheating companies. Interestingly, as further showed in the panel probit models, the *cheaters* are actually driving the results. Therefore, this allows us to argue that the main concern in terms of regional quality is not only related to the share of real impaired companies, rather to a higher and deeply-rooted share of lying firms. We continued our analysis by estimating a set of panel probit models, which produce even stronger results. Table 6 reports the estimated results of the panel probit model (4) on the *zombies*. The coefficient on mafia association is showing a negative and significant effect on the probability of highly impaired firms. While this is an apparently unexpected relationship, it can be due to different effects common to the Italian context. First, it can reflect high entry barriers in the Italian regions which are characterized by high presence of organized crime. Therefore, one can argue that an existing regional and provincial mafia structure can keep the impaired companies, which are paying a lower interest rate, alive rather than forcing them to leave the market. In such a vicious circle, both agents need themselves in order to survive. Second, the presence of organized crime could improve the financial performance of

local firms in the short-run, especially family owned corporations deeply rooted in the domestic territory. Moreover, this can confirm the thesis of Caballero et al. (2008) where a perverse allocation of resources is likely to happen when the debtor (the impaired company) is a partner of the same business group, which in our case is embodied in a mafia structure. Within this context, the lending conditions from local banks might also suffer from an altered socio-economic environment.

Finally, the third hypothesis argues that the debtors can use illegal means to enforce repayment from insolvent firm owners, considering that such instruments are more available in regions with high levels of organized crime. This makes strategic insolvency nearly prohibitively costly. This last hypothesis is particularly confirmed by the fact that especially the *cheaters* are negatively related to mafia associations. This situation also shows that such illegal ways of enforced repayment are likely to have high welfare costs on the owners of truly insolvent firms, which can represent a significant barrier to entrepreneurship and can increase welfare costs of organized crime in the long term.

Moreover, from the panel probit model, in relation to crime, other criminal associations are strongly significant for the *zombies* and the *cheaters*. With respect to firm level estimates, the coefficient on *cash* to asset ratio is positive for the *zombies* and the *cheaters*, indicating that a company has a higher probability of paying an interest rate lower than the market prime rate. The coefficient on *debt* to asset ratio is negative and significant in all three cases, lowering the probability, reflecting possible *evergreening* effects. The coefficient on regional bad loans is negative and significant for the group of *cheaters* and *zombies*, thus indicating that a company has a lower probability of being really impaired. At the same time, the product of bad loans and mafia association confirms the relationship. This framework thus confirms us the coexistence of *zombie* firms both at the regional and provincial level.

Table 6 includes also sector specific effects. The results on sector effects are in line with Caballero et al. (2008) and Savona and Riccardi (2015), showing that the highest share of

zombies is mostly located in construction, accommodation and food service activities (restaurants, bars, hotels and pizzerias) and real estate activities, but also in the area of water, sewerage and waste management, agriculture and public administration and defense.

Table 7 reports the estimated results of the second model specification, regression (9), which reports the effects of regional quality on firms' performance and efficiency, by looking at the group of real inefficient firms, *zreal*. The main results are similar to those of Table 6. However, the product of bad loans and mafia association is statistically significant, thus confirming the presence of real impaired enterprises. Interestingly, crime association is not playing a role, while money laundering is significant and bad loans are not, differently than before. At the firm level, cash to asset ratio is now negative and statistically significant. Debt to asset ratio reflects possible *evergreening* effects. At the sector level, the results of Table 7 are again in line with Caballero et al. (2008) and Savona and Riccardi (2015).

Table 8 shows the results of regression (10), reporting the effects of regional quality on firms' performance and efficiency for the group of *cheaters*. As aforementioned, the results for this second group of *zombies* are much stronger than those for the real ones. Mafia association is again statistically significant. This result is mainly due to firms not repaying by purpose. Organized crime is increasing the possible costs of insolvency for borrowers, because debtors can possibly use illegal means to enforce repayment. However, true insolvencies are not lower in regions with high levels of criminal activities, while the social costs of true insolvencies are likely to be much higher, in addition to other social costs of organized criminal activities. Another interesting aspect is in the positive sign of cash to asset ratio, which confirms that the cheating firms are paying less than the market prime rate. Therefore, in acting like real impaired borrowers they are receiving the financial conditions that should pertain to the real inefficient corporations. Additionally, Tables A4, A5 and A6 in the Appendix are reporting the results on the marginal probability effects of the *zombies*, real *zombies* and *cheaters*.

6 Discussion and Conclusion

In this paper we are addressing and expanding the existing knowledge on the effects of regional quality on firms' performance and efficiency, by identifying highly inefficient firms (so called *zombies*) and measuring institutional quality in a total of 20 Italian regions. In order to do this, we are using the implicit interest rate as a key variable that identifies poorly performing firms receiving credit subsidies (financial assistance) by banks. A probit model and a panel probit model are estimated to find out which variables, especially institutional quality, are the most important determinants of firm efficiency. We proxy regional quality with different types of criminal activities, such as: mafia associations, criminal associations and money laundering, and by looking at the share of bad loans.

At the same time, we are adding knowledge to the *zombie* lending mechanism by identifying two groups of *zombies*, the real ones and the *cheaters* and highlighting that actually the main concern is not related to a certain number of existing *zombies*, rather to high shares of firms which are under-reporting their finances, possibly using illegal methods to enforce repayment thus negatively influencing the local market economy. As aforementioned, one interesting finding is the coefficient on mafia association, which is showing a negative and statistically significant effect on the probability of poorly performing firms at the regional level. This outcome, nevertheless, can incorporate some very specific domestic characteristics pertaining to the Italian context. The first two hypotheses are arguing that the presence of organized crime, which keeps these enterprises alive, can improve – especially in the short period – the financial conditions of local companies, thus generating distorting effects on healthy firms that are competing with the impaired ones, especially the *cheaters*. As from Caballero et al. (2008) the distortions generated by the presence of *zombie* firms are reflected in the depression of productivity when inefficient companies are preserved at the

expenses of more productive firms. All these elements can generate a congested domestic market where resources are allocated inefficiently and socio-cultural features, together with low institutional quality, could make the lending criteria opaque. Regional quality is measured via crime rates and, in particular, by looking at the presence of organized crime. Additionally, a third hypothesis argues that firms behave differently, especially real impaired firms and *cheaters*. They can use illegal means to enforce repayment, thus making strategic insolvency extremely costly. This last hypothesis is particularly confirmed by the *cheaters*. This result is also showing that such illegal instruments are likely to generate high welfare costs on the owners of truly insolvent firms together with barriers to entrepreneurship.

In line with the literature, the presence of organized crime is mostly distributed in the South and Islands (Sardegna and Sicilia) where financial development is weak and the banking market itself is more segmented in terms of dimension and efficiency (Moretti, 2013).

With respect to firm level estimates, the concentration of highly inefficient companies is not following a specific geographical pattern, like the case of organized crime, rather a mixed distribution among the regions located in the Center, Northwest, Islands and South of Italy. Furthermore, *zombie* firms are concentrated in specific sectors of the Italian economy (construction, accommodation and food service activities, real estate and agriculture).

Overall, we can highlight that high-crime levels are affecting firm performance in the long run. The goal is to underline the necessity to achieve further improvements in terms of institutions in the Italian regions and provinces as well.

The results obtained from our analysis allow us to argue that, the debtors can use illegal methods to enforce repayment in regions and provinces with high levels of organized crime. This makes strategic insolvency very costly. However, it can also increase social costs if real insolvencies are not avoided from the local institutions. Observing the situation from the firm's perspective, the fact that the *cheaters* are driving the results can lead us to confirm the existence of an opaque lending system in which certain firms are not repaying their loans

even if financially they could afford it. This under-reporting strategy might be due to *omertà* or simply a strategy to avoid sharing critical information. Therefore, one aspect that could be further investigated and could thus improve regional quality is the debt repayment behavior of such firms. For instance, one could investigate the mechanisms triggering such actions. Moreover, regional and provincial quality could be improved by making the Italian lending mechanisms less opaque, especially in underdeveloped areas, by improving the allocation of resources to healthy firms. In addition, domestic policies should definitely take crime rates more into consideration when promoting growth at the regional and provincial level. A side-benefit of institutional improvement is that better insolvency frameworks correlate with more developed financial markets.

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TABLE 1 DESCRIPTIVE STATISTICS

Variables	Description	Obs.	Mean	Std. Dev.	Min	Max
zombies	Inefficient firms	752,738	0.191	0.393	0.000	1.000
zreal	Real zombies	752,738	0.051	0.221	0.000	1.000
zcheat	Cheaters	752,738	0.140	0.346	0.000	1.000
cashr	Cash ratio	1,590,703	0.062	0.087	0.000	0.400
loanr	Loan ratio	1,585,807	0.076	0.107	0.000	0.400
mafiassoc	Mafia association	1,137,900	0.083	0.263	0.000	5.800
crimassoc	Criminal association	1,137,900	1.149	1.352	0.000	18.900
moneylaund	Money laundering	1,137,900	2.466	2.327	0.000	23.100
badlrl_reg	Bad loans	1,142,959	2.054	1.576	0.605	12.718
blxmafia	Bad loans x Mafia association	1,137,900	0.359	1.682	0.000	48.077

Source: own estimation.

TABLE 2 REGIONAL QUALITY AND FIRM PERFORMANCE

Regions	Mafia association	Bad loans	Zombies	Real zombies	Cheaters
Abruzzo	0.065	2.469	18.107	5.328	12.779
Basilicata	0.129	5.425	18.982	5.612	13.370
Calabria	0.686	7.907	20.017	6.076	13.942
Campania	0.593	4.068	19.345	5.475	13.870
Molise	0.089	6.638	14.416	3.966	10.450
Puglia	0.120	3.745	19.084	5.671	13.413
Sardegna	0.000	3.875	21.027	6.432	14.595
Sicilia	0.351	6.127	18.985	6.763	12.223
Lazio	0.037	0.903	23.873	7.227	16.646
Marche	0.000	2.583	13.538	3.333	10.205
Toscana	0.011	2.516	19.242	5.574	13.667
Umbria	0.039	2.602	15.665	4.321	11.345
Emilia Romagna	0.010	1.446	17.089	4.284	12.805
Friuli-Venezia-Giulia	0.023	1.864	17.693	4.719	12.974
Trentino-Alto Adige	0.027	1.469	19.773	4.469	15.304
Veneto	0.015	1.481	17.171	4.254	12.918
Liguria	0.000	1.858	20.911	5.593	15.318
Lombardia	0.019	1.134	20.290	5.259	15.031
Piemonte	0.018	1.289	17.297	4.090	13.207
Valle D'Aosta	0.000	1.209	28.833	9.906	18.927

Note: The data reported in this table are related to all Italian regions according to NUTS 2. Data on Mafia association are expressed per 100,000 inhabitants and refer to the period 2010-2013 as from *Istat* database. Bad loans are expressed as a ratio to total loans for the period 2010-2014 as from the *Bank of Italy* database. *Zombies*, *real zombies* and *cheaters* are in percentage terms (%) and are computed for all Italian regions and provinces (Table A1) from 2007 to 2013. Data on all Italian provinces and macro-regions are reported in the Appendix. Source: own estimation.

