Corruption and Organized Crime:

Growth Implications for Italy

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Abstract

This paper examines the impact of corruption on economic growth in the presence of organized criminal activities. Using a panel of 19 Italian regions for the period 1983-2009, the analysis reveals (i) a growth-inhibiting effect of both corruption and organized crime, and (ii) that in the presence of organized crime the growth-distorting effect of corruption is less severe. This finding offers support to the argument that with organized corruption arrangements and better coordination in the bureaucrat's rent-seeking behavior, corruption is less distorting for economic growth. The results are robust to different specifications, measures of organized crime, and estimation methods.

Keywords: Organized crime; corruption; economic growth

JEL Classification: C23; K49; O43

1. Introduction

It is well-accepted that criminal organizations typically involve the collusion or direct participation of the public sector in their illegitimate activities. In 1994, the United Nation's Naples Declaration officially recognized that organized crime (OC) has a "corrupting influence on fundamental social, economic, and political institutions", and that OC uses "violence, intimidation and corruption to earn profit or control territories or markets". More recently, a survey conducted by the Eurobarometer (2006), based on public perceptions of the links between corruption and OC, revealed that more than half of European citizens (54%) believe that most corruption in their countries is related to organized crime. It is not difficult, in fact, to realize that criminal systems strongly depend on, and encourage, corruption in order to carry out their activities and to reduce the risk of detection and prosecution. Given the vast literature that examines the links between corruption and economic growth (Lui, 1985; Shleifer and Vishny, 1993; Acemoglu, 1995; Knack and Keefer, 1995; Mauro, 1995; Sachs and Warner, 1997; Ehrlich and Lui, 1999; Svensson, 2005), it is sensible to wonder how the presence of OC may influence the relationship between corruption and growth. The current study aims to address this question by *jointly* considering the growth implications of these two illegal phenomena. This will allow establishing whether organized crime and corrupt activities complement or substitute each other in the growth process.

Since the mid-1990s, a large body of literature has shown that corruption has significant adverse effects on economic growth (e.g., Gyimah-Brempong, 2002; Keefer and Knack, 1997; Knack and Keefer, 1995; Li *et al.*, 2000; Mauro, 1995; Mo, 2001; Sachs and Warner, 1997)[1]. These and other investigations have also indicated a variety of ways through which corruption may affect growth, such as lowering investment rates (e.g., Mauro, 1995), reducing the flood of inward foreign direct investments (e.g. Wei, 2000; Pellegrini and Gerlagh, 2004), decreasing the effectiveness of foreign aid flows (IMF, 1995; World Bank, 1998) and determining misallocations of government expenditure (e.g., Mauro, 1998; Tanzi and Davoodi, 1997; Gupta et al., 2001).[2] Besides, it has been shown that corruption might determine a misallocation of talent and skills away from productive activities towards rent-seeking activities (Acemoglu, 1995; Ehrlich and Lui, 1999; Murphy *et al.*, 1991); may weaken the protection of property rights, create obstacles to doing business and obstruct

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[1] We refer to the most common definition of public sector corruption, which describes the phenomenon as the abuse of public office for personal gain. See Aidt (2003), Bardhan (1997) and Jain (2001) for surveys on the corruption literature.

[2] Del Monte and Papagni (2001) in their study of the effects of corruption on the economic growth of Italian regions have shown that corruption has a negative effect on growth both directly and indirectly by diminishing the productivity of public investment.

technological progress and transfer (see North, 1990; Hall and Jones, 1999; World Bank, 2002); might cause firms to expand slower, to implement inefficient technologies and to move their activities to the informal sector (see Sarte, 2000; Svensson, 2005); may lead to costly concealment and detection of illegal income, resulting in a deadweight loss of resources (see Blackburn *et al.*, 2006; Balckburn and Forgues Puccio, 2007); and even increase the government's reliance on seigniorage finance (Blackburn *et al.*, 2008).

It must be recognized, however, that the phenomenon seems to have different effects on different countries. In fact, some countries such as Vietnam, Indonesia, Thailand, and especially China have attracted very high floods of FDI and achieved very high growth rates in per capita income over relatively long time periods, in spite of rather high levels of corruption.[3] An early branch of the literature has tried to explain the beneficial effects of corruption with the so-called "speed-money" hypothesis, according to which the phenomenon can be positive to growth by helping to circumvent regulations in the bureaucratic process (e.g., Huntington, 1968; Leff, 1964; Lui, 1985). Shleifer and Vishny (1993), instead, have emphasized the importance of the extent to which public officials are organized in their extraction of bribes, since this may have an important influence on the consequences of bribes. The idea is that if bureaucrats are organized and act as a joint monopoly rather than independent monopolists in the collection of bribes, then they will try to maximize their total income, rather than the individual one, and will internalize any externalities. More recently, Blackburn and Forgues-Puccio (2009) followed this approach in the context of a dynamic general equilibrium model in which growth occurs endogenously through the invention and manufacture of new intermediate goods that serve as inputs in the production of final output. Inventive activity (research and development) is undertaken by entrepreneurs who require various licenses from public officials in order to embark on this activity. All bureaucrats are corrupt and each one of them exploits his monopoly over the issue of a license by demanding a bribe in exchange for a license. The authors study the implications of this when bureaucrats act either individualistically (disorganized corruption) or collectively (organized corruption). Given this, the study shows that bribe payments are lower, innovation activity is higher and growth is higher when corrupted behavior is organized compared to when it is disorganized. In this way the analysis shades light on the issue of why the effects of corruption on growth appear to be so different across countries.

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[3] Since the most prominent examples of countries with high-corruption and high-growth rates are to be found in South-East Asia, the anomaly has been called "East Asian" paradox. The term was introduced for the first time by Wedeman (2002), but also studied by Wei (1997) and Campos *et al.* (1999).

The argument just discussed seems to explain the experience of the newly East Asian industrialized economies better than the so called "speed-money" theory. In fact, for these countries it has been empirically found that corruption reduces investment by less and the correlation between corruption and investment is positive (e.g., Campos et al., 1999; Rock and Bonnet, 2004), thus being effectively characterized by centralized (organized) corruption networks. Interestingly, such networks are also a feature of some developed economies that have relatively high corruption ratings, such as Italy. An important aspect, often ignored by the literature on corruption, is that Italy is also characterized by the presence of organized crime.

Organized criminal practices have been known for distorting economic activity through a variety of channels. In particular, for the case of Italy, it has been found that OC (i) diminishes factor, especially labor, productivity (Felli and Tria, 2000 and Centorrino and Ofria, 2008), (ii) inhibits the accumulation of human capital both directly by reducing the incentive to invest in formal education and indirectly by increasing migration outflows (Coniglio *et al.*, 2010), (iii) increases public investment and reduces that from the private sector (Caruso, 2008), (iv) misallocates public subsidies by raising the grants received by firms located in municipalities with mafia activity (Barone and Narciso, 2011), (v) deters foreign investors (Daniele and Marani, 2010), (vi) increases the cost of local public services, especially those associated with the collection and disposal of waste material (Ciaccio, 2009), and (viii) reduces access to credit by increasing the cost of loans and the amount of collaterals required by banks (Bonaccorsi di Patti, 2009). A recent study by Pinotti (2011) investigates the all-inclusive economic costs of OC by focusing on the post-WWII economic growth performance of two southern-Italian regions (Basilicata and Puglia) that were exposed to mafia activity after the 1970s. By applying synthetic control methods to estimate their counterfactual economic performance in the absence of OC, he shows the presence of mafia to have lowered GDP per capita by about 16%.[4,5]

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[4] The author measures OC by the number of cases provided by Art.416-bis of the Italian Penal Code (mafia-type criminal organization) reported by the police to the judiciary authority.

[5] Kroska and Robeck (2006) represents one of the few cross-country analyses on the effects of OC on growth. The authors examine the impact of criminal organizations on the enterprise sector, using a panel data of 34 countries in Europe and Asia for the period 2002-05. The main result is that OC is associated with weak development of micro-enterprises in the service sector operating in large countries with high unemployment rates. The paper also underlines that the presence of OC represents a disincentive for FDI inflows and job creation, particularly in less advanced transition countries.

On top of the macroeconomic and growth implications of each of the two illegal phenomena discussed above, there exist a number of studies that solely focus on the links between corruption and OC. Most of these studies analyze the phenomena from a microeconomic point of view (e.g., Becker and Stigler, 1974; Bowles and Garoupa, 1997; Chang *et al*., 2000; Kugler *et al*., 2003) or from a sociological point of view (e.g., Shaw, 2002; Mazzitelli, 2007; Sergio and Querimi, 2007). The microeconomic literature on (various types of) crime has started to consider the problem of bribed officials since the preliminary work of Becker and Stigler (1974). The authors first recognized that the effectiveness of the enforcement system is reduced if the amount of bribes paid by the criminal to corrupted public enforcers is considerably less than the monetary equivalent of punishment to which the criminal would have incurred if convicted. Clearly this means that bribes have the potential to reduce punishment and therefore deterrence so that more corruption may lead to more crime, including OC. Following this result, the authors suggest improvements to the quality of enforcement by raising the salaries of enforcers.

