The macroeconomic impact of organized crime: a neo-Kaleckian perspective

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Abstract

The paper analyzes how organized crime affects the economy through its impact on the effective demand, following the Neo-Kaleckian approach. From this perspective, the presence of organized crime, on the one hand, tends to reduce the effective demand draining resources through extortion, bribery of public officials and encouraging consumption of criminal goods (illegal goods and goods produced in the underground economy), on the other hand, tends to increase the effective demand using the proceeds of criminal activity in the purchase of legal consumption and investment goods. The model highlights the opposing action of these two forces and identifies the conditions for a negative impact on the degree of capacity utilization and the growth rate. For the latter, these conditions tend to be more stringent, due to the direct impact of organized crime on investment decisions. Overall, the operation of organized crime tends to negatively influence the economic activity to the extent that the income drained from the legal sector is not reused into the same sector.

JEL classification: E12, E2, K4, O17.
Keywords: Neo-Kaleckian, macroeconomics, organized crime, illegal or illicit markets.

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1 Introduction.

The paper analyzes the macroeconomic impact of organized crime (OC) like the Camorra, Cosa Nostra[1], and 'Ndrangheta in Southern Italy, the Yakuza in Japan, and the Triade in China, on the economic system.

Our interest arises from the consideration that the presence of OC has a significant impact on the economic system. In fact, a recent report[2] by the Italian business trade group, Confesercenti, said that the Italian OC has reached such epidemic proportions in Italy that the four largest traditional (Italian-based) OC groups, the Camorra, Cosa Nostra, 'Ndrangheta and Sacra Corona Unita, now have larger cash reserves than any of the country's banks. OC groups currently rake in more than €120 billion each year. That is more than 7% of Italy's GDP. It is believed that OC groups have cash reserves of about €65 billion on hand, more than any legitimate Italian lender and they represent Italy's No.1 bank. Moreover, as a result of the financial crisis, the four largest OC groups have broken out of their traditional strongholds in the south and other local regions and are involved in almost every aspect of Italy's economy.

To avoid misunderstandings, it is best to start our analysis by clarifying that in this paper we will use the term *organized crime (OC)* to define a set of criminal organizations characterized by the following elements:

(i) they act in a defined geographical area where there is State vacuums;

(ii) they are involved in multiple legal and illegal activities;

(iii) they develop forms of coordination, characterized by long-run horizon and different types of hierarchical structures;

(iv) they use the violence or the threat of violence in order to achieve a local control and promote their business.[3]

The first characteristic is the local dimension of OC. In fact, OC replaces the State in the protection of property rights in regions where the institutions are weak or absent. This happens in contexts where the State is geographic,

[1] Cosa Nostra is the Sicilian Mafia, notorious also in some provinces as "Stidda". We prefer this term since American and Sicilian Mafiosi refer to their organization by the term "cosa nostra" *(Our Thing)*. The term Mafia can be applied to any criminal organization, as for example to the Russian Mafia or the Nigerian Mafia.

[2] Rapporto SOS Imprese (2011).

[3] For a broad and complete analysis of the evolution of the definition of "organized crime", from the "Alien Conspiracy" to the "Illegal Enterprise" paradigm, see Paoli (2002), in which OC is defined as "the planned violation of the law for profit or to acquire power, whose offences are each, or together, of a major significance and are carried out by more than two participants who cooperate within a division of labor for a long or undetermined time-span using commercial or commercial-like structures, violence or other means of intimidation or influence on politics, media, public administration, justice, and legitimate".

ethnic or social distant, where revolutions, wars or political changes create a power vacuum, or where the legal regulation of production and distribution of goods leaves room to illegal economic activities.[4]

The second characteristic is the multisectorial dimension of OC which is involved in illegal (production and distribution of illegal drugs, human traffic, counterfeiting of goods, etc.) and legal sectors where criminal revenues are laundered. OC typically penetrates in legal economy operating in traditional sectors, characterized by a small or medium size of firms, low levels of technology and human capital, a limited interregional (or international) competition, and a large presence of public sector.[5]

The third characteristic that qualifies OC is the fact that, in order to create and maintain monopoly power in the territory, OC needs a hierarchical structure that coordinates its activities. In addition, when we consider economic activities in illegal markets, OC differs from a set of ordinary illegal firms since OC groups create a highly integrated economic structure - both vertically and horizontally - that operates monopolies in various stages of the production and distribution of illegal commodities.[6]

The last key feature of OC is the use or threat of violence in order to achieve a local control and obtain economic advantages. Surprisingly this characteristic is not universally accepted in literature. In fact, some authors consider the endogenous emergence of OC and underestimate the role of violence. In particular, Gambetta (1993) argues that OC operates as a governance structure mostly addressed to the underworld so that its activities cannot be reduced to the supply of illegal goods. He suggests that there may be a voluntary demand for these services and denies the necessary coercive character of the relationships between OC and illegal firms, and affirms that its core business is the supply of trust, that is of a more stable institutional setting for illegal firms. In addition, according to the endogenous nature of OC group as part of long-run non-cooperative equilibria, Skaperdas (2001) proposes a model where OC groups are (local) suppliers of collective protection and, "providing protection when the state does not", their presence can be the efficient solution to satisfy producers demand of protection. From our point of view, even though we would consider a non-coercitive nature of some relationships between OC groups and legal firms, we could not deny that violence threat would be used at least for avoiding cheatings and/or against third-parties.

[4] Kumar and Skaperdas (2009).

[5] Fiorentini (2000).

[6] Traditionally, OC were mainly analyzed through the corporate model based on Weberian postulates (Cressey, 1972). This model tackles criminal organizations from several formal traits: centralized and organized hierarchy, clear division of labor, assignment of functions on the basis of personal ability and formal internal rules. More recently this model has been extended considering more flexible inner organization and the study of OC has taken a step forward with the social network analysis (SNA). This method constitutes an alternative way of looking into the criminal organizations by means of studying the social relationships within a network, as a form of organization in the midst of an organizational continuum from more hierarchical and complex organizations to a more horizontal and loosely connected group. See McIllman (1999), Morselli (2008) and Gimenez-Salinas Framis (2011).

In order to explain and evaluate the macroeconomic impact of OC we have to reject the idea that the action of OC is confined solely to illegal or underground markets, but it interacts with the private and public sectors of the legal economy, generating substantial income flows to and from the criminal sector. OC plays as new actor that gets in touch with all the subjects belonging to the legal sector and significantly modifies the directions and sizes of any income flow.

According to the most studies[7], the presence of criminal organizations in a given region negatively affects the efficiency of the economic system and tends to slow economic development. Even though there exists a broad academic and institutional literature on historical and sociological analysis, on empirical evidences of crimes and OC groups and on their social cost[8], fewer are the contributes that tried to estimate the economic impact of OC. Most of them applied a neoclassical supply-led approach for exploiting inefficient allocations of resources due to crimes while almost no one, with rare exceptions[9], tried to construct a demand-led theoretical model for describing and forecasting the macroeconomic impact of OC on economy. A remarkable example of supply-oriented analysis is represented by the recent work of Pinotti (2012); over a thirty-year period, the paper estimates that two southern Italian Regions, Apulia and Basilicata, experience a 16% drop in GDP per capita relative to other southern regions not significantly exposed to OC. One possible explanation for this result is the following. The advent of criminal organizations has favored a decline in private investments connected with an expansion of public investments, especially through corruption of public officials; therefore, the lower productivity of public capital is the main reason that explains the sluggish economic performance. From the perspective of the supply side, an inefficient allocation of resources or a reduction of marginal productivity are the key factors that justify a slowdown in economic growth in the presence of criminal organizations.