TABLE 3 INSTITUTIONS AND FIRM PERFORMANCE
ZOMBIES, PROBIT MODEL REGRESSION

	(I)	(II)	(III)	(IV)	(V)	(VI)
Cash ratio	-0.223***	-0.460***	-0.460***	-0.460***	-0.470***	-0.460***
Loans ratio	-6.250***	-6.683***	-6.682***	-6.683***	-6.687***	-6.684***
Mafia association		-0.034***				-0.110***
Crime association			-0.000			
Money laundering				-0.002*		
Bad loans					0.009*	0.006
Bad loans x Mafia associations						0.012**
Agriculture	0.282***	0.287***	0.288***	0.287***	0.282***	0.287***
Mining & quarrying	-0.124***	-0.160***	-0.159***	-0.160***	-0.151***	-0.160***
Manufacture food	-0.029	-0.023	-0.023	-0.023	-0.022	-0.023
Manufacture textiles	-0.217***	-0.201***	-0.201***	-0.201***	-0.202***	-0.201***
Manufacture wood	-0.296***	-0.319***	-0.319***	-0.320***	-0.320***	-0.320***
Manufacture paper	-0.126***	-0.124***	-0.124***	-0.124***	-0.124***	-0.124***
Manufacture chemicals	-0.152***	-0.238***	-0.238***	-0.238***	-0.239***	-0.238***
Manufacture pharmaceutical	-0.265***	-0.272***	-0.272***	-0.272***	-0.273***	-0.272***
Manufacture non-metallic	-0.188***	-0.187***	-0.187***	-0.188***	-0.187***	-0.188***
Manufacture metals	-0.176***	-0.174***	-0.173***	-0.174***	-0.175***	-0.174***
Manufacture electronics	-0.205***	-0.232***	-0.232***	-0.232***	-0.233***	-0.232***
Manufacture machinery	-0.276***	-0.289***	-0.288***	-0.289***	-0.289***	-0.289***
Manufacture vehicles	-0.160***	-0.112**	-0.112**	-0.112**	-0.114**	-0.112**
Manufacture transport equip.	-0.084**	-0.139***	-0.140***	-0.140***	-0.143***	-0.139***
Manufacture furniture	-0.191***	-0.188***	-0.188***	-0.188***	-0.191***	-0.189***
Other manufacturing	-0.311***	-0.323***	-0.323***	-0.323***	-0.317***	-0.323***
Electricity	-0.239***	-0.313***	-0.313***	-0.313***	-0.313***	-0.312***
Water, sewerage, waste	0.092***	0.065***	0.065***	0.065***	0.063***	0.065***
Construction	0.373***	0.341***	0.341***	0.341***	0.341***	0.341***
Wholesale	-0.258***	-0.283***	-0.283***	-0.283***	-0.285***	-0.283***
Retail	-0.249***	-0.262***	-0.262***	-0.263***	-0.264***	-0.262***
Transportation & Storage	-0.132***	-0.171***	-0.171***	-0.171***	-0.173***	-0.171***
Accommodations, food services	0.307***	0.314***	0.314***	0.314***	0.312***	0.315***
Communication	-0.070***	-0.092***	-0.092***	-0.092***	-0.092***	-0.092***
Real estate	0.537***	0.563***	0.563***	0.563***	0.562***	0.563***
Professional activities	0.005	-0.032	-0.032	-0.031	-0.033	-0.032
Administrative activities	-0.140***	-0.185***	-0.185***	-0.185***	-0.183***	-0.185***
Public administration	1.789***	1.999***	1.999***	1.995***	1.998***	2.000***
Education	0.071*	0.043	0.044	0.044	0.041	0.044
Human Health	0.000	-0.016	-0.016	-0.016	-0.020	-0.017
Arts, Entertainment	0.094***	0.014	0.014	0.013	0.014	0.014
Other services	-0.085***	-0.128***	-0.128***	-0.128***	-0.129***	-0.128***
cons	-0.546***	-0.316***	-0.318***	-0.452***	-0.340***	-0.275***
N. of observations	692,123	434,694	434,694	434,694	436,950	434,694

Note *, **, and *** denote p-values of 10, 5 and 1 percent.

The following table reports the results of the standard probit model regression (3) of the *zombie* companies.

TABLE 4 INSTITUTIONS AND FIRM PERFORMANCE
REAL ZOMBIES, PROBIT MODEL REGRESSION

	(I)	(II)	(III)	(IV)	(V)	(VI)
Cash ratio	-1.506***	-1.977***	-1.977***	-1.978***	-1.982***	-1.977***
Loans ratio	-4.426***	-4.724***	-4.724***	-4.723***	-4.727***	-4.725***
Mafia association		-0.017				-0.095**
Crime association			-0.002			
Money laundering				0.005***		
Bad loans					0.003	-0.000
Bad loans x Mafia associations						0.012*
Agriculture	0.172***	0.118***	0.118***	0.118***	0.114***	0.118***
Mining & quarrying	-0.236***	-0.249***	-0.249***	-0.247***	-0.244***	-0.249***
Manufacture food	-0.335***	-0.397***	-0.397***	-0.395***	-0.386***	-0.397***
Manufacture textiles	-0.400***	-0.438***	-0.438***	-0.439***	-0.438***	-0.437***
Manufacture wood	-0.625***	-0.734***	-0.734***	-0.732***	-0.736***	-0.735***
Manufacture paper	-0.432***	-0.469***	-0.469***	-0.468***	-0.468***	-0.469***
Manufacture chemicals	-0.468***	-0.483***	-0.483***	-0.484***	-0.485***	-0.483***
Manufacture pharmaceutical	-0.535***	-0.620***	-0.620***	-0.620***	-0.622***	-0.620***
Manufacture non-metallic	-0.539***	-0.641***	-0.641***	-0.640***	0.641***	-0.641***
Manufacture metals	-0.497***	-0.534***	-0.534***	-0.533***	-0.535***	-0.534***
Manufacture electronics	-0.470***	-0.558***	-0.558***	-0.558***	-0.561***	-0.558***
Manufacture machinery	-0.632***	-0.687***	-0.687***	-0.686***	-0.688***	-0.687***
Manufacture vehicles	-0.325***	-0.413***	-0.413***	-0.412***	-0.415***	-0.413***
Manufacture transport equip.	-0.195***	-0.190***	-0.190***	-0.190***	-0.200***	-0.190***
Manufacture furniture	-0.413***	-0.429***	-0.429***	-0.428***	-0.432***	-0.429***
Other manufacturing	-0.561***	-0.640***	-0.640***	-0.639***	-0.621***	-0.640***
Electricity	-0.582***	-0.619***	-0.619***	-0.619***	-0.614***	-0.619***
Water, sewerage, waste	-0.187***	-0.295***	-0.295***	-0.295***	-0.298***	-0.295***
Construction	-0.058***	-0.100***	-0.100***	-0.099***	-0.102***	-0.100***
Wholesale	-0.586***	-0.639***	-0.639***	-0.639***	-0.641***	-0.639***
Retail	-0.465***	-0.492***	-0.492***	-0.492***	-0.494***	-0.492***
Transportation & Storage	-0.374***	-0.439***	-0.439***	-0.439***	-0.441***	-0.439***
Accommodations, food services	0.109***	0.050**	0.050**	0.050**	0.045*	0.050**
Communication	-0.319***	-0.378***	-0.378***	-0.379***	-0.376***	-0.378***
Real estate	0.020	-0.025	-0.025	-0.025	-0.026	-0.025
Professional activities	-0.133***	-0.201***	-0.201***	-0.201***	-0.203***	-0.201***
Administrative activities	-0.376***	-0.413***	-0.413***	-0.413***	-0.419***	-0.413***
Public administration	0.492					
Education	-0.093*	-0.191***	-0.191***	-0.191***	-0.194***	-0.191***
Human Health	-0.241***	-0.319***	-0.319***	-0.319***	-0.325***	-0.319***
Arts, Entertainment	0.019	-0.094**	-0.094**	-0.094**	-0.088**	-0.094**
Other services	-0.263***	-0.328***	-0.328***	-0.328***	-0.331***	-0.328***
cons	-1.060***	-0.830***	-0.828***	-0.874***	-0.922***	-0.826***
N. of observations	692,123	434,683	434,683	434,683	436,939	434,683

Note *, **, and *** denote p-values of 10, 5 and 1 percent.

The following table reports the results of the standard probit model regression (7) of the real *zombie* companies.