Some sociological studies, instead, have underlined that the weakening and criminalization of the State is often a component of OC, with government actors also involved in criminal activities, as in the case of some African countries like Nigeria, Liberia, and Ghana. In this respect, Mazzitelli (2007) has explored the different factors that contribute to criminal activities in West Africa, emphasizing that the region is an ideal place for structured criminal networks since risks are reduced as a result of poor governance, i.e., weak state institutions, weak rule of law and enforcement agencies, which are common institutional determinants of corruption as well. In the same spirit, Sergio and Querimi (2007) study the relationship between corruption and socio-economic development, on the one hand, and OC and socio-economic development, on the other, in the context of South-Eastern Europe. The authors note that both corruption and organized crime are prevalent in the region, stressing that the key problem is a weak role of law (i.e., inefficient judicial systems and weak enforcement control). More interestingly, with respect to our study, Buscaglia and Van Dijk (2003) carried out a statistical analysis of a large sample of countries and found that high levels of corruption and OC are consistently linked to low levels of human development and that critical determinants of organized crime are the quality, independence and integrity of law institutions.[6] A further study by Van Dijk (2007) corroborated the interrelations between OC,

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[6] The authors constructed a composite index of OC which includes indicators of five core activities of OC (trafficking in persons, arms, stolen vehicles, cigarettes, and fraud) and four secondary factors (costs for businesses, extent of the informal economy as a proportion of GDP, violence, and money laundering).

law enforcement, rule of law and economic development. When OC is prevalent, law-making tend to serve the interests of few instead of the general interest, undermining market efficiency and public reliance in the legal and regulatory functions of the State.

The above studies illustrate that there exist rich literatures dealing with the links between corruption, OC, and economic growth with only *two* of them being examined at a time. One cannot, however, dismiss the link between OC and corruption when examining their growth implications. This has also been articulated recently by Transparency International which stressed the importance of better understanding the links between the two phenomena as a way of combating corruption (Holmes, 2010) and the way by which corruption may influence economic growth.

This paper contributes to the literature by jointly considering OC and corruption in an empirical investigation that focuses on the growth of Italian regions over the period 1983-2009. The main aim of our analysis is to examine the independent as well as the joint effects of corruption and of OC on economic growth. In this way, we test if the presence of OC influences the growth-impact of corruption. As largely discussed above, there is no doubt that there exists a link between the two phenomena, and it is reasonable to believe that in the presence of OC also corruption among bureaucrats may be organized. More specifically, we start from the hypothesis that criminal groups may play a significant role in organizing corruption. Therefore, in our study we also interact the measures of corruption and OC and interpret that term to proxy for the effect of *organized corruption* on economic growth.

The choice of carrying out our analysis at a cross-regional level for the case of Italy rather than at a cross-country level is mainly due to the availability of data on crimes ascribable to organized criminal groups. The Italian National Institute of Statistics (ISTAT), in fact, offers a variety of data on mafia-related crimes which are available for a rather long period; this has allowed us to construct a variety of indexes and to carry out our investigation for an adequate length of time. Given the lack of appropriate and reliable data on organized crime at an international level, such an analysis would have not been possible at a cross-country level.

Our findings, confirming past studies, show that corruption and OC have both a growth-inhibiting effect, but also that in the presence of OC the negative impact of corruption on growth is smaller in magnitude. The latter result seems to support the argument that when

corruption operates within an organized environment it is less distorting for growth (Blackburn and Forgues-Puccio, 2009). This may, then explain, why in Italy corruption is less harmful than in other countries. Then, the suggestion for policy makers when deciding new anti-corruption policies is that to better understand the nature of the phenomenon of corruption and not to ignore the possible links with other illegal phenomena present in the economy.

The remainder of the paper is structured as follows. Section 2 presents the estimation strategy and the methodology employed in our empirical analysis. Section 3 describes the data set in use. Section 4 reports the benchmark results, whereas Section 5 tests the baseline findings using different specifications and measures of organized crime. Section 6 concludes the paper with a summary and some final comments.

2. Estimation Strategy and Methodology

The aim of our investigation is to assess the effects of corruption and of OC on economic growth and test if, and how, the presence of OC influences the impact of corruption. In order to do so, we employ an empirical specification that conforms to these considerations. Our empirical setup is represented by

$$g_{i,t} = \alpha + \beta_1 Corr_{i,t} + \beta_2 (Corr_{i,t} * HighOC_{i,t}) + \sum_{j=1}^{m} \gamma_j X_{j,it} + \mu_i + \varepsilon_{i,t}, \qquad (1)$$

where the dependent variable $g_{i,t}$ is the growth rate of per capita real GDP of region i in period t; is a measure of corruption; $HighOC_{i,t}$ is a dummy variable that takes the value of 1 in regions where OC is more widespread; $Corr_{i,t} * HighOC_{i,t}$ is the interaction term between corruption and the high OC dummy variable; $\{X_{j,it}\}$ represents a set of explanatory variables typically included in growth regressions (see Barro, 1991; Levine and Renelt, 1992; Sachs and Warner, 1995); μ_i captures unobserved time-invariant region-specific effects; and $\varepsilon_{i,t}$ is the time-varying error term.

The set includes a baseline group of control variables comprising the log of initial real GDP per capita, the ratio of investment to GDP, the rate of inflation as measured by the GDP deflator, and the secondary school enrolment rates. In addition to these baseline variables, an extended group of controls includes the rate of population growth, the ratio of trade to GDP, and the share of total public spending to GDP.

Differently from the existing literature at a cross-country level, which relies on perception indexes of the phenomenon, our measure of corruption, $Corr_{i,t}$, is the official number of crimes against public administration per 100,000 inhabitants reported to the police and published by the Italian National Institute of Statistics (ISTAT).[7] The crimes against public administration that we consider are based on Statutes no. 286 through 294, which include crimes of peculation and embezzlement. Other crimes against public administration, such as insulting a public officer (Statute 279) and neglect or refusal of an official duty (Statute 295), are excluded. This measure has already been used by Del Monte and Papagni (2001, 2007) in empirical analyses for the case of Italy.[8] Since the index is not a measure of actual corruption crimes, but only of the crimes reported to the police, it might underestimate the phenomenon.[9] Thus, β_1 can be viewed as representing the lower bound of the effect of corruption.

In equation (1), we estimate the effect of corruption on the growth rate of GDP per capita by testing if this effect differs in regions with a high prevalence of OC. This is done by interacting the measure of corruption with $HighOC_{i,t}$. These regions have been chosen on the base of data on Mafia criminal association (as defined by art. 416 bis of the Italian penal code) for the period 1983-2009. The regions with the highest rates of this kind of crime are (in order): Sicily, Calabria, Campania, Puglia, Basilicata, Molise, Lazio, and Liguria.

When estimating equation (1), we expect a growth-inhibiting effect of corruption, as usually found in the existing literature, that is, $\beta_1 < 0$. Additionally, if *organized corruption* is less harmful than *disorganized corruption*, we expect the coefficient on the interaction term, β_2, to be positive and significant, meaning that the negative effect of corruption on the rate of GDP pc growth is mitigated in regions where there is a high presence of OC.

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[7] Official data on crimes against public administration are published by ISTAT since 1961 (ISTAT-Annals of Judicial Statistics). The most common measures of perceived corruption used in empirical cross-country analyses are: the Corruption Perception Index (CPI) published by Transparency International; the International Country Risk Guide index (ICRG); and the World Bank index calculated by Kaufmann *et al*. (2006).

[8] We thank Erasmo Papagni for kindly sharing the data for the years 1961-2001. Data from 2002-2005 can be found online at the ISTAT website. For the most recent data on corruption (2006-2009), we thank ISTAT officers for the collection and transmission of the data.

[9] Moreover, as pointed out by the authors, it could also be affected by a systematic bias due to differences among regions in reporting crimes. By regressing the statistics on reported crimes of corruption and an index of the length of the judicial processes, however, they did not find large systematic differences among regions in the proportion of reported and detected crimes to actual ones.