Our paper takes a different perspective and assumes that criminal organizations affect the economic system by inducing changes in the level of effective demand. As illustrated in Figure (1) the presence of OC dramatically changes the economic structure of a region. The paper assumes the following channels through which criminal organizations interact with the legal economy. First,

[7] The estimation of the economic cost of crime has become an important field of study in the last years. See Felli and Tria (2000) on the effects of OC on productivity in the private sector, Alleva and Arezzo (2004) that measured total costs of crime both in terms of lost production and in terms of lost jobs, Centorrino and Ofria (2008) on the relation between OC and productivity in a Kaldor-Verdoorn context; Peri (2004) and Buonanno et al. (2009) on the relation between social capital, level of crimes and long-term economic growth; Daniele and Marani (2008) on the negative impact of crimes on FDI, Detotto and Otranto (2010) on the short and long term effects of crime on economic growth; Levitt (2001) on the relation between unemployment and crimes; Daniele (2009) for a survey.

[8] Anderson (1999) considered that beyond the expenses of the legal system, victim losses, and crime-prevention agencies, the burden of crime includes the opportunity costs of victims', criminals', and prisoners' time, the fear of being victimized, and the cost of private deterrence. See Czabanski (2008) for a survey.

[9] See Reuter (1983) and (1985); Centorrino and Signorino (1993) and (1997).

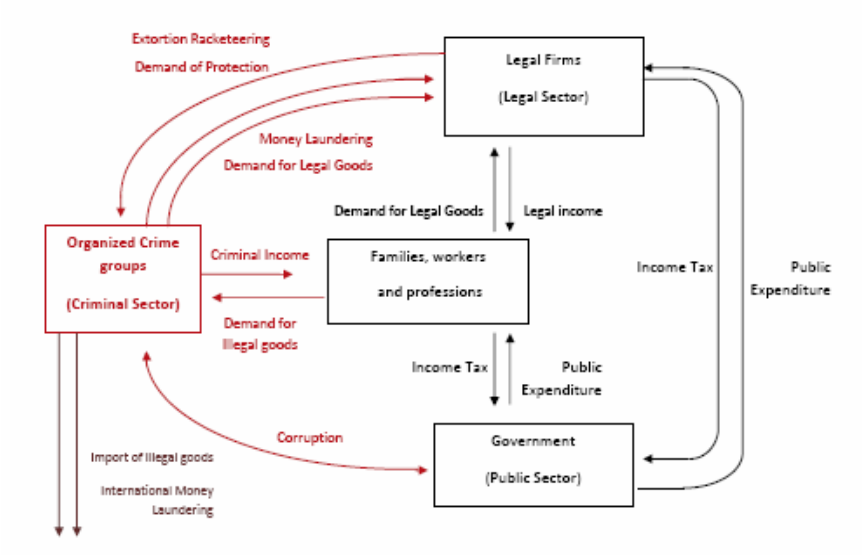

Figure 1: Monetary flows in an economic system where organized crime groups interact with public and private (legal) sectors.

by trading in criminal goods, extorting of money protection from firms, and corrupting of public officials, OC leads to income outflows from the legal sector of the economy; in fact, families can decide to consume criminal goods rather than legal ones, firms distribute lower revenues to families since they have to pay money protection to OC in the same way as they have to pay taxes to the government, the government reduces public expenditure since a share of tax revenues is diverted to OC. Second, by money laundering, OC leads to income inflows into the legal sector to the extent that criminal revenues are allocated to finance legal good consumptions and investments. Third, OC leads to income outflows from the economy, not only from the legal sector, when criminal revenues are employed to purchase legal or criminal goods outside the region or to create precautionary criminal income buffers.

In this light, Neo-Kaleckian models of growth and income distribution are suitable for analyzing how OC affects the operation of the economy through changes in the aggregate demand level; in fact, in these models, the level of the economic activity and the growth rate of capital stock are led by the trend of the effective demand, that is, by consumptions, investments, and public expenditures[10]. From this perspective, the presence of OC, on the one hand, tends to reduce the effective demand draining resources through extortion, bribery of

[10] Neo-Kaleckian models share with the post Keynesian tradition the principle of effective demand, they allow to study the role of income distribution in determining economic changes in accordance with its effects on demand side. For a review of Neo-Kaleckian models see Blecker (2002).

public officials and encouraging consumption of criminal assets (illegal goods and goods produced in the underground economy)[11], on the other hand, tends to increase the effective demand using the proceeds of criminal activity in the purchase of legal goods. The model highlights the opposing action of these two forces and identifies the conditions for a negative impact on the degree of capacity utilization and the growth rate. For the latter variable, these conditions tend to be more stringent seen the direct impact of crime on investment decisions. Overall, the operation of OC tends to negatively influence the economic activity to the extent that the proceeds drained from the legal income are not reused within the same sector.

The paper is organized as follows. In Section 2 we focus on typical crimes that identify and measure the economic presence of OC while in Section 3 we illustrate some empirical evidence on the operation of OC in Italian Provinces. In particular we construct two different indexes of the presence of OC that measure on the one hand its local control, CILP, and on the other hand its economic extent, CIEE. In Section 4, we introduce the model setting of our theoretical analysis where in Section 5 we stress our results in terms of the degree of capacity utilization and the growth rate. Conclusions are demanded to Section 6.

2 Economic dimension of Organized Crime: marker crimes and empirical evidences.

We identify different crimes through which OC affects the legal economy: the extortion racketeering, the underground or illegal trafficking, the corruption and the money laundering. From the perspective of criminal organization, the first three crimes are the key means by which the criminal income is generated, while the money laundering plays the strategic role of supporting the enlargement of OC groups on legal sectors. In the following we introduce some definitions and empirical evidences.

Extortion racketeering. Firms are subject to extortion racketeering and they must pay protection money if they want to operate in a given region. Extortion racketeering, where developed in a systemic form, is one of the most frequent means by which organized criminal groups infiltrate the legitimate economy[12]. According to Monzini (1993) the two main features of the phenomenon may be extortion-protection, which consists in taxation on a regular basis imposed by

[11] Criminal economy consists of underground and illegal economies. In fact, according to OECD (2002) definitions, underground economy consists of productive activities that are legal but are deliberately concealed from the public authorities to avoid payment of taxes or complying with regulations; instead, illegal economy consists of productive activities that generate goods and services forbidden by law or that are unlawful when carried out by unauthorized producers.