TABLE 5 INSTITUTIONS AND FIRM PERFORMANCE
CHEATERS, PROBIT MODEL REGRESSION

	(I)	(II)	(III)	(IV)	(V)	(VI)
Cash ratio	0.364***	0.263***	0.263***	0.263***	0.254***	0.263***
Loans ratio	-5.627***	-5.950***	-5.950***	-5.951***	-5.953***	-5.950***
Mafia association		-0.029**				-0.083**
Crime association			0.001			
Money laundering				-0.006***		
Bad loans					0.010**	0.008*
Bad loans x Mafia associations						0.008
Agriculture	0.237***	0.282***	0.283***	0.282***	0.278***	0.282***
Mining & quarrying	-0.007	-0.041	-0.040	-0.043	-0.031	-0.040
Manufacture food	0.162***	0.210***	0.211***	0.209***	0.207***	0.210***
Manufacture textiles	-0.038	0.016	0.015	0.016	0.015	0.016
Manufacture wood	-0.056*	-0.031	-0.030	-0.033	-0.030	-0.031
Manufacture paper	0.083***	0.119***	0.119***	0.118***	0.119***	0.119***
Manufacture chemicals	0.068**	-0.007	-0.007	-0.007	-0.007	-0.007
Manufacture pharmaceutical	-0.041	0.001	0.001	0.001	0.001	0.001
Manufacture non-metallic	0.047*	0.100***	0.100***	0.099***	0.102***	0.100***
Manufacture metals	0.048***	0.084***	0.084***	0.083***	0.083***	0.084***
Manufacture electronics	0.006	0.027	0.027	0.027	0.028	0.027
Manufacture machinery	-0.028	-0.004	-0.003	-0.004	-0.003	-0.004
Manufacture vehicles	-0.004	0.109**	0.109**	0.109**	0.108**	0.109**
Manufacture transport equip.	0.023	-0.048	-0.048	-0.049	-0.045	-0.048
Manufacture furniture	-0.004	0.022	0.023	0.021	0.021	0.022
Other manufacturing	-0.086**	-0.052	-0.052	-0.053	-0.051	-0.052
Electricity	0.005	-0.049	-0.049	-0.049	-0.051	-0.049
Water, sewerage, waste	0.244***	0.276***	0.277***	0.276***	0.276***	0.277***
Construction	0.499***	0.488***	0.488***	0.488***	0.490***	0.488***
Wholesale	-0.014	-0.005	-0.005	-0.005	-0.005	-0.005
Retail	-0.041**	-0.027	-0.027	-0.028	-0.028	-0.027
Transportation & Storage	0.060***	0.059**	0.059**	0.059**	0.058**	0.059**
Accommodations, food services	0.324***	0.374***	0.374***	0.374***	0.374***	0.374***
Communication	0.108***	0.126***	0.126***	0.126***	0.125***	0.126***
Real estate	0.635***	0.684***	0.684***	0.684***	0.684***	0.684***
Professional activities	0.104***	0.108***	0.108***	0.108***	0.107***	0.108***
Administrative activities	0.052**	0.031	0.031	0.031	0.036	0.031
Public administration	1.812***	2.369***	2.368***	2.360***	2.369***	2.369***
Education	0.167***	0.200***	0.200***	0.200***	0.199***	0.200***
Human Health	0.159***	0.191***	0.191***	0.191***	0.190***	0.191***
Arts, Entertainment	0.121***	0.101***	0.101***	0.100***	0.097***	0.101***
Other services	0.064*	0.058	0.059	0.059	0.060	0.058
cons	-0.999***	-0.819***	-0.822***	-0.995***	-0.848***	-0.818***
N. of observations	692,123	434,694	434,694	434,694	436,950	434,694

Note *, **, and *** denote p-values of 10, 5 and 1 percent.

The following table reports the results of the standard probit model regression (8) of the *cheaters*.

TABLE 6 INSTITUTIONS AND FIRM PERFORMANCE
ZOMBIES, PANEL PROBIT MODEL REGRESSION

	(I)	(II)	(III)	(IV)	(V)	(VI)
Cash ratio	0.545*** (0.045)	0.116* (0.068)	0.122* (0.068)	0.123* (0.068)	0.103 (0.068)	0.104 (0.068)
Loans ratio	-7.940*** (0.045)	-10.338*** (0.074)	-10.328*** (0.074)	-10.329*** (0.074)	-10.341*** (0.074)	-10.349*** (0.074)
Mafia association		-0.140*** (0.020)				-0.278*** (0.048)
Crime association			-0.011*** (0.003)			
Money laundering				-0.002 (0.002)		
Bad loans					-0.031*** (0.004)	-0.028*** (0.004)
Bad loans x Mafia associations						0.032*** (0.007)
Agriculture	0.448*** (0.039)	0.537*** (0.055)	0.537*** (0.055)	0.534*** (0.055)	0.544*** (0.055)	0.554*** (0.055)
Mining & quarrying	-0.237*** (0.079)	-0.358*** (0.116)	-0.357*** (0.116)	-0.358*** (0.116)	-0.330*** (0.114)	-0.344*** (0.116)
Manufacture food	-0.105*** (0.040)	-0.121** (0.056)	-0.125** (0.056)	-0.127** (0.056)	-0.104* (0.056)	-0.104* (0.056)
Manufacture textiles	-0.408*** (0.045)	-0.445*** (0.064)	-0.446*** (0.064)	-0.446*** (0.064)	-0.445*** (0.064)	-0.439*** (0.064)
Manufacture wood	-0.551*** (0.060)	-0.688*** (0.086)	-0.690*** (0.086)	-0.690*** (0.086)	-0.675*** (0.086)	-0.670*** (0.086)
Manufacture paper	-0.244*** (0.049)	-0.290*** (0.070)	-0.290*** (0.070)	-0.291*** (0.070)	-0.282*** (0.070)	-0.281*** (0.070)
Manufacture chemicals	-0.330*** (0.061)	-0.520*** (0.091)	-0.521*** (0.091)	-0.521*** (0.091)	-0.521*** (0.091)	-0.517*** (0.091)
Manufacture pharmaceutical	-0.425*** (0.060)	-0.546*** (0.080)	-0.547*** (0.080)	-0.547*** (0.080)	-0.549*** (0.080)	-0.545*** (0.080)
Manufacture non-metallic	-0.329*** (0.059)	-0.402*** (0.070)	-0.403*** (0.070)	-0.403*** (0.070)	-0.400*** (0.070)	-0.400*** (0.070)
Manufacture metals	-0.317*** (0.034)	-0.371*** (0.049)	-0.370*** (0.049)	-0.370*** (0.049)	-0.370*** (0.048)	-0.367*** (0.048)
Manufacture electronics	-0.365*** (0.046)	-0.476*** (0.065)	-0.475*** (0.065)	-0.474*** (0.065)	-0.477*** (0.065)	-0.475*** (0.065)
Manufacture machinery	-0.458*** (0.039)	-0.561*** (0.056)	-0.559*** (0.056)	-0.559*** (0.056)	-0.565*** (0.056)	-0.564*** (0.056)
Manufacture vehicles	-0.330*** (0.082)	-0.292** (0.116)	-0.291** (0.116)	-0.291** (0.116)	-0.296** (0.115)	-0.291** (0.115)
Manufacture transport equip.	-0.172** (0.082)	-0.257** (0.120)	-0.262** (0.120)	-0.261** (0.120)	-0.262** (0.118)	-0.247** (0.120)
Manufacture furniture	-0.352*** (0.066)	-0.439*** (0.094)	-0.437*** (0.095)	-0.436*** (0.095)	-0.434*** (0.094)	-0.431*** (0.094)
Other manufacturing	-0.567*** (0.066)	-0.714*** (0.095)	-0.714*** (0.095)	-0.715*** (0.095)	-0.700*** (0.094)	-0.708*** (0.095)
Electricity	-0.435*** (0.066)	-0.618*** (0.095)	-0.621*** (0.095)	-0.621*** (0.095)	-0.615*** (0.094)	-0.611*** (0.094)
Water, sewerage, waste	0.212*** (0.039)	0.188*** (0.055)	0.188*** (0.055)	0.186*** (0.055)	0.193*** (0.055)	0.198*** (0.055)
Construction	0.517*** (0.031)	0.566*** (0.044)	0.563*** (0.044)	0.562*** (0.044)	0.573*** (0.044)	0.575*** (0.044)
Wholesale	-0.457*** (0.032)	-0.605*** (0.046)	-0.611*** (0.046)	-0.612*** (0.046)	-0.600*** (0.046)	-0.592*** (0.046)
Retail	-0.428*** (0.035)	-0.571*** (0.050)	-0.580*** (0.050)	-0.582*** (0.050)	-0.561*** (0.050)	-0.553*** (0.050)
Transportation & Storage	-0.264*** (0.038)	-0.401*** (0.054)	-0.408*** (0.054)	-0.409*** (0.054)	-0.399*** (0.054)	-0.389*** (0.054)
Accommodations, food services	0.444*** (0.035)	0.532*** (0.050)	0.528*** (0.050)	0.527*** (0.050)	0.539*** (0.050)	0.547*** (0.050)
Communication	-0.186*** (0.042)	-0.258*** (0.060)	-0.258*** (0.060)	-0.259*** (0.060)	-0.256*** (0.060)	-0.255*** (0.060)
Real estate	0.880*** (0.031)	1.100*** (0.044)	1.102*** (0.044)	1.103*** (0.044)	1.096*** (0.044)	1.097*** (0.044)
Professional activities	0.005 (0.036)	-0.058 (0.052)	-0.057 (0.052)	-0.057 (0.052)	-0.061 (0.052)	-0.059 (0.052)
Administrative activities	-0.280*** (0.040)	-0.430*** (0.058)	-0.433*** (0.058)	-0.433*** (0.058)	-0.422*** (0.058)	-0.422*** (0.058)
Public administration	2.813*** (0.744)	3.617*** (1.186)	3.625*** (1.188)	3.626*** (1.187)	3.610*** (1.187)	3.609*** (1.186)
Education	0.080 (0.086)	0.018 (0.125)	0.011 (0.125)	0.010 (0.125)	0.017 (0.124)	0.032 (0.125)
Human Health	-0.092** (0.044)	-0.151** (0.062)	-0.156** (0.062)	-0.156** (0.062)	-0.144** (0.062)	-0.136** (0.062)
Arts, Entertainment	0.077 (0.052)	-0.062 (0.074)	-0.063 (0.074)	-0.063 (0.074)	-0.062 (0.074)	-0.056 (0.074)
Other services	-0.142** (0.065)	-0.271*** (0.093)	-0.271*** (0.093)	-0.273*** (0.093)	-0.265*** (0.093)	-0.263*** (0.093)
cons	-0.896*** (0.030)	-0.980*** (0.043)	-0.978*** (0.043)	-0.983*** (0.044)	-0.920*** (0.044)	-0.919*** (0.044)
N. of observations	692,208	434,693	434,693	434,693	436,949	434,693

Note: *, **, and *** denote p-values of 10, 5 and 1 percent. Robust standard errors in parenthesis.