To better understand these preliminary findings, and to consider whether OC exhibits an independent effect on growth, we consider the following specification:

$$g_{i,t} = \alpha + \delta_1 Corr_{i,t} + \delta_2 OC_{i,t} + \delta_3 (Corr_{i,t} * OC_{i,t}) + \sum_{j=1}^{m} \gamma_j X_{j,it} + \mu_i + \varepsilon_{i,t}, \qquad (2)$$

where compared to equation (1) we drop the interaction term $Corr_{i,t} * HighOC_{i,t}$, and include a measure of organized crime ($OC_{i,t}$) and an interaction term between corruption and organized crime ($Corr_{i,t} * OC_{i,t}$). In this way, we are able to study the effects of the two phenomena independently of each other, but also jointly through their interaction.

If both corruption and OC distort economic growth, the coefficients δ_1 and δ_2 will both be negative and statistically significant. The term ($Corr_{i,t} * OC_{i,t}$) is the key element in our regression, being used to capture the effect of corruption on economic growth in the presence of OC. If the thesis we described under equation (1) were to hold so that the negative effect of corruption on the rate of growth is reduced in regions where there is prevalent OC, then the coefficient on the interaction term, δ_3, should come out positive and statistically significant. Since we interpret the multiplicative term as a proxy for the impact of organized corruption, our findings would suggest that organized corruption is less distortive than disorganized corruption.

Let us now turn to discuss the main measure of OC we use and the methodology we employ in order to estimate equations (1) and (2). Following the existing literature (Caruso, 2008; Daniele, 2009; Daniele and Marani, 2010; and Pinotti, 2011), we construct different indexes of OC by considering different combinations of "mafia-related" crimes, and use them alternatively through the analysis.[10] Our preferred measure of OC, however, is an index built as the sum of official data on five different crimes that by definition reflect the presence of criminal organizations, or that are indicative of the presence of criminal organizations (which we call OC Index 5).[11] The five crimes we consider are: (i) criminal association (art. 416

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[10] The term Mafia is used to include all the main criminal organizations that are present in the different Italian regions, such as Cosa Nostra in Sicily, Camorra in Campania, N'drangheta in Calabria, and Sacra Corona Unita in Puglia.

[11] In fact, even if it is not always possible to distinguish crimes committed by the Mafia or other criminal organizations, from those committed by other criminals, it is possible to recognize that some offences are not typical of Mafia-type groups, such as, for example, crimes of fraud, theft and sexual violence, as underlined by Daniele and Marani (2010) and La Spina and Lo Forte (2006).

Italian Penal Code), (ii) Mafia criminal association (art. 416 bis Italian Penal Code), (iii) homicides by Mafia, (iv) extortion, and (v) bomb attacks.[12]

Since 1982, the Italian judicial system makes a clear distinction between criminal association (art. 416) and criminal association of Mafia-type (art. 416 bis).[13] Common criminal association is defined as "*the association of three or more people who are organized in order to commit a plurality of crimes*". The characteristics of this kind of offence are the following: (i) the stability of the agreement among the components, i.e., the existence of an associative connection intended to be continuous through time even after once the crimes have been committed and (ii) the existence of a programme of delinquency to commit an indeterminate number of crimes.[14] On the other hand, an association is defined of the Mafia-type "*when its components use intimidation, awe and silence (omertà) in order to commit crimes, to acquire the control or the management of business activities (i.e., concessions, permissions, public contracts or other public services), to derive profit or advantages for themselves or others, to limit the freedom of exerting the right to vote, and to find votes for themselves or others during the electoral campaign*".[15]

In general, all judicial-based measures of crime are subject to under-reporting, as underlined by MacDonald (2002). This may be especially true for mafia-related crimes, as intimidation and silence (*omertà*) affect judicial investigations particularly in regions where criminal organizations are more influential. At the same time, however, under-reporting is smaller for crimes like homicides (Fajnzylber *et al.*, 2002 and Soares, 2004). This is why we include in our baseline index the number of homicides attributable to Cosa Nostra, Camorra, 'Ndrangheta and Sacra Corona Unita.

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[12] For all crimes we use rates per 100,000 inhabitants reported by the police to the judicial authority. These data are available by ISTAT, Annals of Judicial Statistics.

[13] Until 1982, Article 416 of the Italian Penal Code ("*associazione a delinquere*") punished in the same way all the groups of three or more people involved in some type of criminal activity. This generic term could not distinguish between small groups of bank-robbers and larger criminal networks with a powerful control over the territory. This changed in 1982 with the introduction of the crime: "*associazione a delinquere di stampo mafioso*" provided by Article 416 -bis(Law 646/82).

[14] This definition is similar to that given by the UN Convention against Transnational Organized Crime (2004) which describes organized crime as a "*...structured group of three or more persons existing for a period of time and acting in concert with the aim of committing one or more serious crimes or offences [...] in order to obtain, directly or indirectly, a financial or other material benefit*".

[15] The last two typical activities of the Mafia-type criminal organizations have been introduced by the Italian penal code only in 1992, in the framework of the measures adopted after the Capaci and Via D'Amelio's massacres (where the judges Giovanni Falcone and Paolo Borsellino were killed). Besides, art. 416 bis provides the confiscation of mafia's properties, and the application of this law also in the hypothesis of camorra, 'ndrangheta or other associations ascribable to those of mafia-type, that are in any case locally denominated.

Another usual crime of the Mafia-type organizations, which we incorporate in our baseline measure of OC, is extortion. "The *pizzo* is confirmed to be the typical offence of criminal organizations, being used to financially maintain the criminals' families, the clans, to ensure wages to co-operators, to support prisoners, and to pay the lawyers.[16] The *pizzo* ensures the everyday activity of criminal organizations, it increases its domain, it confers more prestige to the clans, and measures the rate of silence (*omertà*) in a given area, headquarter, or community" (Confesercenti, 2009, p. 14).[17] In fact, it has been largely documented by the existing literature that almost all the Mafia families exercise their power over a territory through the racket of extortion.[18] Also in this case, however, official data often underestimate the phenomenon, since the crimes formally reported to the police are less than those actually committed. This has been regularly pointed out by Confesercenti (2009), according to which in the year 2009 a total of 160,000 commercial activities mainly based in Sicily, Campania, Puglia and Calabria have been subject to extortion, with total revenues estimated to be close to nine billions of Euros.[19]

Since we have good reasons to believe that official data may underestimate the effective extent of extortion, we include in our OC index another crime which is symptomatic of the presence of the phenomenon: bomb attacks. Most of the times, in fact, bomb attacks are used to threaten and intimidate businessmen who refuse to pay extortion, or politicians who refuse to collaborate. These offences, however, differently from those of extortion, cannot be hidden by the victims, so that they contribute to better capture the intensity of the phenomenon of extortion and of Mafia-type criminal organizations in general.

As mentioned earlier, the sum of these five mafia-related crimes composes our baseline OC proxy (OC Index 5). Nevertheless, as better explained later in the paper, in order to test the

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[16] "*Pizzo*" is the Italian word to indicate the "black tax" imposed by the Mafia to entrepreneurs subject to extortion.

[17] "Confesercenti" is the Italian shopkeepers association.

[18] See, for example, Catanzaro (1991) and Gambetta (1993) with reference to *Cosa Nostra*, Ciconte (1992) for *'ndrangheta* and Monzini (1999) for *Camorra* (all cited in Daniele and Marani, 2010).

[19] More precisely, according to Confesercenti (2009) the percentage of shops subject to extortion by the Mafia-type organizations is as high as 80% in the cities of Catania and Palermo (Sicily), 70% in Reggio Calabria (Calabria), and 50% in Naples (Campania) and at the north of Bari and Foggia (Apulia). However, in the suburbs and hinterlands of these cities, the percentages are even higher and almost all the commercial activities are subject to extortion including shops, restaurants, construction companies, and others. The average value of the *pizzo* for small businesses in these geographic areas amount to 100-200 euros a month in Naples and 200-500 euros a month in Palermo. More elegant shops in the city centre pay almost 500-1000 euros in Naples and 750-1000 euros in Palermo. The average *pizzo* is even higher for supermarkets, which are forced to pay to the Mafia up to 3000 euros in Naples and up to 5000 euros a month in Palermo. Construction sites may pay up to 10,000 euros a month in Palermo. Asmundo and Lisciandra (2008) have estimated that in 2009 the annual total revenues from extortion were higher than 1 billion of euros in Sicily, which corresponds to more than 1.3 percent of the regional GDP.

robustness of our benchmark findings, we build a variety of other OC indexes which also include the crimes of arsons, "serious" robberies (i.e., robberies in bank and post offices), and kidnappings. Crimes of arsons are considered because, as well as crimes of bomb attacks, they are indicative of the presence of extortion and of a more general intimidating activity of criminal groups. Robberies in banks and post offices, instead, are included since they are often related to OC as they require a high degree of organization and the collaboration of a plurality of individuals.[20] Finally, the inclusion of crimes of kidnapping is due to the fact that "historical" Mafias have specialized through time in this kind of offence, as also recognized by previous studies (e.g., Ciconte, 1992; Pinotti, 2011).[21]

Our estimation methodology utilises dynamic panel techniques, difference-GMM and system-GMM, already used in the empirical growth literature by an increasing number of researchers (see Beck *et al*., 2000; Roodman 2007). These panel estimations seem to be the most appropriate since they are based on techniques that control for (i) potential endogeneity of the regressors, (ii) region-specific effects, and (iii) heteroskedasticity and autocorrelation within regions in models such as our growth regressions of equations (1) and (2). More specifically, in the difference-GMM estimation, developed by Arellano and Bond (1991), the endogenous variables are instrumented with lags of their levels. While the system-GMM estimation, developed by Arellano and Bover (1995) and Blundell and Bond (1998), accounts for possible endogeneity by treating the model as a system of equations in first-differences and in levels. The endogenous variables in the first-difference equation are instrumented with the lags of their levels, whilst the endogenous variables in the level equation are instrumented with the lags of their first differences. An advantage of these GMM estimators is that they avoid a full specification of the serial correlation and heteroskedasticity properties of the error, or any other distributional assumption.