[12] As also remarked in Transcrime (2009), Konrad and Skaperdas (1998) describe extortion as the "defining activity of organized crime".

violent means; labour racketeering, which is violent negotiation for access to the labour market and employment. A third way, that can be defined as the long-run strategy, is represented by the so-called monopolistic racketeering, which is a specific market strategy aimed at the physical elimination of the competitors, or at the creation of monopolistic coalitions. A recent study on the perceived dimension of the phenomenon in Italy in 2008 says that 10.9% of businesses in Italy were worried about being victims of extortion, with a higher value (20%) for businesses located in the Southern Regions of the country (8.3% in the North). Moreover, independently of geographical position, the economic sectors most concerned about being victims of extortion racketeering were hotels and catering, and the commercial and retail sector. A recent report[13] by the Italian business trade group, Confesercenti, said that extortion racketeering represents a turnover for Italian OC groups of more that €21billion, about the 15% of its total turnover, second only to the revenues from illegal drug traffic.

Trafficking in illegal markets. Families may buy legal goods produced in the legal economy; but they may also buy goods produced in the underground and illegal economies, enriching criminal organization to the extent that they control these productions. Focusing only on illegal goods, as anticipated before, the revenues from drug traffics is the most important activity of OC in Italy with a turnover of about 60€billion while the Financial Action Task Force (FATF) of the Group of Seven leading industrial nations (G7) has recently estimated that the drugs business is the third biggest economy in the world today and that the annual value of the worldwide trade in illegal drugs ranges between 1200€billion to 4000€billion[14]. Drug trafficking[15] remains the most common form of transnational OC in the EU and the role of Italy is crucial since the country represents an important gateway for and consumer of Latin American cocaine and Southwest Asian heroin entering the European market.

Corruption. Also the Public Sector is directly and indirectly affected by the presence of OC groups. The government makes public expenditures financed through tax revenues; even if we do not consider that the presence of OC affects

[13] Rapporto SOS Imprese (2011).

[14] The independent, "Drugs trade 'the third largest economy' ", newspaper article, 16th may 2012, http://www.independent.co.uk/news/drugs-trade-the-third-largest-economy-1072489.html.

[15] When we consider drug trafficking (that is, illegal possession, cultivation, production, supplying, transportation, importing, exporting and financing of drugs operations) we mainly focus on illicit drugs like cocaine, heroin, synthetic drugs, cannabis resin (hashish) and herbal cannabis (marijuana). With respect to European Union Member States a study conducted by the commission in 2010 says that drug trafficking has generally been increasing steadily since 2002. This trend slowed over the period 2005 to 2008, with the total number of offences remaining fairly stable, but there were considerable variations between countries. Increases of about a half were observed in Sweden, Romania and Slovenia. Less marked, but still substantial, rises took place in Cyprus, Spain, Denmark, Greece and the United Kingdom (particularly in Northern Ireland).

legal sector income and tax revenue[16], only the corruption[17] of public officials may raise public good costs, redirecting public resources in favour of criminal organizations. Empirical evidence confirms that the phenomenon of corruption is deeply correlated with public expenditure. In particular, Del Monte and Papagni (2007) and Acconcia and Cantabene (2008) confirm the positive correlation between corruption and crime indexes and between corruption index and public expenditure in Italy in the last decades[18].

Money Laundering. Investing illegal or criminal income in the legal sector represents the main way for cleaning dirty money. The phenomenon called money laundering plays a relevant role in development strategies of OC groups. In fact, money represents the lifeblood of the organization that engages in criminal conduct for financial gain because it covers operating expenses, replenishes inventories, purchases the services of corrupt officials to escape detection and further the interests of the illegal enterprise, and pays for an extravagant lifestyle. To spend money in these ways, criminals must make the money they derived illegally appear legitimate. Moreover, a trail of money from an offense to criminals can become incriminating evidence. Criminals must obscure or hide the source of their wealth or alternatively disguise ownership or control to ensure that illicit proceeds are not used to prosecute them. According to Schneider (2009), the worldwide turnover generated by criminal operations reached a size of 1300 in 1998 to 2100US$billion in 2003 and, of course, are the object for money laundering processes. Some authors like Agarwal and Agarwal (2006) estimate even a higher figure, from 2000 to 2500US$billion in 2005, or Walker (2007), up to 3000US$billion.

[16] Moreover, Centorrino and Signorino (1997) affirm that the presence of OC causes a "fiscal gap" in tax revenues not only for the impact of criminal activities on legal income, but also for the increase of tax evasion when firms have to pay a criminal tax (racketeering) too.

[17] Spencer et al. (2006) describe corruption as "many kinds of irregular influence, the objective of which is to allow the participants to make profits they are not entitled to; the method being the breaking of internal or external rules". Notice that corruption has long been considered one of the defining characteristics of organized crime. As comprehensive reviews of organized crime definitions include corruption as a defining element (see Finckenauer 2005; Hagan 2006).

[18] Del Monte and Papagni (2007) investigate the determinants of corruption in Italy in the period 1963–2001 using statistics on crimes against the public administration at a regional level. Their estimates show that economic variables (government consumption, level of development) and political and cultural influences (party concentration, presence of voluntary organizations, absenteeism at national elections) significantly affect corruption in Italy. More recently, Acconcia and Cantabene (2008) test the hypothesis of strong correlation between corruption and public expenditure in Italy. Their analysis conclude that during the 1980s and the first half of the 1990s corruption in Italy, at least in part, fed on the huge amounts of public spending in social infrastructure, such as buildings, swamp and land reclamation, as well as public spending in social security; while, the perverse relationship between corruption and public spending collapsed just after the prosecutions and convictions related to Mani Pulite.

3 The presence of organized crime in Italy.

The statistical analysis of criminal organizations is by its nature very complex, since we are witnessing the overlap of two complementary dimensions, a social and an economic one. In this section, starting from official statistics on crimes reported, we try to measure the different intensity of the two components in the Italian Provinces.

We analyze the criminal statistics for Italy produced by the Italian National Institute of Statistics (ISTAT) on a provincial basis (NUTS 3 level administrative units), and we reconstruct the activities of criminal organizations by distinguishing between (i) offenses or crimes that are being made to obtain and maintain control of the territory *(the local power of OC)* and (ii) offenses and crimes that measure their presence in legal and illegal markets *(the economic extent of OC)*. These two dimensions, the first local and the second global, have suggested the use by some authors of the term *"glocal"* to indicate the geographical space of action of OC. This distinction arises from the will to separately measure what Block (1980) respectively called *"power syndicate"* and *"enterprise syndicate"* of criminal groups.[19]

Indeed, we build two composite indexes, which we call "composite index of local presence" (CILP) and "composite index of economic extent" (CIEE) of criminal organizations, starting from the data of offences and crimes reported by victims to the police[20]. These data are collected by ISTAT on a provincial basis and we compute for any selected crime the average number of offences reported in the period 2008-2010 on 10000 inhabitants[21]. Then, for any selected crime we compute the z-score on the theoretical normal-shaped national population. In this way we obtain ordinal and comparable crime-to-crime indexes. The next step is to construct the two composite indexes as the average z-score of all the crimes used to represent any single dimension of OC activities.

More precisely, in order to identify the composite index of local presence (CILP) of OC we considered the statistics of the following offenses: Mafia murders and attempted Mafia murders, Mafia-type criminal associations, extortions, damages, arsons and damages followed by arsons, bodily injuries, city councils (LAU 2 administrative units) dissolved for infiltration by OC, assets and firms confiscated from OC. All these crimes can be considered either as instrumental to rule and control the territory or as a manifestation of the same power of OC.