TABLE 7 INSTITUTIONS AND FIRM PERFORMANCE
REAL ZOMBIES, PANEL PROBIT MODEL REGRESSION

	(I)	(II)	(III)	(IV)	(V)	(VI)
Cash ratio	-1.320*** (0.068)	-2.283*** (0.098)	-2.282*** (0.098)	-2.281*** (0.098)	-2.284*** (0.098)	-2.283*** (0.098)
Loans ratio	-5.608*** (0.063)	-6.775*** (0.092)	-6.772*** (0.092)	-6.767*** (0.092)	-6.775*** (0.092)	-6.777*** (0.092)
Mafia association		-0.036 (0.025)				-0.153** (0.062)
Crime association			-0.004 (0.004)			
Money laundering				0.007*** (0.002)		
Bad loans					0.000 (0.004)	0.000 (0.005)
Bad loans x Mafia associations						0.019** (0.009)
Agriculture	0.272*** (0.044)	0.219*** (0.056)	0.219*** (0.056)	0.217*** (0.056)	0.212*** (0.056)	0.218*** (0.056)
Mining & quarrying	-0.396*** (0.097)	-0.482*** (0.126)	-0.481*** (0.126)	-0.481*** (0.126)	-0.458*** (0.124)	-0.482*** (0.126)
Manufacture food	-0.571*** (0.050)	-0.695*** (0.064)	-0.696*** (0.064)	-0.696*** (0.064)	-0.681*** (0.064)	-0.695*** (0.064)
Manufacture textiles	-0.711*** (0.058)	-0.785*** (0.075)	-0.785*** (0.075)	-0.788*** (0.075)	-0.788*** (0.075)	-0.784*** (0.075)
Manufacture wood	-1.024*** (0.089)	-1.252*** (0.121)	-1.252*** (0.121)	-1.252*** (0.121)	-1.256*** (0.121)	-1.251*** (0.121)
Manufacture paper	-0.704*** (0.065)	-0.819*** (0.085)	-0.819*** (0.085)	-0.818*** (0.085)	-0.814*** (0.085)	-0.819*** (0.085)
Manufacture chemicals	-0.763*** (0.085)	-0.815*** (0.109)	-0.815*** (0.109)	-0.815*** (0.109)	-0.818*** (0.109)	-0.814*** (0.109)
Manufacture pharmaceutical	-0.835*** (0.076)	-1.041*** (0.103)	-1.042*** (0.103)	-1.042*** (0.103)	-1.045*** (0.103)	-1.042*** (0.103)
Manufacture non-metallic	-0.845*** (0.067)	-1.082*** (0.090)	-1.083*** (0.090)	-1.080*** (0.090)	-1.081*** (0.090)	-1.082*** (0.090)
Manufacture metals	-0.779*** (0.042)	-0.895*** (0.054)	-0.894*** (0.054)	-0.893*** (0.054)	-0.896*** (0.054)	-0.895*** (0.054)
Manufacture electronics	-0.759*** (0.061)	-0.940*** (0.079)	-0.940*** (0.079)	-0.939*** (0.079)	-0.944*** (0.079)	-0.940*** (0.079)
Manufacture machinery	-0.987*** (0.053)	-1.142*** (0.069)	-1.141*** (0.069)	-1.139*** (0.069)	-1.144*** (0.069)	-1.142*** (0.069)
Manufacture vehicles	-0.515*** (0.104)	-0.678*** (0.138)	-0.678*** (0.138)	-0.677*** (0.138)	-0.683*** (0.138)	-0.678*** (0.138)
Manufacture transport equip.	-0.317*** (0.101)	-0.331** (0.130)	-0.332** (0.130)	-0.339*** (0.130)	-0.345*** (0.128)	-0.330** (0.130)
Manufacture furniture	-0.645*** (0.087)	-0.729*** (0.112)	-0.728*** (0.112)	-0.727*** (0.112)	-0.733*** (0.112)	-0.729*** (0.112)
Other manufacturing	-0.946*** (0.094)	-1.143*** (0.126)	-1.143*** (0.126)	-1.143*** (0.126)	-1.124*** (0.126)	-1.143*** (0.126)
Electricity	-0.946*** (0.097)	-1.081*** (0.125)	-1.082*** (0.125)	-1.084*** (0.125)	-1.071*** (0.125)	-1.081*** (0.125)
Water, sewerage, waste	-0.200*** (0.047)	-0.393*** (0.059)	-0.393*** (0.059)	-0.393*** (0.059)	-0.397*** (0.059)	-0.393*** (0.059)
Construction	-0.089** (0.036)	-0.151*** (0.045)	-0.151*** (0.045)	-0.152*** (0.045)	-0.154*** (0.045)	-0.150*** (0.045)
Wholesale	-0.905*** (0.039)	-1.069*** (0.050)	-1.070*** (0.050)	-1.071*** (0.050)	-1.074*** (0.050)	-1.068*** (0.050)
Retail	-0.684*** (0.043)	-0.805*** (0.055)	-0.806*** (0.055)	-0.808*** (0.055)	-0.809*** (0.055)	-0.804*** (0.055)
Transportation & Storage	-0.607*** (0.046)	-0.753*** (0.059)	-0.754*** (0.059)	-0.758*** (0.059)	-0.760*** (0.059)	-0.752*** (0.059)
Accommodations, food services	0.176*** (0.040)	0.0916* (0.051)	0.0908* (0.051)	0.0887* (0.051)	0.0839* (0.051)	0.0922* (0.051)
Communication	-0.537*** (0.053)	-0.656*** (0.068)	-0.656*** (0.068)	-0.658*** (0.068)	-0.653*** (0.068)	-0.656*** (0.068)
Real estate	0.096*** (0.036)	0.032 (0.045)	0.033 (0.045)	0.032 (0.045)	0.032 (0.045)	0.032 (0.045)
Professional activities	-0.207*** (0.043)	-0.316*** (0.054)	-0.316*** (0.054)	-0.316*** (0.054)	-0.319*** (0.054)	-0.316*** (0.054)
Administrative activities	-0.585*** (0.051)	-0.702*** (0.065)	-0.703*** (0.065)	-0.705*** (0.065)	-0.710*** (0.065)	-0.702*** (0.065)
Public administration	0.971 (0.808)	-6.028 (135.400)	-6.028 (135.300)	-6.035 (135.500)	-6.018 (132.900)	-6.029 (135.600)
Education	-0.175 (0.107)	-0.346** (0.142)	-0.347** (0.142)	-0.348** (0.142)	-0.354** (0.141)	-0.345** (0.142)
Human Health	-0.410*** (0.053)	-0.552*** (0.069)	-0.553*** (0.069)	-0.555*** (0.069)	-0.563*** (0.069)	-0.552*** (0.069)
Arts, Entertainment	0.015 (0.059)	-0.177** (0.077)	-0.177** (0.077)	-0.179** (0.077)	-0.170** (0.077)	-0.177** (0.077)
Other services	-0.399*** (0.081)	-0.538*** (0.105)	-0.537*** (0.105)	-0.539*** (0.105)	-0.543*** (0.105)	-0.537*** (0.105)
cons	-1.580*** (0.034)	-1.586*** (0.045)	-1.584*** (0.045)	-1.610*** (0.046)	-1.584*** (0.046)	0.538*** (0.046)
N. of observations	692,209	434,694	434,694	434,694	436,950	434,694

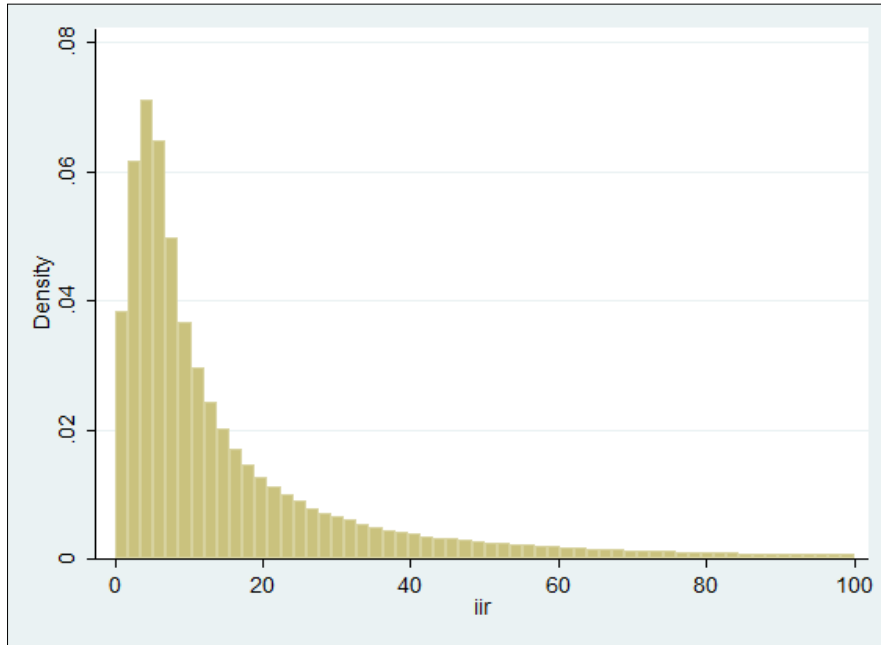
Note *, **, and *** denote p-values of 10, 5 and 1 percent. Robust standard errors in parenthesis.