A difficulty associated with the two dynamic GMM estimators relates to the choice of the number of lags of the endogenous and predetermined variables. In order to restrict the number of instruments not to exceed by far the number of regions, and thus avoid over fitting of the instrumented variables, we use a lag structure of two to four lags for difference-GMM and two to three for system-GMM. In each case we have to collapse the instrument set.[22]

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[20] As we will see later, "serious" robberies are also included in the OC index proposed by ISTAT.

[21] According to Ciconte (1992), among 620 kidnapping cases that have been registered in Italy in the period 1969-1989, approximately 200 can be attributed to 'Ndrangheta (even from those committed in North Italy) and only 8, of more than 400 billions lire that have been paid for kidnapping for extortion, have been intercepted.

[22] The *collapse* sub option of gmmstyle specifies that the Stata command xtabond2 should create one instrument for each variable and lag distance, rather than one for each time period, variable, and lag distance. In large

In both the system- and difference-GMM estimations, we test the validity of the instruments by applying two specification tests. The first is the Hansen (1982) *J*-test of over-identifying restrictions which we use to examine the coherency of the instruments. The second is the Arellano and Bond (1991) test for serial correlation of the disturbances up to second order. This test is important since the presence of serial correlation can cause a bias to both the estimated coefficients and standard errors. The appropriate check relates only to the absence of second-order serial correlation since first-differencing induces first order serial correlation in the transformed errors.

3. Data

We use a panel of 19 Italian regions for the period 1983-2009.[23] Depending on the index of OC we use, however, the period considered in our estimations differs, due to data availability. For instance, data on homicides by Mafia, criminal association (art. 416), extortion, arsons, and robberies in banks and post offices are available from 1975, while those on Mafia criminal association (art. 416 bis) and bomb attacks are available only since 1983.[24] Table A in the Data Appendix provides definitions, sources and the exact period availability of the data, while Table 1 presents some summary statistics.

Following the standard approach, we construct 7 non-overlapping 4-year period averages (1983-86, 1987-90, ..., 2007-09) in order to minimize business cycles effects. This implies a maximum sample size of 133 observations when we use our baseline measure of organized crime (OC Index 5), though sometimes we end up working with an unbalanced panel of 114 observations due to missing data.[25]

An initial assessment of the relationship between corruption and economic growth is given in the first cross-region scatter plot in Figure 1 in the Data Appendix. This shows a negative correlation between the two variables, with a correlation coefficient of -0.53 and significant

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samples, collapse reduces statistical efficiency; but in small samples, it can avoid the bias that arises as the number of instruments climbs toward the number of observations (Roodman, 2006).

[23] We exclude Valle d'Aosta, since it is the smallest and richest region and is usually excluded in the empirical analysis of Italian regions, being treated as an outlier.

[24] As mentioned earlier, the crime of "Mafia criminal association" (art. 416 bis) has been introduced in the Italian Penal Code only in 1983. Data on the sum of robberies in banks and post offices, kidnapping for extortion, and extortion, instead, are available since 1961 from CRENOS.

[25] When we use the measure of OC available since 1961, we construct 13 non-overlapping 4-year period averages (1961-64, 1965-68, ..., 2008-2009) and the maximum sample size is 247, though we end up working with an unbalanced panel of 171 because of missing data.

at the 1 percent level. The other graphs in Figure 1 display cross-region scatter plots of growth against three alternative measures of organized crime (i.e., extortions, arsons, and OC Index 5). All of the scatter plots show a negative relationship between organized crime and growth, with the correlation coefficient ranging between -0.18 and -0.35 and always significant at the 1 percent level. Given this visual support, we are encouraged to pursue a more formal analysis of the importance of these variables in influencing growth, both independently of each other and jointly trough their interaction.

Table B in the Data Appendix reports the correlation matrix of alternative measures of OC, showing that they are highly and significantly correlated. For instance, the correlation between our baseline measure of organized crime (OC Index 5) and the index used by Daniele and Marani (2010) is equal to 0.841, while correlation with the ISTAT index is equal to 0.596. The table also shows the correlation matrix between the different Mafia-related crimes that define OC Index 5. It is shown that all these crimes are strongly and positively correlated to each other.

4. Baseline Results

We begin our analysis by estimating equation (1) first with fixed effects, in order to account for region-specific effects, and then with difference- and system-GMM to also account for the potential endogeneity of all of the right-hand-side variables. The results are reported in Table 2. They illustrate the typical findings of growth regressions: there is conditional income convergence, a positive statistically significant effect of investment, and a negative statistically significant effect of inflation.[26] As already found in the empirical growth literature, both at the cross-country level (Benhabib and Spiegel, 1994) and for the case of Italy (Di Liberto, 2008), the coefficient on education is found to be statistically insignificant or even negative. This result may be due to the specific measure of education we use to proxy for human capital (secondary school enrolment rates) or due to the distorted structural composition of the Italian labor force and the inefficient allocation of human capital across sectors. The last column, which considers the extended regression, also shows the significant effects of trade and public spending, the former positive and the latter negative. These findings have been established by several empirical studies using cross-national data sets (Landau, 1983; Kormendi and Meguire, 1985; Barro, 1991) and Italian data (Auteri and Costantini, 2003). The coefficient on population growth, instead, is not found to be

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[26] Note that income convergence takes shape only when we control for fixed effects.

statistically significant, contrary to findings in existing empirical growth analyses, which predict a statistically significant negative effect (e.g., Barro, 1991).

With regard to the variables of interest, confirming past studies, we find an inhibiting effect of corruption on growth significant at least at the 5% level. More interestingly, the coefficient on the interaction term, β_2, is found to be positive and statistically significant (albeit at the 10% level for most regressions), suggesting that the negative effect of corruption on the rate of GDP per capita growth is smaller, or even positive, in regions where there is a high presence of OC. This finding lends support to the claims that the way by which corrupt activities influence economic growth may depend on the way these activities are organized.

With regard to instrumentation, when using GMM techniques (columns 2 to 4) we consider all the right-hand-side variables of equation (1) as potentially endogenous. Therefore, the small number of Italian regions constrains us in reducing the maximum number of lags to five for difference-GMM and to three and two for system-GMM, in order to maintain the number of instruments at a minimum. For the same reason, we also collapse the instrument set. Despite this tight restriction, in each case the instruments appear to be valid by the Hansen (1982) specification test, while, at the same time, the Arellano and Bond (1991) test does not reject the null hypothesis of no second-order serial correlation, at any acceptable level of significance.

To better understand these preliminary findings, we next estimate equation (2) with difference- and system-GMM using the baseline set of controls and a variety of organized crime measures. Our findings are presented in Table 3. Panel A shows the results based on difference-GMM, while Panel B reports those based on system-GMM. Each of the five columns shows the outcome obtained using a different measure of organized crime. Column (1) reports results found by using the simplest index of organized crime, Mafia criminal association (number of crimes per 100,000 inhabitants). The following columns refer to indexes constructed by adding, each at a time, to the first index the following types of OC: homicides by Mafia, criminal association, bomb attacks, and extortion. The index used in the last column is the most complete measure and represents our baseline index of organized crime (OC Index 5).

The effects of the controls included in vector confirm the findings reported in Table 2. We can also see that our main conjecture is strongly supported in each case. The coefficients on corruption and organized crime are negative and statistically significant in all the regressions at the 1% level in most cases, while the coefficient on the interaction term *Corruption*OC* is always positive and statistically significant almost always at the 1% level. Thus, both types of illegal activities have a growth inhibiting effect, with the impact of corruption on growth being less severe in the presence of criminal organizations, as suggested by the coefficient on the interaction term. This result points, once again, to the importance of considering the organizational structure of corrupt activities in order to better assess their impact on growth. Our findings are qualitatively very strong. Nevertheless, as we would expect, the magnitude of the three coefficients of interest varies depending on the measure of organized crime considered. Finally, in each case, the diagnostic tests support the validity of the instruments.