Regarding to the composite index of economic extent (CIEE) of OC, we considered the statistics of the following offenses: exploitation of prostitution, drug production and trafficking, theft and robbery, computer fraud, counterfeiting,

[19] For a deep analysis of the two aspects see Sciarrone (1998).

[20] We are aware that the data can be characterized by systematic bias, overestimating the presence of criminal organizations in those provinces where the victims were simply less afraid to report to and/or more confident in the police. However, we are also aware that there is not another source of data for Italy more detailed and less distorted.

[21] The data are available for the 103 provinces operating in 2008. The decision of focusing on a so short period of time (three years) is justify by the will to avoid structural breaks in the series due to political, legal, social or economic factors.

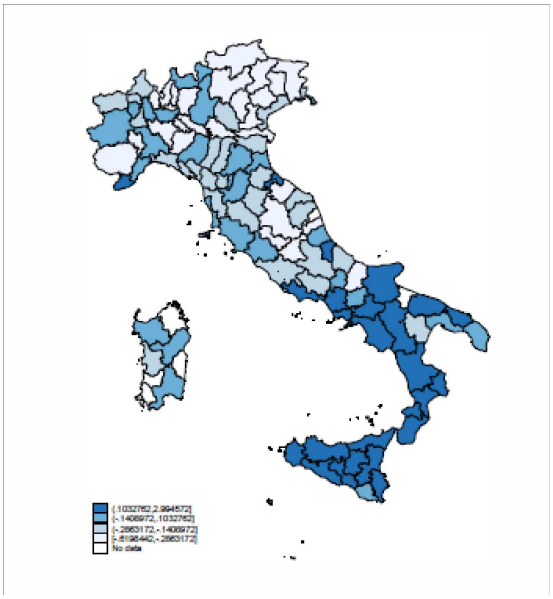

Figure 2: the composite index of local presence (CILP) of Organized Crime. Our elaboration on ISTAT data (2008-2010).

smuggling of goods, money laundering, usury and criminal associations. The listed crimes refer to economic activities of OC in legal and illegal markets.

In Figure *(2)* we find the per-quartile map of the composite index of local presence (CILP)[22]. As indicated by the darker color, with some exceptions such as Turin, Imperia or Latina, the index assumes higher value in the provinces of Southern Italy, where traditionally we measure the presence of criminal organizations.

Analogously, in Figure *(3)* we find the per-quartile map of the composite index of economic extent (CIEE)[23]. As indicated by the darker color, the index assumes higher value not only in the provinces of Southern Italy but also in the Center and in the North where a more prosperous economy incentives criminal organizations investments. Notice that rich provinces as Turin, Milan, Brescia, Genoa, Savona and Rimini belong to the last quartile (the most criminal one) of the CIEE distribution.

[22] In Appendix II, Figures *(5)* and *(6)* show in tables the values of the criminal statistics and the composite index of local presence (CILP) of OC for provinces.

[23] In Appendix II, in Figures *(7)* and *(8)* there are in tables the values of the z-score of the criminal statistics used and the composite index of economic extent (CIEE) of OC for provinces.

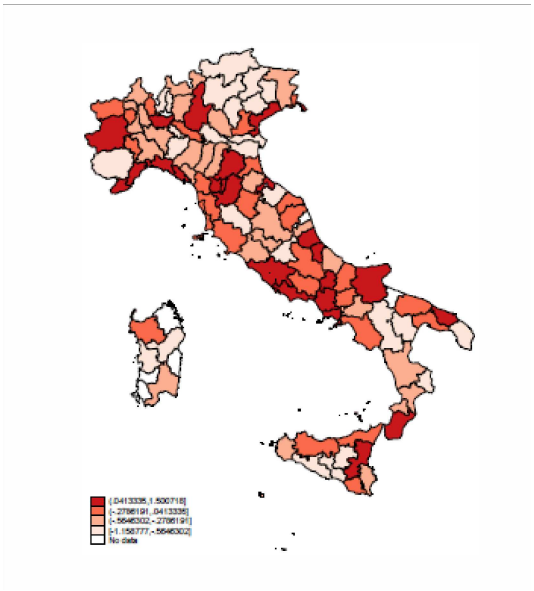

Figure 3: the composite index of economic extent (CIEE) of Organized Crime. Our elaboration on ISTAT data (2008-2010).

The two composite indexes, CILP and CIEE, represent two complementary aspects of the activities of criminal organizations. With reference to the scatter plot between the two indexes[24] in Figure *(4)*, we can try to classify Italian provinces in four groups or categories:

(a) provinces such as Treviso, Rovigo, Trento, Pordenone, Belluno, etc., mostly in northern Italy, where both indexes are characterized by relative low values (both negative);

(b) provinces such as Naples, Caserta, Reggio Calabria, Foggia, Brindisi, Catania, etc., in which both the indexes are relative high (both positive);

(c) provinces such as Milan, Venice, Rimini, Imperia, etc., which are characterized by low values of the CILP, but high values of the CIEE (the first negative or close to zero, the second positive);

(d) provinces such as Ragusa, Agrigento, Messina, Crotone, Enna, etc., where we face high values of the CILP together with low values of the CIEE (the first positive, the second negative or close to zero).

[24] Correlations between the two indexes for macroregions are presented in Appendix. Just watching the graph seems to be that different relations hold between the two indexes in the first quadrant (maybe a negative relation when both indexes are positive) and in the third one (maybe a positive relation when both index are negative). This aspect requires a deep analysis that surely will be part of a further development of our work.

Provinces belonging to category (a) are those with a negligible OC presence in their territory and characterized by a low risk of criminal infiltration in their economic system.

Provinces belonging to categories (b) and (d) are those with traditionally high OC presence. The former, relatively richer than the latter, face the entrepreneurial activities of OC in legal and illegal markets, while the latter are characterized by relatively underdeveloped economies in which criminal organizations do not have room for their investments.

Provinces belonging to category (c) are those with traditionally low or negligible OC presence. Nevertheless, criminal organizations are increasingly investing in these provinces where the richness of the local economy creates high demand of illegal markets. Historically we can say that criminal organizations in Italy are born in the provinces of categories (b) and (d) but have spread, recently and increasingly, in provinces of category (c).

Clearly, the explanation of the timing and causes of spread of criminal organizations, outside the territorial contexts where they were born, requires a more rigorous analysis, econometric type, which will surely be part of a future development of this work.