TABLE 8 INSTITUTIONS AND FIRM PERFORMANCE
CHEATERS, PANEL PROBIT MODEL REGRESSION

	(I)	(II)	(III)	(IV)	(V)	(VI)
Cash ratio	0.990*** (0.044)	0.897*** (0.065)	0.903*** (0.065)	0.905*** (0.065)	0.881*** (0.065)	0.882*** (0.065)
Loans ratio	-6.985*** (0.046)	-8.698*** (0.072)	-8.687*** (0.072)	-8.690*** (0.072)	-8.702*** (0.071)	-8.711*** (0.072)
Mafia association		-0.150*** (0.020)				-0.259*** (0.047)
Crime association			-0.011*** (0.003)			
Money laundering				-0.008*** (0.002)		
Bad loans					-0.036*** (0.003)	-0.033*** (0.004)
Bad loans x Mafia associations						0.030*** (0.007)
Agriculture	0.374*** (0.040)	0.506*** (0.055)	0.505*** (0.055)	0.503*** (0.055)	0.518*** (0.055)	0.525*** (0.055)
Mining & quarrying	0.013 (0.079)	-0.061 (0.114)	-0.060 (0.114)	-0.062 (0.114)	-0.037 (0.114)	-0.046 (0.114)
Manufacture food	0.227*** (0.040)	0.333*** (0.055)	0.330*** (0.056)	0.327*** (0.055)	0.347*** (0.055)	0.353*** (0.055)
Manufacture textiles	-0.061 (0.045)	0.021 (0.063)	0.021 (0.063)	0.020 (0.063)	0.023 (0.063)	0.026 (0.063)
Manufacture wood	-0.117*** (0.060)	-0.092 (0.082)	-0.094 (0.082)	-0.094 (0.082)	-0.073 (0.082)	-0.072 (0.082)
Manufacture paper	0.121** (0.048)	0.194*** (0.067)	0.193*** (0.067)	0.191*** (0.067)	0.204*** (0.067)	0.203*** (0.067)
Manufacture chemicals	0.067 (0.060)	-0.024 (0.087)	-0.025 (0.087)	-0.025 (0.087)	-0.023 (0.087)	-0.021 (0.087)
Manufacture pharmaceutical	-0.042 (0.055)	-0.004 (0.077)	-0.005 (0.077)	-0.005 (0.077)	-0.004 (0.077)	-0.003 (0.077)
Manufacture non-metallic	0.065 (0.048)	0.162** (0.067)	0.162** (0.067)	0.160** (0.067)	0.165** (0.067)	0.164** (0.067)
Manufacture metals	0.074** (0.034)	0.140*** (0.048)	0.141*** (0.048)	0.140*** (0.048)	0.143*** (0.048)	0.144*** (0.048)
Manufacture electronics	0.016 (0.045)	0.052 (0.063)	0.053 (0.063)	0.054 (0.063)	0.053 (0.063)	0.052 (0.063)
Manufacture machinery	-0.021 (0.039)	0.019 (0.055)	0.021 (0.055)	0.020 (0.055)	0.016 (0.054)	0.015 (0.055)
Manufacture vehicles	-0.046 (0.082)	0.134 (0.111)	0.135 (0.111)	0.136 (0.111)	0.133 (0.111)	0.135 (0.111)
Manufacture transport equip.	0.038 (0.082)	-0.016 (0.119)	-0.022 (0.119)	-0.015 (0.119)	-0.012 (0.117)	-0.007 (0.119)
Manufacture furniture	-0.016 (0.065)	-0.006 (0.096)	-0.004 (0.097)	-0.004 (0.097)	0.002 (0.095)	0.002 (0.096)
Other manufacturing	-0.129** (0.064)	-0.119 (0.089)	-0.119 (0.089)	-0.120 (0.089)	-0.111 (0.089)	-0.114 (0.089)
Electricity	-0.005 (0.064)	-0.067 (0.090)	-0.070 (0.090)	-0.067 (0.090)	-0.065 (0.090)	-0.060 (0.090)
Water, sewerage, waste	0.419*** (0.039)	0.532*** (0.054)	0.531*** (0.054)	0.530*** (0.054)	0.542*** (0.054)	0.543*** (0.054)
Construction	0.697*** (0.032)	0.794*** (0.045)	0.792*** (0.045)	0.791*** (0.045)	0.806*** (0.044)	0.805*** (0.044)
Wholesale	-0.042 (0.033)	-0.045 (0.046)	-0.051 (0.046)	-0.051 (0.046)	-0.035 (0.046)	-0.031 (0.046)
Retail	-0.087** (0.035)	-0.110** (0.051)	-0.109** (0.051)	-0.110** (0.051)	-0.090* (0.051)	-0.080 (0.051)
Transportation & Storage	0.071* (0.037)	0.078 (0.053)	0.061 (0.053)	0.061 (0.053)	0.075 (0.053)	0.081 (0.053)
Accommodations, food services	0.465*** (0.035)	0.610*** (0.050)	0.605*** (0.050)	0.605*** (0.050)	0.623*** (0.050)	0.627*** (0.050)
Communication	0.125*** (0.042)	0.168*** (0.059)	0.168*** (0.059)	0.169*** (0.059)	0.170*** (0.060)	0.172*** (0.059)
Real estate	0.973*** (0.032)	1.203*** (0.045)	1.205*** (0.045)	1.206*** (0.045)	1.198*** (0.044)	1.198*** (0.045)
Professional activities	0.160*** (0.037)	0.188*** (0.052)	0.189*** (0.052)	0.190*** (0.052)	0.187*** (0.052)	0.187*** (0.052)
Administrative activities	0.041 (0.041)	0.004 (0.057)	0.001 (0.057)	0.002 (0.057)	0.018 (0.057)	0.012 (0.057)
Public administration	2.433*** (0.658)	4.017*** (1.047)	4.025*** (1.049)	4.034*** (1.049)	4.010*** (1.047)	4.007*** (1.047)
Education	0.249*** (0.085)	0.318*** (0.119)	0.310*** (0.119)	0.310*** (0.119)	0.324*** (0.118)	0.333*** (0.119)
Human Health	0.179*** (0.043)	0.251*** (0.061)	0.246*** (0.061)	0.247*** (0.061)	0.265*** (0.060)	0.267*** (0.061)
Arts, Entertainment	0.142*** (0.052)	0.128* (0.073)	0.127* (0.073)	0.127* (0.073)	0.123* (0.073)	0.134* (0.073)
Other services	0.104 (0.064)	0.0861 (0.090)	0.0863 (0.090)	0.0856 (0.090)	0.0963 (0.090)	0.0944 (0.090)
cons	-1.515*** (0.031)	-1.749*** (0.044)	-1.747*** (0.044)	-1.736*** (0.044)	-1.680*** (0.044)	-1.678*** (0.045)
N. of observations	692,209	434,694	434,694	434,694	436,950	434,694

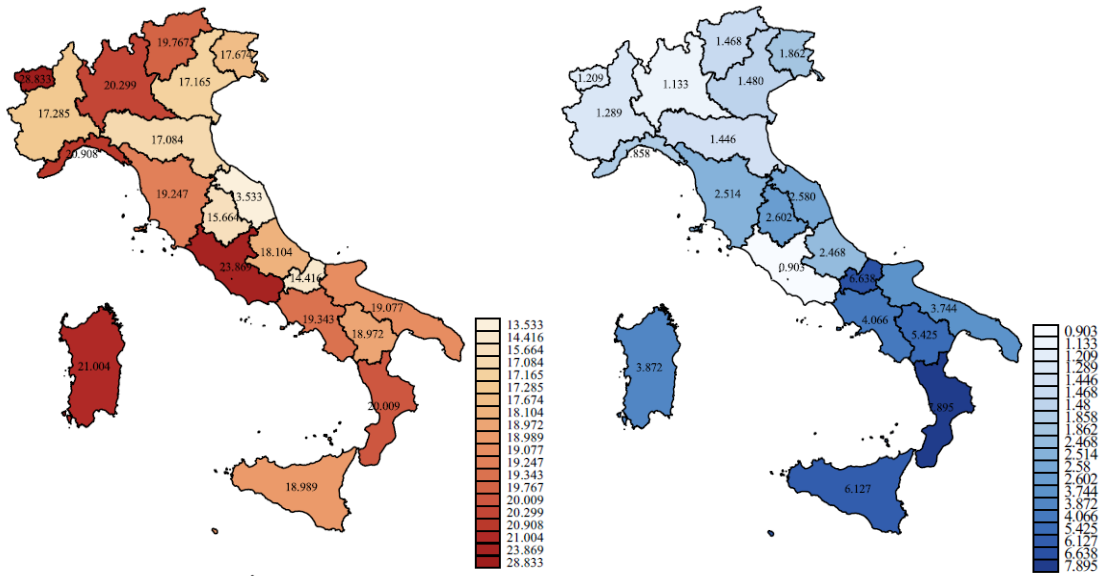
Note *, **, and *** denote p-values of 10, 5 and 1 percent. Robust standard errors in parenthesis.

FIGURE 1 THE IMPLICIT INTEREST RATE



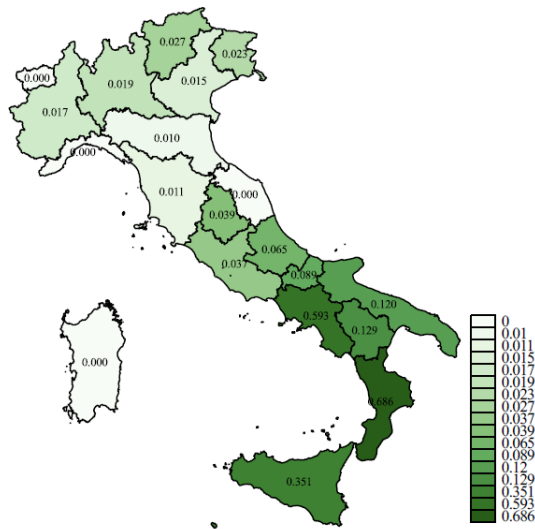
Note: the implicit interest rate is calculated to identify inefficient firms receiving subsidies by banks.
Source: own estimation.

FIGURE 2 MAPPING REGIONAL QUALITY ⁵



6

7



8

⁵ The share of *zombie* firms (%) is related to the period 2007-2013. Bad loans are represented as a ratio to total loans in relation to the period 2010-2014 and are averaged to create yearly flows. Mafia association is per 100,000 inhabitants and refers to the period 2010-2013. The maps were created with the software QGIS.

⁶ The following map reports the share of *zombie* firms.

⁷ The following map reports the share of bad loans.

⁸ The last map is related to the concentration of mafia association.