5. Robustness Checks

Having found strong support for our thesis so far, this section tests the robustness of our baseline results under various modifications. These include the consideration of different regression specifications and the use of alternative measures of organized crime.

5.1 Robustness to Different Specifications

As previously discussed, a difficulty associated with the dynamic GMM estimators relates to the choice of the number of lags of the endogenous variables that are used as instruments. All our previous system-GMM results have been obtained by using a length of two to three lags and by collapsing the instruments in order to limit their number. As a robustness test, we reduce the length of the maximum lags to two so that we only use the second lagged value of a variable as its instrument. The results are shown in column (2) of Table 4, while column (1) reproduces column (5) of Panel B in Table 3 for comparison purposes. As can be seen, our findings remain intact.

We further check the robustness of our baseline findings by adding (one at a time) more control variables usually found in growth regressions: the rate of population growth, the share of total public spending to GDP, the ratio of trade to GDP, and a measure of financial development. The results are reported in columns (3) to (6) of Table 4. Once again, our main results remain unaltered, with some of the additional regressors having the expected sign and being statistically significant (public spending and financial development).

In some Italian regions, OC is a more recent phenomenon (for instance Puglia, Basilicata, Lazio, Liguria, Molise). Thus, it is possible that our results may be driven by the variation of OC across time. In order to control for this variability, we estimate the regression by adding interaction terms of corruption, OC and decadal dummies.[27] Results are reported in column (7) of Table 4, and they show that decadal differences in OC do not seem to matter for growth. However, it is possible that our findings are driven by regional differences in OC experience. We account for such regional dissimilarities by adding interaction terms of corruption, OC and territorial dummy variables for regions where organized criminality is more widespread.[28] Results are reported in column (8) of Table 4. We observe that our main thesis continues to be strongly supported and once we account for the interaction of OC and corruption at the cross-regional level, the region-specific estimates are not statistically significant. In each regression of Table 4, the validity of the instruments is confirmed by the Hansen (1982) and Arellano and Bond (1991) tests.

5.2 Robustness to Alternative Measures of Organized Crime.

For the most part of the preceding analysis we have used OC Index 5 as our preferred measure of organized crime. The literature, however, has used different indexes to proxy for the presence of criminal organizations, and it is important to verify that our results can be established also with the use of these measures. For this reason, we construct additional indexes by considering different combinations of "mafia-related" crimes and use them in estimations of equation (2). The results are reported in Table 5. All these different indexes are highly and significantly correlated, as it can be seen from Table B in the Data Appendix. Thus, we do not expect their impact to differ from that of OC Index 5, a result confirmed by the findings.

Column (1) replicates column (5) of Table 3, Panel B for comparison. As discussed earlier, this baseline measure is built as the sum of official data recorded on five different crimes that by definition reflect the presence of criminal organizations or that are symptomatic of the presence of criminal organizations (i.e., criminal association, Mafia criminal association, homicides by Mafia, bomb attacks, and extortion). Column (2), instead, reports the outcomes

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[27] Since our baseline measure of OC is available for the period 1983-2009, we account for the two decades 1980s and 1990s, excluding the 2000s as to avoid the so-called "dummy trap".

[28] As before, the regions have been classified on the base of the data on Mafia-type criminal association (art. 416 bis of the Italian Penal Code) averaged for the period 1983-2009. The regions with the highest number of these crimes, in diminishing order, are: Sicily, Calabria, Campania, Puglia, Basilicata, Molise, Lazio, and Liguria.

by using an index that excludes from OC Index 5 the crimes of "criminal association" and "extortion" and includes "arsons". The crimes of arsons and bomb attacks are considered in order to proxy for the excluded extortions. It is, in fact, largely recognised that these offences are frequently used in order to intimidate businessmen unwilling to pay for extortion (see Confesercenti, 2009; Daniele and Marani, 2010).

The results reported in the following three columns have been obtained by using measures of OC which include all the crimes considered in OC Index 5 by adding one at a time crimes of arsons (Column 3), crimes of kidnapping for extortion (Column 4), and crimes of arsons and kidnapping for extortion (Column 5). The inclusion of crimes of kidnapping is due to the fact that "historical" Mafias have specialized through time in this kind of offence, as also recognized by Pinotti (2011).[29] The estimates in Column (6), instead, have been found by measuring OC with the Index proposed by Daniele and Marani (2010). This measure accounts for the Mafia-related crimes of extortion, bomb attacks, arsons, criminal association, and Mafia criminal association. Differently from our baseline index, then, this measure includes arsons and excludes homicides by Mafia. As expected, though, the two indexes are highly and significantly correlated (0.841).

Another measure of OC that has been used in the literature is that of Caruso (2008), who proposed the measure produced by the Italian National Institute of Statistics (ISTAT) and is available for the years 1995-2003, 2006, 2008-2010. Based on the definition of criminal organization given by the Italian Minister of Interiors, this index includes the crimes of homicides by Mafia, bomb attacks, arsons and "serious" robberies (such as robberies in banks and post offices). Column (7) shows the estimation results obtained by proxying OC with this index.[30]

The measures of OC we have used up to now include crimes for which data are available for the period 1983-2009. We now wish to test our results for a longer period of time. To do this, we construct an index of OC which may proxy for organized criminal activities in a less clear manner, but can go all the way back to 1961. This measure is built as the sum of crimes on

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[29] More precisely, Pinotti (2011) refers to crimes of kidnapping and not kidnapping for extortion. But also in that case, the author finds a significant positive correlation between the two different typologies of crimes (Mafia criminal association and kidnapping). At the same time, we consider crimes of kidnapping for extortion, and find a positive and significant correlation with mafia criminal association crimes (see Table B in Data Appendix).

[30] Rather than using directly the index given by ISTAT, we build an index as the sum of OC offences recommended by this institute. This is due to the fact that the original is available for a shorter period of time, as underlined before. Our measure, instead, is able to cover the period 1983-2009.

"serious" robberies (in banks and post offices), kidnapping for extortion, and extortion, all available from CRENoS. The results are shown in Colum (8). The crimes of "serious" robberies are considered, in contrast to other typologies of property crimes such as thefts and burglaries, as they are often related to OC given that they require a high degree of organization and the collaboration of a plurality of individuals. As illustrated in Table 5, in all cases, our main thesis continues to be strongly supported and does not seem to be affected by the specific measure adopted to proxy for OC.

All OC indexes considered thus far have been built as the *sum* of different Mafia-related crime rates. Next, we wish to test the robustness of our results by using measures of OC data that have been built with the use of the Principal Component Analysis (PCA) method. As is known, the PCA is a statistical technique used for data reduction. It is appropriate when we have data on a number of variables that are correlated with one another, possibly because they are measuring the same construct. Because of this redundancy it is possible to reduce the observed variables into a smaller number of "artificial" variables (called principal components) that will account for most of the variance in the observed variables.[31]

Table 6 shows the results obtained by estimating equation (2) with alternative measures of OC calculated using the PCA procedure. Column (1) reports the findings acquired by proxying OC with an index (Index 3) that uses crimes of mafia association, homicides by mafia, and criminal association. These crimes have been already considered in Colum (3) of Table 3, but in that case the measure has been built as the simple sum of the rates of the three different offences. The following two columns report the findings acquired by proxying OC with an index that includes the same crimes as Index 3 plus crimes of bomb attacks (Column 2) and crimes of bomb attacks and extortion (PCA of our baseline measure OC Index 5 in Column 3). The offences considered in Column (4), instead, are mafia association, homicides by mafia, bomb attacks, and arsons. The last column uses a measure of OC calculated following the PCA procedure to put together the offences suggested by ISTAT. In each case, our main finding continues to be in place.

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[31] More specifically, the leading eigenvectors from the eigen decomposition of the correlation or covariance matrix of the variables describe a series of uncorrelated linear combinations of the variables that contain most of the variance. The weights produced by these eigenvectors are optimal weights in the sense that for the given dataset, no other series of weights could produce a set of components that are more successful in accounting for the maximum variance in the dataset. The weights are created to satisfy a principle of least squares similar, but not equal, to that used in multiple regressions.

To summarise, our findings corroborate the thesis that corruption and organized crime have both a growth-inhibiting effect, but the negative impact of corruption is weaker in the presence of organized crime. This last result supports the hypothesis that with organized corruption arrangements and better coordination in the bureaucrats' rent-seeking behavior, corruption is less distorting for economic growth.