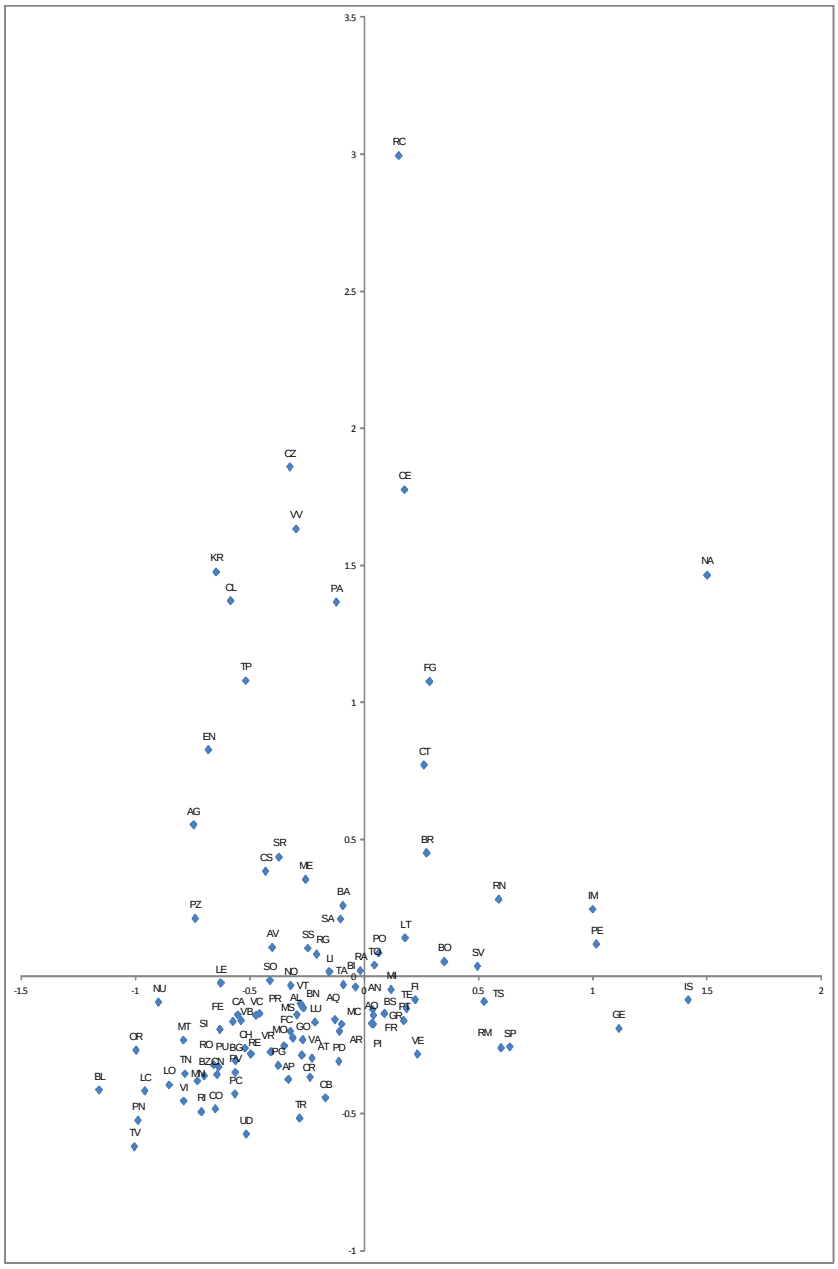

Figure 4: Scatter plot of CILP (on the Y-axis) and CIEE (on the X-axis). Our elaboration on ISTAT data (2008-2010).

4 The model.

The model analyzes how the operation of OC affects the economy through changes in the aggregate demand level; in particular, the focus is on crimes as extortion, trading in criminal goods, corruption of public officials, and money laundering, which are strictly connected with the social and economic dimensions of OC. The model describes an economy where a legal sector and a criminal sector interact. The legal sector produces the legal income (Y_l); in this sector families allocate their disposable income to savings or consumptions of legal and criminal goods, firms undertake investments, and the government provides public goods financed through tax revenues. The criminal sector, which is ruled by OC, produces the criminal income (Y_c); in this sector criminals extort money protection from firms, trading in criminal goods, corrupt public officials in order to obtain a share of tax revenues, and launder money in legal activities. Thus, the criminal income comes from extortion revenues, sale proceeds of criminal goods, and corruption revenues; moreover, criminals allocate their illegal income to savings or consumptions of criminal goods and, through the money laundering, to legal activities as consumptions or investments. Both the production and allocation of the illegal income affect the legal sector of the economy: the first determines legal income outflows, while the second determines legal income inflows. OC, on the one hand, supports an effective demand decrease through extortion revenues, consumptions of criminal goods made by families, and corruption revenues; on the other hand, it supports an effective demand increase through its legal consumptions and investments.

The legal sector of the economy produces only one legal good, which can be used as a consumption good, an investment good, or a public good. The model assumes that the legal income level is determined by the effective demand level, that is, it is equal to legal consumptions (C_l), legal investments (I_l), and public expenditures (G). Equation (1) describes the legal income determination:

$$
\begin{aligned}
Y_l &= C_l + I_l + G && (1)\\
C_l &= C_l^f + C_l^c = (1 - \alpha_e - \tau)\, c\, (1 - c_c)\, Y_l + \beta_l Y_c && (2)\\
I_l &= I_l^f + I_l^c && (3)\\
G &= \tau Y_l\, (1 - \alpha_c) && (4)
\end{aligned}
$$

Equation (2) defines C_l as legal good consumptions made by families $\left(C_l^f\right)$ and criminals, (C_l^c): C_l^f is a linear function of the legal income, net of extortion and tax payments, $(1 - \alpha_e - \tau)\, c\, (1 - c_c)\, Y_l$, where $c \in [0, 1]$ is the parameter denoting the propensity to consume legal and criminal goods out of the legal disposable income, and $c_c \in [0, 1]$ is the parameter denoting family preferences for criminal goods; C_l^c is a linear function of the criminal income, $\beta_l Y_c$, where $\beta_l \in [0, 1]$ is the parameter denoting the propensity to consume legal goods out of the criminal income. In equation (2), families choose the income share to save, and then they allocate their residual income to legal and criminal consumptions;

instead, criminals directly chooses the income share allocated to legal consumptions. As the seminal paper of Kaldor (1966) assumes different propensity to consume out of wages and profits, likewise this paper assume different propensity to consume out of legal and criminal income; the main reason for this is the money laundering role, this activity affects only the propensity to consume out of the criminal income, and not that one out of the legal income. Equation (3) defines I_l as legal investments made by firms $\left(I_l^f\right)$, and that one made by criminals (I_l^c). Equation (4) defines G as a linear function of tax revenues, $(1-\alpha_c)\,\tau Y_l$, where $\alpha_c \in [0,1]$ is the parameter denoting the tax revenue share distorted in favour of OC, and τ is the parameter denoting the tax rate; the government works with a balanced budget, but only a fraction of tax revenues becomes public expenditures because OC embezzles of a share of tax revenues through public official corruption, thereby 1 unit of tax revenues is necessary to provide $1-\alpha_c$ unit of public expenditures.