A Appendix: Additional Tables

TABLE A1 PROVINCES INSTITUTIONAL QUALITY AND FIRM PERFORMANCE

Provinces	Mafia association	Bad Loans	Zombies	Real Zombies	Cheaters
Agrigento	0.075	6.127	18.985	6.763	12.223
Alessandria	0.000	1.290	17.297	4.090	13.207
Ancona	0.000	2.583	13.538	3.333	10.205
Aosta	0.000	1.209	28.833	9.906	18.927
Arezzo	0.000	2.516	19.242	5.574	13.667
Ascoli Piceno	0.000	2.582	13.538	3.333	10.205
Asti	0.000	1.289	17.297	4.090	13.207
Avellino	0.000	4.068	19.345	5.475	13.870
Bari	0.075	3.745	19.084	5.671	13.413
Barletta-Andria-Trani	0.000	3.739	19.084	5.671	13.413
Belluno	0.000	1.481	17.171	4.254	12.918
Benevento	0.075	4.068	19.345	5.475	13.870
Bergamo	0.000	1.134	20.290	5.259	15.031
Biella	0.000	1.287	17.297	4.090	13.207
Bologna	0.000	1.446	17.089	4.284	12.805
Bolzano	0.051	1.470	19.773	4.469	15.304
Brescia	0.025	1.134	20.290	5.259	15.031
Brindisi	0.225	3.745	19.084	5.671	13.413
Cagliari	0.000	3.875	21.027	6.432	14.595
Caltanissetta	0.867	6.127	18.985	6.763	12.223
Campobasso	0.000	6.640	14.416	3.966	10.450
Carbonia-Iglesias		3.873	21.027	6.432	14.595
Caserta	0.800	4.068	19.345	5.475	13.870
Catania	0.450	6.128	18.985	6.763	12.223
Catanzaro	0.000	7.906	20.017	6.076	13.942
Chieti	0.000	2.470	18.107	5.328	12.779
Como	0.000	1.134	20.290	5.259	15.031
Cosenza	0.150	7.907	20.017	6.076	13.942
Cremona	0.000	1.134	20.290	5.259	15.031
Crotone	0.150	7.906	20.017	6.076	13.942
Cuneo	0.000	1.290	17.297	4.090	13.207
Enna	0.600	6.127	18.985	6.763	12.223
Fermo	0.000	2.584	13.538	3.333	10.205
Ferrara	0.000	1.446	17.089	4.284	12.805
Firenze	0.000	2.516	19.242	5.574	13.667
Foggia	0.149	3.748	19.084	5.671	13.413
Forlì-Cesena	0.000	1.446	17.089	4.284	12.805
Frosinone	0.100	0.903	23.873	7.227	16.646
Genova	0.000	1.864	17.693	4.719	12.974
Gorizia	0.000	1.864	17.693	4.719	12.974
Grosseto	0.000	2.514	19.242	5.574	13.667
Imperia	0.000	1.858	20.911	5.593	15.318
Isernia	0.275	6.634	14.416	3.966	10.450
L'Aquila	0.250	2.469	18.107	5.328	12.779
La Spezia	0.000	1.858	20.911	5.593	15.318
Latina	0.150	0.903	23.873	7.227	16.646
Lecce	0.225	3.746	19.084	5.671	13.413
Lecco	0.000	1.133	20.290	5.259	15.031
Livorno	0.000	2.517	19.242	5.574	13.667
Lodi	0.000	1.134	20.290	5.259	15.031
Lucca	0.000	2.517	19.242	5.574	13.667
Macerata	0.000	2.583	13.538	3.333	10.205
Mantova	0.000	1.134	20.290	5.259	15.031
Massa-Carrara	0.000	2.518	19.242	5.574	13.667
Matera	0.000	5.426	18.982	5.612	13.370
Medio Campidano		3.873	21.027	6.432	14.595
Messina	0.126	6.127	18.985	6.763	12.223
Milano	0.025	1.134	20.290	5.259	15.031
Modena	0.000	1.446	17.089	4.284	12.805
Monza e della Brianza	0.000	1.133	20.290	5.259	15.031
Napoli	0.775	4.068	19.345	5.475	13.870
Novara	0.000	1.289	17.297	4.090	13.207
Nuoro	0.000	3.870	21.027	6.432	14.595
Ogliastra		3.879	21.027	6.432	14.595

Olbia		3.875	21.027	6.432	14.595
Oristano	0.000	3.875	21.027	6.432	14.595
Padova	0.025	1.481	17.171	4.254	12.918
Palermo	0.549	6.127	18.985	6.763	12.223
Parma	0.050	1.446	17.089	4.284	12.805
Pavia	0.000	1.134	20.290	5.259	15.031
Perugia	0.050	2.602	15.665	4.321	11.345
Pesaro e Urbino	0.000	2.583	13.538	3.333	10.205
Pescara	0.000	2.469	18.107	5.328	12.779
Piacenza	0.000	1.446	17.089	4.284	12.805
Pisa	0.000	2.516	19.242	5.574	13.667
Pistoia	0.000	2.518	19.242	5.574	13.667
Pordenone	0.075	1.864	17.693	4.719	12.974
Potenza	0.200	5.425	18.982	5.612	13.370
Prato	0.100	2.516	19.242	5.574	13.667
Ragusa	0.300	6.127	18.985	6.763	12.223
Ravenna	0.000	1.446	17.089	4.284	12.805
Reggio Calabria	2.574	7.906	20.017	6.076	13.942
Reggio Emilia	0.000	1.446	17.089	4.284	12.805
Rieti	0.000	0.903	23.873	7.227	16.646
Rimini	0.075	1.446	17.089	4.284	12.805
Roma	0.025	0.903	23.873	7.227	16.646
Rovigo	0.000	1.481	17.171	4.254	12.918
Salerno	0.225	4.068	19.345	5.475	13.870
Sassari	0.000	3.876	21.027	6.432	14.595
Savona	0.000	1.858	20.911	5.593	15.318
Siena	0.000	2.515	19.242	5.574	13.667
Siracusa	0.000	6.127	18.985	6.763	12.223
Sondrio	0.000	1.134	20.290	5.259	15.031
Taranto	0.100	3.744	19.084	5.671	13.413
Teramo	0.075	2.470	18.107	5.328	12.779
Terni	0.000	2.604	15.665	4.321	11.345
Torino	0.025	1.289	17.297	4.090	13.207
Trapani	0.175	6.128	18.985	6.763	12.223
Trento	0.000	1.469	19.773	4.469	15.304
Treviso	0.000	1.481	17.171	4.254	12.918
Trieste	0.000	1.865	17.693	4.719	12.974
Udine	0.000	1.864	17.693	4.719	12.974
Varese	0.075	1.134	20.290	5.259	15.031
Venezia	0.000	1.538	17.171	4.254	12.918
Verbano-Cusio-Ossola	0.150	1.289	17.297	4.090	13.207
Vercelli	0.000	1.293	17.297	4.090	13.207
Verona	0.050	1.481	17.171	4.254	12.918
Vibo Valentia	0.750	7.907	20.017	6.076	13.942
Vicenza	0.000	1.481	17.171	4.254	12.918
Viterbo	0.000	0.903	23.873	7.227	16.646

Note: The data reported in this table are related to all Italian provinces according to NUTS 3 with a total of 110 provinces, as of 2004. Since 2015 the Italian provinces have been reorganized and on paper lowered to 100. Data on Mafia association are expressed per 100,000 inhabitants and refer to the period 2010-2013 as from *Istat* database. Bad loans are expressed as a ratio to total loans for the period 2010-2014 as from the *Bank of Italy* database. Zombies, real zombies and cheaters are in percentage terms (%) and are computed for the entire observed time frame from 2007 to 2013. Source: own estimation.

TABLE A2 MACRO-REGIONS INSTITUTIONAL QUALITY AND FIRM PERFORMANCE

Macro-regions	Mafia association	Bad Loans	Zombies	Real Zombies	Cheaters
Center	0.024	1.732	20.608	6.037	14.570
Islands	0.272	5.499	19.556	6.671	12.885
Northeast	0.015	1.495	17.414	4.321	13.093
Northwest	0.018	1.204	19.812	5.085	14.727
South	0.381	4.242	19.075	5.541	13.533

Note: The data reported in this table are related to all Italian macro-regions according to NUTS 1. Data on Mafia association are expressed per 100,000 inhabitants and refer to the period 2010-2013 as from *Istat* database. Bad loans are expressed as a ratio to total loans for the period 2010-2014 as from the *Bank of Italy* database. *Zombies*, *real zombies* and *cheaters* are in percentage terms (%) and are computed for the period 2007 to 2013. Source: own estimation.

TABLE A3 ECONOMIC ACTIVITIES AND FIRM PERFORMANCE

NACE Codes	Mafia association	Bad Loans	Zombies	Real Zombies	Cheaters
Agriculture	0.112	2.715	19.038	5.358	13.680
Mining & quarrying	0.058	2.300	19.383	5.388	13.995
Manufacture food	0.103	2.459	18.766	5.154	13.613
Manufacture textiles	0.065	1.990	18.740	5.028	13.712
Manufacture wood	0.083	2.383	17.826	4.815	13.010
Manufacture paper	0.060	1.994	18.691	4.980	13.712
Manufacture chemicals	0.060	1.814	19.068	5.103	13.965
Manufacture pharmaceutical	0.058	1.762	19.182	5.105	14.077
Manufacture non-metallic	0.056	1.814	18.726	4.934	13.792
Manufacture metals	0.052	1.859	18.718	4.951	13.767
Manufacture electronics	0.046	1.698	18.925	4.989	13.935
Manufacture machinery	0.032	1.607	18.533	4.795	13.739
Manufacture vehicles	0.047	1.762	18.474	4.827	13.647
Manufacture transport equip.	0.099	2.255	19.048	5.227	13.822
Manufacture furniture	0.035	2.023	18.078	4.804	13.274
Other manufacturing	0.049	1.878	18.604	4.937	13.667
Electricity	0.076	1.950	19.073	5.132	13.940
Water, sewerage, waste	0.074	2.128	19.256	5.232	14.024
Construction	0.092	2.187	19.495	5.396	14.099
Wholesale	0.104	2.176	19.209	5.248	13.961
Retail	0.146	2.540	19.667	5.576	14.091
Transportation & Storage	0.113	2.233	19.429	5.362	14.067
Accommodations, food services	0.109	2.308	19.591	5.470	14.121
Communication	0.060	1.706	19.938	5.456	14.482
Real estate	0.048	1.655	19.422	5.200	14.222
Professional activities	0.049	1.673	19.484	5.220	14.263
Administrative activities	0.089	2.020	19.890	5.527	14.364
Public administration	0.125	1.673	20.310	5.475	14.835
Education	0.179	2.514	19.591	5.489	14.102
Human Health	0.119	2.531	19.401	5.438	13.963
Arts, Entertainment	0.082	2.035	19.463	5.354	14.110
Other services	0.084	2.024	19.490	5.344	14.146

Note: The following table reports the concentration of *zombie* companies, real *zombies* and *cheaters* in the different sectors of the economy (Nace codes). As aforementioned, the *cheaters* are driving the results.