6. Concluding remarks

There exist a number of studies in the economics literature that focus on the links between corruption and growth, on the one hand, and organized crime and growth, on the other. There are even some analyses that examine the association between corruption and organized crime. But to the best of our knowledge, there are no studies jointly considering these two types of illegal phenomena in the context of a growth analysis. The investigation we have presented in this paper, then, is a contribution which aims to fill this gap.

Using dynamic panel model estimations for a data set of 19 Italian regions over the period 1983-2009, we illustrate that corruption and organized crime both have a negative effect on economic growth. Additionally, we find that in the presence of criminal organizations the diminishing impact of corruption on growth is less severe. This finding may explain why in Italy corruption is less harmful than in other countries and seems to support the argument that when the phenomenon has some specific form of organizational structure, it is less distorting for growth.

Finally, it is important to emphasize that our findings should not be viewed as giving a prescription in favour of organized criminal activities, but rather as a plausible explanation to the fact that corruption seems to have a less harmful effect in Italy compared to other countries. It then follows that a recommendation to policy makers, when deciding new anti-corruption policies, would be to better understand the nature of the phenomenon of corruption and not to ignore the possible links with other illegal phenomena present in the economy.

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Data Appendix

Figure 1
Organized Crime, Corruption and Economic Growth
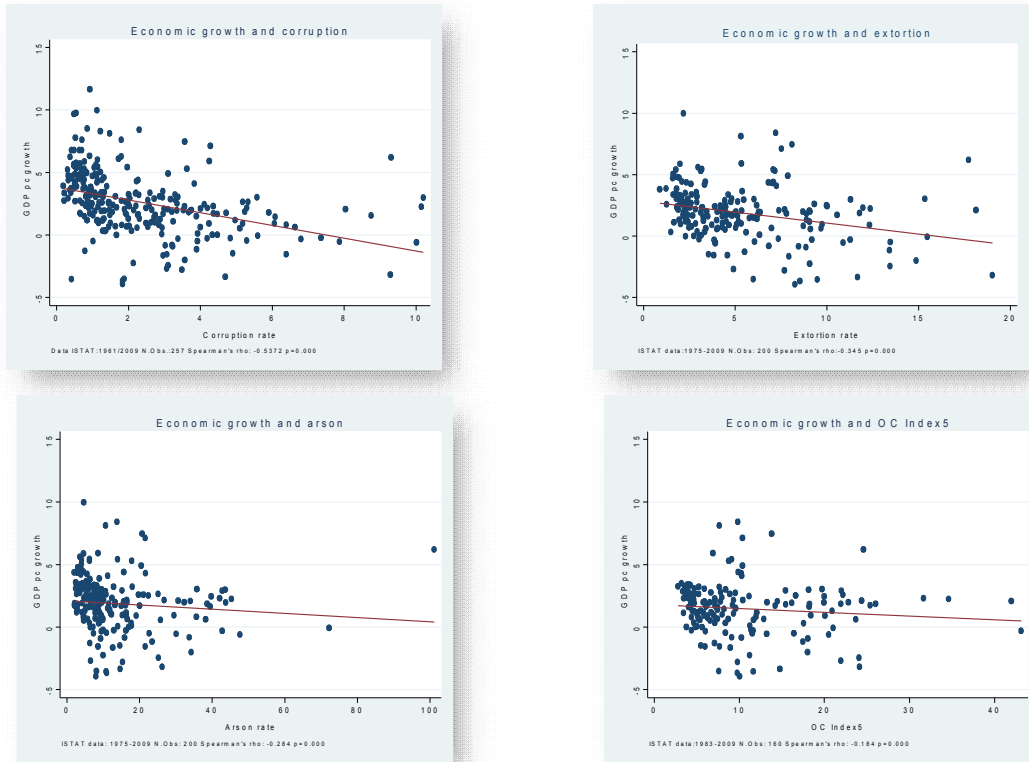
Notes: Economic growth is the GDP per capita growth rate (average 1961-2009). Corruption rate is the official number of crimes against Public Administration per 100,000 inhabitants published by the Italian National Institute of Statistics- ISTAT (average 1961-2009). Extortion rate is the number of extortions per 100,000 inhabitants reported by the police to the judicial authorities and published by ISTAT (average 1975-2009). Arson rate is the number of arsons per 100,000 inhabitants reported by the police to the judicial authorities and published by ISTAT (average 1975-2009). OC Index 5 is the sum of five mafia-related crimes: homicides by mafia, mafia association, criminal association, bomb attacks and extortion (ratios over 100,000 inhabitants, average 1983-2009). Source: ISTAT-Annals of Judicial Statistics.

Table A
Description of Variables and Sources

Table B Matrix Correlation of Organized Crimes

Spearman Alternative Crime Measures

Variables	Description	Sources
GDP growth pc	Log difference of GDP per capita in thousands of millions of lire *(constant prices 1990)*	ISTAT- Annals of Statistics and CRENoS-1961/2009
Initial GDP pc (log)	Log of initial GDP per capita in thousands of millions of lire *(constant prices 1990)*	ISTAT- Annals of Statistics and CRENoS -1961/2009
Investment	Share of gross private investment (as % of GDP)	ISTAT- Annals of Statistics and CRENoS -1961/2009
Education	Percentage of population in age range 14-18 registered in high school	ISTAT- Annals of Statistics and CRENoS -1961/2009
Inflation	GDP deflator	ISTAT- Annals of Statistics and CRENoS -1961/2009
Population growth	Population growth rate	ISTAT- Annals of Statistics -1961/2009
Public spending	Share of total public spending (as % of GDP)	ISTAT- Annals of Statistics -1961/2009
Trade	Share of trade (as % of GDP)	ISTAT- Annals of Statistics -1961/2009
Financial development	Share of value added of financial and banking sector (as % of GDP)	ISTAT- Annals of Statistics and CRENoS -1975/2009
Corruption	Number of crimes against Public Administration (PA) based on Statues no. 286 through 294. Excluding crimes against PA that do not involve corruption such as Statute 279 (insulting a public officer) and Statute 295 (neglect or refusal of an official duty) reported to the police, per 100,000 inhabitants. These crimes include embezzlement and misallocation of public funds.	ISTAT- Annals of Judicial Statistics -1961/2009
OC Index 5	Sum of the following crimes: Mafia criminal association, homicides by Mafia, criminal association, bomb attacks, extortion (per 100,000 inhabitants(	ISTAT- Annals of Judicial Statistics -1983/2009
Extortion	Number of crimes of extortion denounced (per 100,000 inhabitants)	ISTAT- Annals of Judicial Statistics -1975/2009
Criminal Association (art.416)	Number of crimes of criminal association (per 100,000 inhabitants) defined as: *"the association of three or more people who are organized in order to commit a plurality of crimes"*	ISTAT- Annals of Judicial Statistics -1975/2009
Mafia Criminal Association (art.416 bis)	Number of crimes of Mafia criminal association (per 100,000 inhabitants) defined as: *"the association is of the Mafia type when its components use intimidation, awe and silence in order to commit crimes, to acquire the control or the management of business activities (i.e., concessions, permissions, public contracts or other public services); to derive profit or advantages for themselves or others, to limit the freedom of exerting the right to vote, and to find votes for themselves or others during the electoral campaign."*	ISTAT- Annals of Judicial Statistics -1983/2009
Homicides by Mafia	Number of homicides by mafia (per 100,000 inhabitants)	ISTAT- Annals of Judicial Statistics -1975/2009
Bomb Attacks	Number of bomb attacks (per 100,000 inhabitants)	ISTAT- Annals of Judicial Statistics -1983/2009
Arsons	Number of arsons (per 100,000 inhabitants)	ISTAT- Annals of Judicial Statistics -1975/2009
Robberies in Banks	Number of robberies in banks (per 100,000 inhabitants)	ISTAT- Annals of Judicial Statistics -1975/2009
Robberies in Post Offices	Number of robberies in post offices (per 100,000 inhabitants)	ISTAT- Annals of Judicial Statistics -1975/2010
Kidnapping for extortion	Number of kidnapping for extortion (per 100,000 inhabitants)	ISTAT- Annals of Judicial Statistics -1975/2011
OC Index ISTAT	Sum of the following crimes: homicides by Mafia, bomb attacks, arsons, serious robberies (in banks and post offices) per 100,000 inhabitants	ISTAT- Annals of Judicial Statistics -1983/2009
OC Index CRENOS	Sum of the following crimes: extortion, kidnapping for extortion, serious robberies (in banks and post offices) per 100,000 inhabitants	ISTAT- Annals of Statistics and CRENoS - 1961/2009
OC Index	Sum of the following crimes: extortion, bomb attacks, arsons, criminal association,	ISTAT- Annals of Judicial

Correlation matrix (p-values in parentheses):