The criminal sector, which is ruled by OC, produces the criminal income through extortion, trading in criminal goods, and corruption; therefore, the criminal income consists of extortion revenues (ER), trading revenues (TR), and corruption revenues (CR). Equation (5) describes the criminal income production:

$$
\begin{aligned}
Y_c &= ER + TR + CR && (5)\\
ER &= \alpha_e Y_l && (6)\\
TR &= \alpha_t C_c = \alpha_t \left(C_c^f + C_c^c\right) = \alpha_t \left[\left(1-\alpha_e-\tau\right) cc_c Y_l + \beta_t Y_c\right] && (7)\\
CR &= \alpha_c \tau Y_l && (8)
\end{aligned}
$$

Equation (6) defines ER as a linear function of the legal income, $\alpha_e Y_l$, since the protection money is fixed as a given share of the legal income. Equation (7) shows that TR come from the sale of criminal goods, $\alpha_t C_c$, where C_c defines criminal good consumptions made by families, C_c^f, and criminals, C_c^c, while $\alpha_t \in [0,1]$ is the parameter denoting the profit margin obtained by marketing criminal goods; in fact, we assume that OC does not produce these goods, but it only retails criminal goods purchased abroad. C_c^f is a linear function of the legal income, net of extortion and tax payments, $\left(1-\alpha_e-\tau\right) cc_c Y_l$, and C_c^c is a linear function of the criminal income, $\beta_t Y_c$, where $\beta_t \in [0,1]$ is the parameter denoting the propensity to consume criminal goods out of the criminal income. Finally, equation (8) defines CR as a share of tax payments, $\alpha_c \tau Y_l$, obtained through the corruption of public officials.

Families can allocate their legal disposable income, that is, the legal income net of tax and extortion payments, to consumptions, both of legal or criminal goods, or to savings (S_f). Equations (9-10) describe the legal income allocation:

$$
\begin{aligned}
Y_l &= T + E + C_l^f + C_c^f + S_f && (9)\\
Y_l &= \tau Y_l + \alpha_e Y_l + \left(1-\alpha_e-\tau\right) cY_l + \left(1-\alpha_e-\tau\right)\left(1-c\right) Y_l && (10)
\end{aligned}
$$

OC can allocate its criminal income to legal and criminal good consumptions, legal investments, or savings (S_c). Equation (11-12) describe the criminal income allocation:

$$Y_c = (C_l^c + C_c^c + I_l^c) + S_c \tag{11}$$
$$Y_c = (\beta_l + \beta_t + \beta_h) Y_c + [1 - (\beta_l + \beta_t + \beta_h)] Y_c \tag{12}$$

S_c defines the share of the criminal income that does not come back neither into the legal sector of the economy through legal consumptions and investments nor into the criminal sector through criminal consumptions; note that the following condition holds: $1 > \beta_l + \beta_t + \beta_h$, where $\beta_h \in [0, 1]$ is the parameter denoting the propensity to invest out of the criminal income in legal activities, thereby OC always saves a positive share of the criminal income and an increase in β_l, β_t, and β_h decreases this share. OC savings consist of criminal income buffers held for precautionary purposes; in fact, the working life of criminals tend to be very short, as they may be arrested by police or killed by other criminals, so they try to protect their families by laying up these buffers. Moreover, launder money in the legal sector involves considerable risk because if the criminal income flows are identified criminals may be subject, in addition to the arrest, to the judicial attachment of their assets. As mentioned before, OC has a twofold dimension: one local and one global. The first is defined by the control of a given region, and it is closely related to crimes as extortion, corruption, and, to a lesser extent, trading in criminal goods and money laundering. The second is defined by investments in legal and illegal activities outside the ruled region, and it is closely related to crime as trading in criminal goods and money laundering. In general, the global dimension can imply criminal income outflows or inflows; in this paper, the focus is on the local dimension, thereby the global dimension only takes into account criminal good imports.

Equations (11-12) also allow to explain how we deal with money laundering within the model. Masciandaro (2007) defines money laundering as an activity whose economic function is to transform the criminal income into effective purchasing power. Given the perspective taken in this paper with the emphasis placed on the effective demand role, on the one hand, money laundering costs can only be criminal good consumptions or legal good consumptions and investments; on the other hand, the money laundered can only be allocated to legal consumptions and investments; in this light, the parameters β_l and β_h denote the criminal income share laundered into the region.

As normal in a Neo-Kaleckian framework, the model assumes a production function with fixed coefficients, the effective legal output is always less than the potential legal output obtainable by the existing capital stock. Inequality (13) describes the production function:

$$Y_l = \frac{Y_l}{L} L = a_l L \leq a_k K = \frac{Y_p}{K} K = Y_p \tag{13}$$

Where L defines the labour employment, K defines the capital stock, Y_p defines the potential output, a_l is the parameter denoting the reciprocal of the labour input coefficient, and a_k is the parameter denoting the reciprocal of the capital input coefficient.

4.1 The relationship between legal and criminal income.

OC draws the criminal income from extortion, trading in illegal or underground productions, and corruption; on this assumption, we come to the following statement.

Proposition 1 *The criminal income is a liner function of the legal income; in particular, the criminal income is a fixed share of the legal income. OC, to the extent that rules the criminal sector of the economy, draws a rent from the legal sector.*

Proof. *By algebraic manipulation of equation (5) presented in Appendix, it is possible to obtain the following result:*

$$\frac{Y_c}{Y_l} = \varepsilon = \frac{[\alpha_e + \alpha_t (1 - \alpha_e - \tau) cc_c + \alpha_c \tau]}{(1 - \alpha_t \beta_t)} \tag{14}$$

■

According to equation (14), the ratio between the criminal and legal income depends on the extortion rate, the profit margin on criminal good trade, the tax rate, the propensities to consume out of the legal and criminal income, and the tax revenue share distorted in favour of OC.

Corollary 2 *The ratio between the legal income and the criminal income is a positive function of the extortion rate, the profit margin on criminal good trade, the tax revenue share distorted in favour of OC, and the propensities to consume out of the legal and criminal income; while it can be positively or negatively related to the tax rate.*

Proof. *In Appendix.* ■

A change in α_e has twofold impact on the criminal income: on the one hand, it has a direct impact proportional to the legal income; on the other hand, it has an indirect impact proportional to criminal good consumptions made by families; the first effect is greater than the second and the net impact is amplified by the criminal income multiplier, $\left(\frac{1}{1-\alpha_t \beta_t}\right)$. A change in α_t modifies the criminal income multiplier, $\left(\frac{1}{1-\alpha_t \beta_t}\right)$, and raises the impact of criminal good consumptions made by families, $((1 - \alpha_e - \tau) cc_c)$, and criminals, $(\beta_t (\alpha_e + \alpha_c \tau))$. A change in α_c has an impact proportional to tax payments (τ). A change in β_t modifies the criminal income multiplier $\left(\frac{1}{1-\alpha_t \beta_t}\right)$, that is, it amplifies the impact of a given resource distortion from the legal sector

$\left(\alpha_t \left[\alpha_e + \alpha_t \left(1 - \alpha_e - \tau\right) c^l c_c^l + \alpha_c \tau\right]\right)$. A change in c or in c_c affects the criminal income by increase or decrease the criminal good consumption made by families $(\alpha_t \left(1 - \alpha_e - \tau\right) c_c or \alpha_t \left(1 - \alpha_e - \tau\right) c)$. Since corruption revenues are positively related to τ and criminal good consumptions made by families are inversely related to τ, the net impact of a change in this parameter depends on the balance (outweigh) of these two effect $(\alpha_c - \alpha_t c c_c)$.