**TABLE A4 INSTITUTIONS AND FIRM PERFORMANCE
ZOMBIES, MARGINAL PROBABILITY EFFECTS**

	(I)	(II)	(III)	(IV)	(V)	(VI)
Cash ratio	-0.048*** (0.006)	-0.103*** (0.008)	-0.103*** (0.008)	-0.103*** (0.008)	-0.106** (0.008)	-0.103*** (0.008)
Loans ratio	-1.333*** (0.005)	-1.499*** (0.007)	-1.499*** (0.007)	-1.499*** (0.007)	-1.502*** (0.007)	-1.499*** (0.007)
Mafia association		-0.008** (0.003)				-0.025** (0.008)
Crime association			-0.000 (0.000)			
Money laundering				-0.001 (0.000)		
Bad loans					0.002 (0.001)	0.001 (0.001)
Bad loans x Mafia associations						0.003* (0.001)
Agriculture	0.069*** (0.005)	0.074*** (0.006)	0.074*** (0.006)	0.074*** (0.006)	0.072*** (0.006)	0.074*** (0.006)
Mining & quarrying	-0.025*** (0.007)	-0.033*** (0.009)	-0.033*** (0.009)	-0.033*** (0.009)	-0.031*** (0.009)	-0.033*** (0.009)
Manufacture food	-0.006 (0.004)	-0.005 (0.005)	-0.005 (0.005)	-0.005 (0.005)	-0.005 (0.005)	-0.005 (0.005)
Manufacture textiles	-0.041*** (0.004)	-0.041*** (0.005)	-0.041*** (0.005)	-0.040*** (0.005)	-0.041*** (0.005)	-0.040*** (0.005)
Manufacture wood	-0.053*** (0.004)	-0.060*** (0.006)	-0.060*** (0.006)	-0.060*** (0.006)	-0.060*** (0.006)	-0.060*** (0.006)
Manufacture paper	-0.025*** (0.004)	-0.026*** (0.006)	-0.026*** (0.006)	-0.026*** (0.006)	-0.026*** (0.006)	-0.026*** (0.006)
Manufacture chemicals	-0.030*** (0.005)	-0.047*** (0.006)	-0.047*** (0.006)	-0.047*** (0.006)	-0.047*** (0.006)	-0.047*** (0.006)
Manufacture pharmaceutical	-0.049*** (0.004)	-0.052*** (0.005)	-0.052*** (0.005)	-0.052*** (0.005)	-0.053*** (0.005)	-0.052*** (0.005)
Manufacture non-metallic	-0.036*** (0.004)	-0.038*** (0.005)	-0.038*** (0.005)	-0.038*** (0.005)	-0.038*** (0.005)	-0.038*** (0.005)
Manufacture metals	-0.034*** (0.003)	-0.036*** (0.004)	-0.036*** (0.004)	-0.036*** (0.004)	-0.036*** (0.004)	-0.036*** (0.004)
Manufacture electronics	-0.039*** (0.004)	-0.046*** (0.005)	-0.046*** (0.005)	-0.046*** (0.005)	-0.046*** (0.005)	-0.046*** (0.005)
Manufacture machinery	-0.051*** (0.003)	-0.056*** (0.004)	-0.056*** (0.004)	-0.056*** (0.004)	-0.056*** (0.004)	-0.056*** (0.004)
Manufacture vehicles	-0.031*** (0.007)	-0.024* (0.009)	-0.024* (0.009)	-0.024* (0.009)	-0.024** (0.009)	-0.024* (0.009)
Manufacture transport equip.	-0.017* (0.008)	-0.029** (0.010)	-0.029** (0.010)	-0.029** (0.010)	-0.030** (0.010)	-0.029** (0.010)
Manufacture furniture	-0.037*** (0.005)	-0.038*** (0.007)	-0.038*** (0.007)	-0.038*** (0.007)	-0.039*** (0.007)	-0.038*** (0.007)
Other manufacturing	-0.055*** (0.005)	-0.060*** (0.006)	-0.060*** (0.006)	-0.060*** (0.006)	-0.060*** (0.006)	-0.060*** (0.006)
Electricity	-0.044*** (0.005)	-0.059*** (0.006)	-0.059*** (0.006)	-0.059*** (0.006)	-0.059*** (0.006)	-0.059*** (0.006)
Water, sewerage, waste	0.021*** (0.004)	0.015** (0.005)	0.015** (0.005)	0.015** (0.005)	0.015** (0.005)	0.015** (0.005)
Construction	0.091*** (0.004)	0.086*** (0.005)	0.086*** (0.005)	0.086*** (0.005)	0.086*** (0.005)	0.086*** (0.005)
Wholesale	-0.049*** (0.003)	-0.056*** (0.003)	-0.057*** (0.003)	-0.057*** (0.003)	-0.057*** (0.003)	-0.056*** (0.003)
Retail	-0.047*** (0.003)	-0.052*** (0.003)	-0.052*** (0.003)	-0.052*** (0.003)	-0.052*** (0.003)	-0.052*** (0.003)
Transportation & Storage	-0.026*** (0.003)	-0.035*** (0.004)	-0.035*** (0.004)	-0.035*** (0.004)	-0.036*** (0.004)	-0.035*** (0.004)
Accommodations, food services	0.076*** (0.004)	0.081*** (0.006)	0.081*** (0.006)	0.081*** (0.006)	0.081*** (0.006)	0.082*** (0.006)
Communication	-0.014*** (0.004)	-0.020*** (0.005)	-0.020*** (0.005)	-0.020*** (0.005)	-0.020*** (0.005)	-0.020*** (0.005)
Real estate	0.139*** (0.004)	0.153*** (0.006)	0.153*** (0.006)	0.153*** (0.006)	0.153*** (0.006)	0.153*** (0.006)
Professional activities	0.001 (0.004)	-0.007 (0.005)	-0.007 (0.005)	-0.007 (0.005)	-0.007 (0.005)	-0.007 (0.005)
Administrative activities	-0.028*** (0.003)	-0.038*** (0.004)	-0.038*** (0.004)	-0.038*** (0.004)	-0.037*** (0.004)	-0.038*** (0.004)
Public administration	0.617*** (0.105)	0.681*** (0.140)	0.681*** (0.140)	0.680*** (0.141)	0.681*** (0.140)	0.681*** (0.140)
Education	0.016 (0.009)	0.010 (0.012)	0.010 (0.012)	0.010 (0.012)	0.009 (0.012)	0.010 (0.012)
Human Health	0.000 (0.004)	-0.004 (0.005)	-0.004 (0.005)	-0.004 (0.005)	-0.004 (0.005)	-0.004 (0.005)
Arts, Entertainment	0.021*** (0.006)	0.003 (0.007)	0.003 (0.007)	0.003 (0.007)	0.003 (0.007)	0.003 (0.007)
Other services	-0.017*** (0.006)	-0.027*** (0.007)	-0.027*** (0.007)	-0.027*** (0.007)	-0.027*** (0.007)	-0.027*** (0.007)
N. of observations	692,123	434,694	434,694	434,694	436,950	434,694

Note *, **, and *** denote p-values of 10, 5 and 1 percent. Robust standard errors in parenthesis.