	Mafia criminal association	Criminal association	Homicides by Mafia	Bomb Attacks	Extortion	Arsons	OC Index 5	OC Index ISTAT	OC Index CRENOS	OC Daniele Marani	PCA OC Index 5
Mafia criminal association	1										
Criminal association	0.547 (0.000)	1									
Homicides by Mafia	0.587 (0.000)	0.515 (0.000)	1								
Bomb Attacks	0.423 (0.000)	0.379 (0.000)	0.405 (0.000)	1							
Extortion	0.253 (0.012)	0.472 (0.000)	0.515 (0.000)	0.450 (0.000)	1						
Arsons	0.121 (0.128)	0.062 (0.383)	0.205 (0.004)	0.2?? (0.000)	0.024 (0.000)	1					
OC Index 5	0.448 (0.000)	0.767 (0.000)	0.382 (0.000)	0.602 (0.000)	0.848 (0.000)	0.586	1				
OC Index ISTAT	0.207 (0.023)	0.071 (0.42)	0.341 (0.000)	0.444 (0.000)	0.573 (0.000)	0.931 (0.000)	0.596 (0.000)	1			
OC Index CRENOS	0.227 (0.025)	0.161	0.404	0.396 (0.000)	0.515 (0.000)	0.551 (0.000)	0.529 (0.000)	0.530 (0.001)			
OC Daniele Marani	0.288 (0.000)	0.339 (0.000)	0.319 (0.000)	0.477 (0.000)	0.771 (0.000)	0.912 (0.000)	0.841 (0.000)	0.414 (0.000)	0.306	1	
PCA OC Index 5	0.764 (0.000)	0.929 (0.000)	0.464 (0.000)	0.398 (0.000)	0.436 (0.000)	0.189 (0.080)	0.622		0.404 (0.000)		1

Table 1
Summary Statistics

Variable	Mean	Std Dev	Min	Max	Obs
GDP p.c. growth (%)	2.63	2.56	-3.95	11.63	257
Initial GDP p.c. (1990 lire)	18,900,000	8,068,528	4,165,179	39,000,000	257
Investment (% GDP)	24.81	6.68	15.81	71.55	240
Education	62.06	25.27	11.84	104.79	260
Inflation (%)	19.77	6.98	5.9	-4.52	260
Population growth (%)	4.06	3.67	0.12	16.01	257
Public spending (% GDP)	19.46	5.53	9.62	33.52	200
Trade (% GDP)	33.95	28.08	1.22	223.44	207
Financial development (% GDP)	20.03	3.33	12.29	27.54	140
Corruption	2.35	1.98	0.19	10.2	257
OC Index 5	10.67	7.41	2.78	43.12	160
Extortion	5.29	3.55	0.89	19.03	200
Criminal Association	1.85	0.96	0.44	6	200
Mafia Criminal Association	0.3	0.5	0	2.95	160
Homicides by Mafia	0.24	0.71	0	6.73	200
Bomb Attacks	2.37	4.28	0	24	160
Arsons	13.4	12.72	2.02	101.13	200
Robberies in Banks	2.34	1.68	0	7.38	160
Robberies in Posts	1.16	0.96	0	6.81	160
Kidnapping for extortion	0.24	0.2	0	1.11	200
OC Index ISTAT	20.51	15.53	4	76.61	120
OC Index CRENOS	38.93	40.6	3.19	295.12	200
OC Index Daniele and Marani	25.95	18.62	7.44	124.78	160
PCA OC Index 5	1.25	1.65	-1.48	8.2	160

Notes: Data on GDP per capita growth, investment, inflation, secondary school enrolment, trade, public spending, financial development and population growth are from CRENOS and the Italian National Institute of Statistics (ISTAT), Annals of Statistics (various years). For these variables, summary statistics are based on average data for the period 1961-2009. Data on crimes are from ISTAT, Annals of Judicial Statistics (various years). The period of time considered for the averages depends on the availability of data (see Table A in Data Appendix for a detailed description of the availability of data).

Table 2
Preliminary Findings

Dependent Variable: GDP pc growth	[1]	[2]	[3]	[4]
	FE	Diff-GMM	Sys-GMM	Sys-GMM extended
Initial GDP per capita (log)	-3.787	-1.056	0.906	0.162
	(0.000)	(0.000)	(0.124)	(0.875)
Inflation	-0.111	-0.137	-0.185	0.216
	(0.000)	(0.000)	(0.000)	(0.000)
Education	0.030	0.010	-0.022	0.032
	(0.092)	(0.130)	(0.021)	(0.250)
Investment	0.122	0.123	0.407	0.186
	(0.000)	(0.000)	(0.000)	(0.000)
Corruption	-0.395	-0.868	-0.183	-0.335
	(0.005)	(0.000)	(0.000)	(0.031)
Corruption*HighOC	0.232	0.438	0.236	0.546
	(0.084)	(0.098)	(0.084)	(0.007)
Population growth				0.082
				(0.276)
Trade				0.029
				(0.008)
Public spending				-0.134
				(0.016)
Regions/Obs	19/225	19/225	19/225	19/177
R²	0.529			
Number of instruments		24	19	19
Hansen *J*-test (*p*-value)		0.440	0.172	0.114
AR(1) test (*p*-value)		0.000	0.000	0.001
AR(2) test (*p*-value)		0.135	0.567	0.278
No. of lags of endogenous variables used as instruments		2_5	2_3	2_2

Notes: Dependent variable is the GDP per capita growth rate. *p*-values in parentheses. Constant term not reported. Regressions based on fixed effects (Column 1), difference-GMM (Column 2), system-GMM (Column 3), and system-GMM with additional control variables (Column 4). All control variables in difference- and system-GMM estimations are instrumented for. The term *Corruption*HighOC* is the interaction term between the measure of corruption and a dummy variable for the regions where the presence of OC is more widespread. These are: Sicily, Calabria, Campania, Puglia, Basilicata, Molise, Lazio and Liguria (classified on the base of data on Mafia criminal association, as defined by art. 416 bis of the Italian Penal Code).

Table 3

Benchmark Findings

Panel A: Diff-GMM	[1]	[2]	[3]	[4]	[5]
Initial GDP per capita (log)	-7.47	-6.29	-9.18	-8.87	-8.97
	(0.000)	*(0.031)*	*(0.000)*	*(0.000)*	*(0.000)*
Inflation	-0.369	-0.405	-0.482	-0.361	-0.422
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Education	-0.038	-0.052	-0.066	-0.020	-0.033
	(0.038)	*(0.054)*	*(0.003)*	*(0.223)*	*(0.046)*
Investment	0.284	0.248	0.372	0.147	0.255
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Corruption	-0.297	-0.256	-0.394	-0.472	-0.635
	(0.043)	*(0.043)*	*(0.007)*	*(0.000)*	*(0.000)*
Organized crime	-3.082	-0.786	-0.220	-0.262	-0.140
	(0.000)	*(0.000)*	*(0.015)*	*(0.000)*	*(0.000)*
Corruption*Organized crime	0.424	0.114	0.201	0.026	0.039
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Regions/Obs	19/114	19/114	19/114	19/114	19/114
Number of instruments	21	21	21	21	21
Hansen *J*-test (*p*-value)	0.338	0.256	0.258	0.256	0.239
AR(1) test (*p*-value)	0.005	0.003	0.004	0.003	0.002
AR(2) test (*p*-value)	0.717	0.341	0.442	0.933	0.900
No. of lags of endogenous variables used as instruments	2_4	2_4	2_4	2_4	2_4
Panel B: Sys-GMM					
Initial GDP per capita (log)	-1.60	-0.60	-1.20	-3.06	-1.73
	(0.059)	*(0.424)*	*(0.207)*	*(0.001)*	*(0.151)*
Inflation	-0.351	-0.386	-0.345	-0.322	-0.308
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Education	-0.079	-0.092	-0.080	-0.055	-0.053
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Investment	0.218	0.256	0.176	0.107	0.108
	(0.000)	*(0.000)*	*(0.001)*	*(0.006)*	*(0.007)*
Corruption	-0.206	-0.196	-0.749	-0.367	-0.795
	(0.000)	*(0.002)*	*(0.000)*	*(0.000)*	*(0.000)*
Organized crime	-2.045	-0.720	-0.521	-0.160	-0.126
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Corruption*Organized crime	0.316	0.143	0.210	0.017	0.039
	(0.000)	*(0.000)*	*(0.000)*	*(0.039)*	*(0.000)*
Regions/Obs	19/133	19/133	19/133	19/133	19/133
Number of instruments	22	22	22	22	22
Hansen *J*-test (*p*-value)	0.272	0.279	0.491	0.32	0.348
AR(1) test (*p*-value)	0.004	0.003	0.002	0.003	0.002
AR(2) test (*p*-value)	0.244	0.133	0.841	0.147	0.25
No. of lags of endogenous variables used as instruments	2_3	2_3	2_3	2_3	2_3

Notes: Dependent variable is the GDP per capita growth rate. *p*-values in parentheses. Constant term not reported. Regressions based on Difference-GMM (Panel A) and System-GMM (Panel B). All control variables are instrumented for. The measures of OC are as follows: Mafia crim. assoc. (Column 1); Mafia crim. assoc. + homicides by Mafia (Column 2); Mafia crim. assoc.+ homicides by Mafia + crim. assoc. (Column 3); Mafia crim. assoc.+ homicides by Mafia + crim. assoc. + bomb attacks (Column 4); OC Index 5: Mafia crim. assoc.+ homicides by Mafia + crim. assoc.+ bomb attacks+ extortion (Column 5).