5 The impact of OC on the degree of capacity utilization and the growth rate.

In order to analyze how OC affects the economic activity level and the growth process, we need to specify an investment function. With regard to investments undertaken by firms, we refer to the classical neo-Kaleckian investment function, with the investment demand in terms of capital stock that is positively related to the economic activity level. Equation (15) describes the investment function:

$$\frac{I_l^f}{K} = g_{i,l}^f = \gamma + \gamma_u u \tag{15}$$

Firms' investment decisions are a function of the ratio between the effective legal income and the potential legal income, that is, the degree of capacity utilization $\left(u = \frac{y_l}{y_p}\right)$, and γ_u is the parameter denoting the sensitivity of investment decisions to it; γ is the parameter denoting the impact of other factors not related to the economic activity level.

In the legal sector saving decisions are taken by families and investment decisions are taken by firms and OC; such decisions are brought into balance, whereby savings equal investments, through changes in the degree of capacity utilization. On these assumptions, we come to the following statement

Proposition 3 *The equilibrium solution for the degree of capacity utilization is affected by the behavior of families, firms, and the government; moreover, the degree of capacity utilization is also affected by the criminal income production and allocation, that is, by the behavior of OC.*

Proof. *By algebraic manipulation of Equations (1) and (9) that describe the legal income production and allocation, as presented in Appendix, we obtain*

$$u = \frac{\gamma}{\left[1 - \left(1 - \alpha_e - \tau\right) c \left(1 - c_c\right) - \left(\beta_l + \beta_h\right) \varepsilon - \tau \left(1 - \alpha_c\right)\right] a_k - \gamma_u} \tag{16}$$

■

Equation (16) confirms the classical result of the neo-Kaleckian model of growth: the degree of capacity utilization is a positive function of the demand level, which is supported by consumptions, investments, and public expenditures. OC, on the one hand, reduces the demand level through extortion, trading of criminal goods, and corruption of public officials; on the other hand, it

raises the demand level through the criminal income allocation to consumptions and investments; therefore, the net effect depends on the parameter values.

Corollary 4 *The degree of capacity utilization is positively related to* α_t, β_l, β_t, β_h, *and* c; *while the impact of* α_e, α_c, c_c, *and* τ *is uncertain.*
Proof. *In Appendix.* ■

In general, the impact of OC operation on the degree of capacity utilization tends to be negative when the criminal income allocation does not support (promote) the effective demand enough, that is, when β_l and β_h tend to zero. An increase in α_e and α_c negatively affect u to the extent that the increase in consumptions and investments made by OC (respectively, $(\beta_l + \beta_h)\frac{\partial \varepsilon}{\partial \alpha_e}$ and $(\beta_l + \beta_h)\frac{\partial \varepsilon}{\partial \alpha_c}$) does not offset the reduction in family consumption and government public expenditures (respectively, $c(1-c_c)$ and τ). An increase in α_t and β_t, has always a positive effect on u because of its impact on the criminal income multiplier. An increase in c_c has a positive effect on the u only if the decrease in the legal good consumption made by families, $(1-\alpha_e-\tau)c$, is offset by the increase in investments and consumptions made by OC, $(\beta_l + \beta_h)\frac{\partial \varepsilon}{\partial c_c}$. The impact of a change in the government size is more complex; an increase in τ positively affects u to the extent that the increase in public expenditures net of corruption revenues, $(1-\alpha_c)$, and that one in investments and consumptions made by OC, $(\beta_l + \beta_h)\frac{\partial \varepsilon}{\partial c_c}$, is greater than the reduction in consumptions made by families.

Proposition 5 *The equilibrium solution for the growth rate is a direct function of the degree of capacity utilization; OC affects the growth rate in two ways: indirectly, through its impact on the degree of capacity utilization and, directly, through its investment decisions.*
Proof. *By substituting the equilibrium solution for the degree of capacity utilization in equation (15) and taking into account also investments in terms of capital made by OC:*

$$\begin{aligned} g_i &= \frac{I_l^f}{K} + \frac{I_l^c}{K} = g_{i,l}^f + g_{i,l}^c = \gamma + \gamma_u u + \beta_h a_k \varepsilon u \\ g^* &= \gamma + (\gamma_u + \beta_h a_k \varepsilon) u^* \\ g^* &= \gamma + \frac{(\gamma_u + \beta_h a_k \varepsilon)\gamma}{[1-(1-\alpha_e-\tau)c(1-c_c)-(1-\alpha_c)\tau - \beta_l \varepsilon] a_k - \gamma_u} \end{aligned} \quad (17)$$

■

Equation (17) describes how the growth process is driven by the effective demand, that is, by the degree of capacity utilization.

Corollary 6 *As the degree of capacity utilization, the growth rate g^* is positively related to α_t, β_l, β_t, β_h, and c. The impact of α_e, α_c, c_c, and τ is uncertain, but the conditions that imply a positive effect are less constraining than those which refer to the degree of capacity utilization.*
Proof. *In Appendix.* ■

The previous corollary confirms the framework come out about the degree of capacity utilization. The parameters α_t, β_t, β_l, β_h, and c, all have a positive impact on the growth rate because they are positively related to the legal and criminal income; moreover, β_h strengthens these effects to the extent that it increases the share of the criminal income allocated to legal investments. The parameters c_c, τ, α_e, and α_c, negatively affect the growth rate only if the potential negative impact on the legal income, that is, on the degree of capacity utilization, offsets the positive impact on the criminal income, that is, on investments coming from the criminal income.

6 Conclusions.

The paper introduces a Neo-Kaleckian model for describing the macroeconomic impact of the presence of organized crime. The evaluations in terms of income level, capacity utilization and growth rate are not unambiguous since the presence of OC, on the one hand, tends to reduce the effective demand draining resources through extortion, bribery of public officials and encouraging consumption of criminal assets (illegal goods and goods produced in the underground economy), on the other hand, tends to increase the effective demand using the proceeds of criminal activity in the purchase of legal goods and investment goods. The model allows highlight the opposing action of these two forces and to identify the conditions for a negative impact on the utilization of productive capacity and growth rate. For the latter variable, these conditions tend to be more stringent seen the direct impact of crime on the rate of investment growth. Overall, the operation of organized crime tends to negatively influence the economic activity to the extent that the income drained from the legal sector is not reused into the same sector.

	ε	$u*$	$g*$
α_e	positive	positive/negative	positive/negative
α_t	positive	positive	positive
α_c	positive	positive/negative	positive/negative
β_t	positive	positive	positive
β_l	none	positive	positive
β_h	none	positive	positive
c	positive	positive	positive
c_c	positive	positive/negative	positive/negative
τ	positive/negative	positive/negative	positive/negative

According to the proposed theoretical model, as reported in the previous table, we can summarize our results as follows:

- The ratio between the legal income and the criminal income ε is a positive function of the extortion rate α_e, the profit margin on criminal good trade α_t, the tax revenue share distorted in favour of OC α_c, and the propensities to consume out of the legal and criminal income β_t; while it can be positively or negatively related to the tax rate τ.

- The degree of capacity utilization u^* is positively related to the profit margin on criminal good tradeα_t, the propensities to consume β_l, β_t and β_h, and c; while the impact of α_e, α_c, c_c, and τ is uncertain.

- The growth rate g^* is positively related to α_t, β_l, β_t, β_h, and c. The impact of α_e, α_c, c_c, and τ is uncertain, but the conditions implying a positive effect are less constraints than those which refer to the degree of capacity utilization.