TABLE A5 INSTITUTIONS AND FIRM PERFORMANCE
REAL ZOMBIES, MARGINAL PROBABILITY EFFECTS

	(I)	(II)	(III)	(IV)	(V)	(VI)
Cash ratio	-0.103*** (0.003)	-0.140*** (0.004)	-0.140*** (0.004)	-0.140*** (0.004)	-0.141*** (0.005)	-0.140*** (0.004)
Loans ratio	-0.304*** (0.002)	-0.335*** (0.003)	-0.335*** (0.003)	-0.335*** (0.003)	-0.337*** (0.003)	-0.335*** (0.003)
Mafia association		-0.001 (0.001)				-0.007** (0.003)
Crime association			-0.000 (0.000)			
Money laundering				0.000*** (0.000)		
Bad loans					0.000 (0.000)	0.000 (0.000)
Bad loans x Mafia associations						0.001 (0.000)
Agriculture	0.014*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)
Mining & quarrying	-0.013*** (0.002)	-0.014*** (0.003)	-0.014*** (0.003)	-0.014*** (0.003)	-0.014*** (0.003)	-0.014*** (0.003)
Manufacture food	-0.017*** (0.001)	-0.020*** (0.001)	-0.020*** (0.001)	-0.020*** (0.001)	-0.020*** (0.001)	-0.020*** (0.001)
Manufacture textiles	-0.019*** (0.001)	-0.021*** (0.001)	-0.021*** (0.001)	-0.021*** (0.001)	-0.021*** (0.001)	-0.021*** (0.001)
Manufacture wood	-0.024*** (0.001)	-0.027*** (0.001)	-0.027*** (0.001)	-0.027*** (0.001)	-0.027*** (0.001)	-0.027*** (0.001)
Manufacture paper	-0.020*** (0.001)	-0.022*** (0.001)	-0.022*** (0.001)	-0.022*** (0.001)	-0.022*** (0.001)	-0.022*** (0.001)
Manufacture chemicals	-0.021*** (0.001)	-0.022*** (0.001)	-0.022*** (0.001)	-0.022*** (0.001)	-0.022*** (0.001)	-0.022*** (0.001)
Manufacture pharmaceutical	-0.023*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)
Manufacture non-metallic	-0.023*** (0.001)	-0.026*** (0.001)	-0.026*** (0.001)	-0.026*** (0.001)	-0.026*** (0.001)	-0.026*** (0.001)
Manufacture metals	-0.023*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)
Manufacture electronics	-0.021*** (0.001)	-0.024*** (0.001)	-0.024*** (0.001)	-0.024*** (0.001)	-0.024*** (0.001)	-0.024*** (0.001)
Manufacture machinery	-0.025*** (0.001)	-0.027*** (0.001)	-0.027*** (0.001)	-0.027*** (0.001)	-0.028*** (0.001)	-0.027*** (0.001)
Manufacture vehicles	-0.017*** (0.002)	-0.020*** (0.002)	-0.020*** (0.002)	-0.020*** (0.002)	-0.020*** (0.002)	-0.020*** (0.002)
Manufacture transport equip.	-0.011*** (0.002)	-0.011*** (0.003)	-0.011*** (0.003)	-0.011*** (0.003)	-0.012*** (0.003)	-0.011*** (0.003)
Manufacture furniture	-0.019*** (0.001)	-0.021*** (0.002)	-0.021*** (0.002)	-0.021*** (0.002)	-0.021*** (0.002)	-0.021*** (0.002)
Other manufacturing	-0.023*** (0.001)	-0.026*** (0.001)	-0.026*** (0.001)	-0.026*** (0.001)	-0.025*** (0.001)	-0.026*** (0.001)
Electricity	-0.024*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)
Water, sewerage, waste	-0.011*** (0.001)	-0.016*** (0.001)	-0.016*** (0.001)	-0.016*** (0.001)	-0.016*** (0.001)	-0.016*** (0.001)
Construction	-0.004*** (0.001)	-0.007*** (0.001)	-0.007*** (0.001)	-0.007*** (0.001)	-0.007*** (0.001)	-0.007*** (0.001)
Wholesale	-0.027*** (0.001)	-0.030*** (0.001)	-0.030*** (0.001)	-0.030*** (0.001)	-0.030*** (0.001)	-0.030*** (0.001)
Retail	-0.022*** (0.001)	-0.023*** (0.001)	-0.023*** (0.001)	-0.023*** (0.001)	-0.024*** (0.001)	-0.023*** (0.001)
Transportation & Storage	-0.019*** (0.001)	-0.021*** (0.001)	-0.021*** (0.001)	-0.021*** (0.001)	-0.022*** (0.001)	-0.021*** (0.001)
Accommodations, food services	0.008*** (0.002)	0** (0.002)	0.004** (0.002)	0.004** (0.002)	0.003 (0.002)	0.004** (0.002)
Communication	-0.016*** (0.001)	-0.019*** (0.001)	-0.019*** (0.001)	-0.019*** (0.001)	-0.019*** (0.001)	-0.019*** (0.001)
Real estate	0.001 (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)
Professional activities	-0.008*** (0.001)	-0.012*** (0.001)	-0.012*** (0.001)	-0.012*** (0.001)	-0.012*** (0.001)	-0.012*** (0.001)
Administrative activities	-0.019*** (0.001)	-0.020*** (0.001)	-0.020*** (0.001)	-0.020*** (0.001)	-0.021*** (0.001)	-0.020*** (0.001)
Public administration	0.053 (0.071)					
Education	-0.006 (0.003)	-0.011*** (0.003)	-0.011*** (0.003)	-0.011*** (0.003)	-0.012*** (0.003)	-0.011*** (0.003)
Human Health	-0.013*** (0.001)	-0.017*** (0.001)	-0.017*** (0.001)	-0.017*** (0.001)	-0.017*** (0.001)	-0.017*** (0.001)
Arts, Entertainment	0.001 (0.002)	-0.006** (0.002)	-0.006** (0.002)	-0.006** (0.002)	-0.006** (0.002)	-0.006** (0.002)
Other services	-0.014*** (0.002)	-0.017*** (0.002)	-0.017*** (0.002)	-0.017*** (0.002)	-0.017*** (0.002)	-0.017*** (0.002)
N. of observations	692,123	434,683	434,683	434,683	436,939	434,683

Note *, **, and *** denote p-values of 10, 5 and 1 percent. Robust standard errors in parenthesis.

**TABLE A6 INSTITUTIONS AND FIRM PERFORMANCE
CHEATERS, MARGINAL PROBABILITY EFFECTS**

	(I)	(II)	(III)	(IV)	(V)	(VI)
Cash ratio	0.061*** (0.005)	0.047*** (0.006)	0.047*** (0.006)	0.047*** (0.006)	0.045*** (0.006)	0.047*** (0.006)
Loans ratio	-0.946*** (0.004)	-1.057*** (0.006)	-1.057*** (0.006)	-1.057*** (0.006)	-1.058*** (0.006)	-1.057*** (0.006)
Mafia association		-0.005** (0.002)				-0.015** (0.006)
Crime association			0.000 (0.000)			
Money laundering				-0.001*** (0.000)		
Bad loans					0.002* 0.002*	0.002 (0.001)
Bad loans x Mafia associations						0.001 (0.001)
Agriculture	0.046*** (0.005)	0.059*** (0.006)	0.059*** (0.006)	0.059*** (0.006)	0.058*** (0.006)	0.059*** (0.006)
Mining & quarrying	-0.001 (0.007)	-0.007 (0.009)	-0.007 (0.009)	-0.007 (0.009)	-0.005 (0.009)	-0.007 (0.009)
Manufacture food	0.030*** (0.004)	0.042*** (0.006)	0.042*** (0.006)	0.042*** (0.006)	0.042*** (0.006)	0.042*** (0.006)
Manufacture textiles	-0.006 (0.004)	0.003 (0.005)	0.003 (0.005)	0.003 (0.005)	0.003 (0.005)	0.003 (0.005)
Manufacture wood	-0.009 (0.005)	-0.005 (0.007)	-0.005 (0.007)	-0.005 (0.007)	-0.005 (0.007)	-0.005 (0.007)
Manufacture paper	0.015** (0.005)	0.023*** (0.006)	0.023*** (0.006)	0.023*** (0.006)	0.023*** (0.006)	0.023*** (0.006)
Manufacture chemicals	0.012* (0.006)	-0.001 (0.007)	-0.001 (0.007)	-0.001 (0.007)	-0.001 (0.007)	-0.001 (0.007)
Manufacture pharmaceutical	-0.007 (0.005)	0.000 (0.006)	0.000 (0.006)	0.000 (0.006)	0.000 (0.006)	0.000 (0.006)
Manufacture non-metallic	0.008 (0.004)	0.019** (0.006)	0.019** (0.006)	0.019** (0.006)	0.019** (0.006)	0.019** (0.006)
Manufacture metals	0.008** (0.003)	0.016*** (0.004)	0.016*** (0.004)	0.015*** (0.004)	0.015*** (0.004)	0.016*** (0.004)
Manufacture electronics	0.001 (0.004)	0.005 (0.005)	0.005 (0.005)	0.005 (0.005)	0.005 (0.005)	0.005 (0.005)
Manufacture machinery	-0.005 (0.003)	-0.001 (0.004)	-0.001 (0.004)	-0.001 (0.004)	-0.001 (0.004)	-0.001 (0.004)
Manufacture vehicles	-0.001 (0.007)	0.021* (0.010)	0.021* (0.010)	0.021* (0.010)	0.021* (0.010)	0.021* (0.010)
Manufacture transport equip.	0.004 (0.008)	-0.008 (0.010)	-0.008 (0.010)	-0.008 (0.010)	-0.008 (0.010)	-0.008 (0.010)
Manufacture furniture	-0.001 (0.006)	0.004 (0.008)	0.004 (0.008)	0.004 (0.008)	0.004 (0.008)	0.004 (0.008)
Other manufacturing	-0.014** (0.005)	-0.009 (0.007)	-0.009 (0.007)	-0.009 (0.007)	-0.009 (0.007)	-0.009 (0.007)
Electricity	0.001 (0.006)	-0.008 (0.007)	-0.008 (0.007)	-0.008 (0.007)	-0.009 (0.007)	-0.008 (0.007)
Water, sewerage, waste	0.048*** (0.005)	0.058*** (0.006)	0.058*** (0.006)	0.058*** (0.006)	0.058*** (0.006)	0.058*** (0.006)
Construction	0.104*** (0.004)	0.106*** (0.005)	0.106*** (0.005)	0.106*** (0.005)	0.107*** (0.005)	0.106*** (0.005)
Wholesale	-0.002 (0.003)	-0.001 (0.004)	-0.001 (0.004)	-0.001 (0.004)	-0.001 (0.004)	-0.001 (0.004)
Retail	-0.007* (0.003)	-0.005 (0.004)	-0.005 (0.004)	-0.005 (0.004)	-0.005 (0.004)	-0.005 (0.004)
Transportation & Storage	0.010** (0.004)	0.011* (0.005)	0.011* (0.005)	0.011* (0.005)	0.011* (0.005)	0.011* (0.005)
Accommodations, food services	0.066*** (0.004)	0.082*** (0.006)	0.082*** (0.006)	0.082*** (0.006)	0.082*** (0.006)	0.082*** (0.006)
Communication	0.019*** (0.004)	0.024*** (0.006)	0.024*** (0.006)	0.024*** (0.006)	0.024*** (0.006)	0.024*** (0.006)
Real estate	0.140*** (0.005)	0.161*** (0.006)	0.161*** (0.006)	0.161*** (0.006)	0.161*** (0.006)	0.161*** (0.006)
Professional activities	0.019*** (0.004)	0.020*** (0.005)	0.020*** (0.005)	0.020*** (0.005)	0.020*** (0.005)	0.020*** (0.005)
Administrative activities	0.009* (0.004)	0.006 (0.005)	0.006 (0.005)	0.006 (0.005)	0.007 (0.005)	0.006 (0.005)
Public administration	0.596*** (0.110)	0.762*** (0.112)	0.762*** (0.112)	0.762*** (0.112)	0.762*** (0.112)	0.762*** (0.112)
Education	0.031*** (0.009)	0.040** (0.012)	0.040** (0.012)	0.040** (0.012)	0.040** (0.012)	0.040** (0.012)
Human Health	0.029*** (0.004)	0.038*** (0.006)	0.038*** (0.006)	0.038*** (0.006)	0.038*** (0.006)	0.038*** (0.006)
Arts, Entertainment	0.022*** (0.005)	0.019** (0.007)	0.019** (0.007)	0.019** (0.007)	0.018** (0.007)	0.019** (0.007)
Other services	0.011 (0.006)	0.011 (0.008)	0.011 (0.008)	0.011 (0.008)	0.011 (0.008)	0.011 (0.008)
N. of observations	692,123	434,694	434,694	434,694	436,950	434,694

Note *, **, and *** denote p-values of 10, 5 and 1 percent. Robust standard errors in parenthesis.