Table 4
Robustness of Benchmark Findings

Dependent Variable: GDP pc growth	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]

Initial GDP per capita (log)	-1.73	-2.66	-0.65	-1.13	-2.33	-1.27	-0.96	-4.92
	(0.151)	(0.165)	(0.686)	(0.325)	(0.027)	(0.321)	(0.503)	(0.366)
Inflation	-0.308	-0.333	-0.311	-0.342	-0.364	-0.115	-0.331	-0.491
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Education	-0.053	-0.044	-0.039	-0.039	-0.042	-0.047	-0.053	-0.039
	(0.000)	(0.021)	(0.055)	(0.014)	(0.079)	(0.003)	(0.008)	(0.526)
Investment	0.108	0.219	0.239	0.268	0.214	-0.012	0.223	0.212
	(0.007)	(0.000)	(0.000)	(0.000)	(0.000)	(0.822)	(0.000)	(0.183)
Corruption	-0.795	-0.813	-0.848	-0.851	-0.812	-0.330	-0.796	-3.433
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.032)
Organized crime	-0.126	-0.102	-0.195	-0.167	-0.167	-0.148	-0.144	-0.779
	(0.000)	(0.018)	(0.040)	(0.000)	(0.000)	(0.001)	(0.001)	(0.039)
Corruption*Organized crime	0.039	0.036	0.051	0.054	0.051	0.020	0.045	0.250
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.020)	(0.000)	(0.054)
Population growth			0.31	0.16	0.159	0.261		
			(0.021)	(0.169)	(0.112)	(0.001)		
Public spending				-0.163	-0.164	0.050		
				(0.003)	(0.001)	(0.326)		
Trade					0.009	-0.016		
					(0.298)	(0.061)		
Financial development						0.164		
						(0.043)		
Corr*OC*1980s							0.019	
							(0.437)	
Corr*OC*1990s							0.000	
							(0.931)	
Corr*OC*Campania								-0.069
								(0.246)
Corr*OC*Calabria								-0.074
								(0.213)
Corr*OC*Sicilia								-0.073
								(0.169)
Corruption*OC*Puglia								0.019
								(0.926)
Corruption*OC*Basilicata								0.064
								(0.425)
Corruption*OC*Molise								-0.104
								(0.210)
Corruption*OC*Lazio								-0.255
								(0.401)
Corruption*OC*Liguria								0.246
								(0.191)
Regions/Obs	19/133	19/133	19/133	19/133	19/130	19/111	19/133	19/134
Number of instruments	22	15	17	19	21	23	18	31
Hansen *J*-test (*p*-value)	0.348	0.072	0.079	0.074	0.103	0.666	0.077	0.778
AR(1) test (*p*-value)	0.002	0.003	0.008	0.004	0.009	0.006	0.003	0.001
AR(2) test (*p*-value)	0.25	0.572	0.276	0.322	0.419	0.317	0.368	0.234
No. of lags of endogenous variables used as instruments	2_3	2_2	2_2	2_2	2_2	2_2	2_2	2_2

Notes: Dependent variable is the GDP per capita growth rate. *p*-values in parentheses. Constant term not reported. Regressions based on System-GMM. All control variables are instrumented for. OC measured by the baseline index, OC Index 5.

Table 5
Robustness to Alternative Measures of OC

Dependent Variable: GDP pc growth	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
	OC Index 5	MA+HM+BA+Ar	OC5+Ars.	OC5+KE	OC5+Ars+KE	Daniele and Marani	ISTAT Caruso	Index 1961-2009
Initial GDP per capita (log)	-1.73	-1.62	-2.66	-2.37	-1.92	-1.95	-1.98	-1.97
	(0.151)	(0.185)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.025)
Inflation	-0.308	-0.306	-0.316	-0.316	-0.324	-0.325	-0.257	-0.177
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education	-0.053	-0.053	-0.031	-0.036	-0.041	-0.042	-0.07	0.004
	(0.000)	(0.000)	(0.002)	(0.011)	(0.002)	(0.001)	(0.000)	(0.691)
Investment	0.108	0.106	0.048	0.097	0.083	0.090	0.056	0.204
	(0.007)	(0.009)	(0.424)	(0.008)	(0.104)	(0.057)	(0.215)	(0.000)
Corruption	-0.795	-0.809	-0.811	-0.761	-0.769	-0.752	-0.281	-0.551
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.057)	(0.000)
Organized crime	-0.126	-0.12	-0.076	-0.044	-0.045	-0.042	-0.04	-0.029
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.015)	(0.000)
Corruption*Organized crime	0.039	0.039	0.014	0.009	0.010	0.009	0.006	0.007
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.049)	(0.000)
Regions/Obs	19/133	19/133	19/133	19/133	19/133	19/133	19/114	19/171
Number of instruments	22	22	22	22	22	22	22	22
Hansen *J*-test (*p*-value)	0.348	0.347	0.280	0.284	0.246	0.257	0.548	0.360
AR(1) test (*p*-value)	0.002	0.002	0.002	0.002	0.002	0.002	0.008	0.000
AR(2) test (*p*-value)	0.250	0.262	0.470	0.506	0.505	0.513	0.087	0.203
No. of lags of endogenous variables used as instruments	2_3	2_3	2_3	2_3	2_3	2_3	2_3	2_3

Notes: Dependent variable is the GDP per capita growth rate. *p*-values in parentheses. Constant term not reported. Regressions based on system-GMM. All control variables are instrumented for. OC is measured as follows: OC Index 5 (Column 1); Mafia association+ homicides by Mafia + bomb attacks + arsons (Column 2); OC Index 5 + arsons (Column 3); OC Index 5 + kidnapping for extortion (Column 4); OC Index 5 + arsons + kidnapping for extortion (Column 5); OC index proposed by Daniele and Marani (2010): extortion + bomb attacks + arsons + criminal association + Mafia criminal association (Column 6); ISTAT OC index: homicides by Mafia + bomb attacks + arsons + "serious robberies" (Column 7); OC index which includes: "serious robberies" + kidnapping for extortion + extortion (Column 8).

Table 6
Robustness to Alternative PCA Indexes of OC

Dependent Variable: GDP pc growth	[1]	[2]	[3]	[4]	[5]
	Index 3	Index 4	Index 5	Index 6	ISTAT Index
Initial GDP pc (log)	-0.28	-0.82	-0.22	-1.67	-2.48
	(0.745)	(0.411)	(0.805)	(0.080)	(0.000)
Inflation	-0.35	-0.363	-0.349	-0.373	-0.255
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education	-0.083	-0.086	-0.083	-0.080	-0.060
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Investment	0.188	0.215	0.188	0.197	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.967)
Corruption	-0.225	-0.137	-0.197	-0.144	-0.279
	(0.000)	(0.002)	(0.002)	(0.079)	(0.000)
Organized crime	-0.609	-0.515	-0.463	-0.571	-0.765
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Corruption*Organized crime	0.268	0.138	0.174	0.105	0.112
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Regions/Obs	19/133	19/133	19/133	19/133	19/133
Number of instruments	22	22	22	22	22
Hansen *J*-test (*p*-value)	0.318	0.272	0.280	0.239	0.046
AR(1) test (*p*-value)	0.002	0.002	0.002	0.001	0.004
AR(2) test (*p*-value)	0.893	0.132	0.259	0.239	0.273
No. of lags of endogenous variables used as instruments	2_3	2_3	2_3	2_3	2_3

Notes: Dependent variable is the GDP per capita growth rate. *p*-values in parentheses. Constant term not reported. Regressions based on system-GMM. All control variables are instrumented for. Index 3: PCA of Mafia criminal association, homicides by Mafia, criminal association; Index 4: PCA of Mafia criminal association, homicides by Mafia, criminal association, bomb attacks; Index 5: PCA of crime variables in baseline measure OC Index 5; Index 6: PCA of Mafia criminal association, homicides by Mafia, bomb attacks, arsons; ISTAT Index: PCA of crime variables in ISTAT Index.