From a theoretical point of view a further development of our analysis is represented by the elaboration of a two-region model where the operation of OC implies legal and criminal income flows across regions; in this case, the level of economic activity in both regions is affected by ties arising out of the interaction between the legal sectors of the economy. From an empirical point of view an interesting development is the elaboration of a statistical methodology in order to describe the main features of the operation of organized crime in a given region; in particular, this methodology should be based on the distinction the social and economic dimension of OC.

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Appendix I

Proof of Proposition 1. By algebraic manipulation of equation (5), it is possible to obtain the following result:

$$\begin{aligned}
Y_c &= (\alpha_e Y_l) + \{\alpha_t [(1-\alpha_e-\tau) cc_c Y_l + \beta_t Y_c]\} + (\alpha_c \tau Y_l) \\
Y_c &= \alpha_e Y_l + \alpha_t (1-\alpha_e-\tau) cc_c Y_l + \alpha_t \beta_t Y_c + \alpha_c \tau Y_l \\
Y_c - \alpha_t \beta_t Y_c &= \alpha_e Y_l + \alpha_t (1-\alpha_e-\tau) Y_l cc_c + \alpha_c \tau Y_l \\
Y_c (1-\alpha_t \beta_t) &= [\alpha_e + \alpha_t (1-\alpha_e-\tau) cc_c + \alpha_c \tau] Y_l \\
Y_c &= \frac{[\alpha_e + \alpha_t (1-\alpha_e-\tau) cc_c + \alpha_c \tau]}{(1-\alpha_t \beta_t)} Y_l
\end{aligned}$$

Proof of Corollary 1.*By differentiating equation (14)with respect to* α_e, α_t, α_c, β_t, c, c_c, *and* τ*it is possible to obtain the following results:*

$$\begin{aligned}
\frac{\partial \varepsilon}{\partial \alpha_e} &= \frac{1}{(1-\alpha_t \beta_t)} (1-\alpha_t cc_c) \geq 0 \\
\frac{\partial \varepsilon}{\partial \alpha_t} &= \frac{(1-\alpha_e-\tau) cc_c (1-\alpha_t \beta_t) - (-\beta_t) [\alpha_e + \alpha_t (1-\alpha_e-\tau) cc_c + \alpha_c \tau]}{(1-\alpha_t \beta_t)^2} \\
\frac{\partial \varepsilon}{\partial \alpha_t} &= \frac{(1-\alpha_e-\tau) cc_c + \beta_t (\alpha_e + \alpha_c \tau)}{(1-\alpha_t \beta_t)^2} \geq 0 \\
\frac{\partial \varepsilon}{\partial \alpha_c} &= \frac{\tau}{(1-\alpha_t \beta_t)} \geq 0 \\
\frac{\partial \varepsilon}{\partial \beta_t} &= \frac{\alpha_t [\alpha_e + \alpha_t (1-\alpha_e-\tau) c^l c_c^l + \alpha_c \tau]}{(1-\alpha_t \beta_t)^2} \geq 0 \\
\frac{\partial \epsilon}{\partial c} &= \frac{\alpha_t (1-\alpha_e-\tau) c_c}{(1-\alpha_t \beta_t)} \geq 0 \\
\frac{\partial \epsilon}{\partial c_c} &= \frac{\alpha_t (1-\alpha_e-\tau) c}{(1-\alpha_t \beta_t)} \geq 0 \\
\frac{\partial \varepsilon}{\partial \tau} &= \frac{\alpha_c - \alpha_t cc_c}{(1-\alpha_t \beta_t)} \geq 0 \quad if \quad \alpha_c \geq \alpha_t cc_c
\end{aligned}$$

Proof of Proposition 3 By algebraic manipulation of Equations (1) and (9) that describe the legal income production and allocation we obtain

$$\begin{aligned}
Y_l &= \left(C_l^f + C_l^c\right) + G + \left(I_l^f + I_l^c\right) \Rightarrow Y_l - C_l^f = C_l^c + G + \left(I_l^f + I_l^c\right) \\
Y_l &= T + E + C_l^f + C_c^f + S_f \Rightarrow Y_l - C_l^f = T + E + C_c^f + S_f
\end{aligned}$$

$$\begin{aligned}
C_l^c + G + \left(I_l^f + I_l^c\right) &= T + E + C_c^f + S_f \\
\beta_l Y_c + \tau Y_l (1-\alpha_c) + \left(I_l^f + I_l^c\right) &= \tau Y_l + \alpha_e Y_l + (1-\alpha_e-\tau) cc_c Y_l + (1-\alpha_e-\tau)(1-c) Y_l
\end{aligned}$$

$$\left(I_l^f + I_l^c\right) = \tau Y_l + \alpha_e Y_l + (1-\alpha_e-\tau)\, cc_c Y_l + (1-\alpha_e-\tau)(1-c) Y_l - \beta_l Y_c - \tau Y_l (1-\alpha_c)$$

$$\left(I_l^f + I_l^c\right) = (1-\alpha_e-\tau)\, cc_c Y_l + \tau Y_l + \alpha_e Y_l + (1-\alpha_e-\tau) Y_l - (1-\alpha_e-\tau)\, c - \beta_l Y_c - \tau Y_l (1-\alpha_c) \tag{18}$$

$$\left(I_l^f + I_l^c\right) = (1-\alpha_e-\tau)\, cc_c Y_l + Y_l - (1-\alpha_e-\tau)\, cY_l - \beta_l \varepsilon Y_l - \tau Y_l (1-\alpha_c)$$

$$\left(I_l^f + \beta_h \varepsilon Y_l\right) = Y_l + (1-\alpha_e-\tau)\, cc_c Y_l - (1-\alpha_e-\tau)\, cY_l - \beta_l \varepsilon Y_l - \tau Y_l (1-\alpha_c)$$

$$\begin{aligned}
I_l^f &= Y_l - (1-\alpha_e-\tau)\, c(1-c_c) Y_l - \beta_l \varepsilon Y_l - \beta_h \varepsilon Y_l - \tau Y_l (1-\alpha_c) \\
I_l^f &= \left[1 - (1-\alpha_e-\tau)\, c(1-c_c) - (\beta_l+\beta_h)\, \varepsilon - \tau(1-\alpha_c)\right] Y_l \\
\frac{I_l^f}{K} &= \left[1 - (1-\alpha_e-\tau)\, c(1-c_c) - (\beta_l+\beta_h)\, \varepsilon - \tau(1-\alpha_c)\right] \frac{Y_l}{K} \frac{Y_p}{Y_p} \\
g_i &= \left[1 - (1-\alpha_e-\tau)\, c(1-c_c) - (\beta_l+\beta_h)\, \varepsilon - \tau(1-\alpha_c)\right] a_k u \\
\gamma + \gamma_u u &= \left[1 - (1-\alpha_e-\tau)\, c(1-c_c) - (\beta_l+\beta_h)\, \varepsilon - \tau(1-\alpha_c)\right] a_k u \\
u &= \frac{\gamma}{\left[1 - (1-\alpha_e-\tau)\, c(1-c_c) - (\beta_l+\beta_h)\, \varepsilon - \tau(1-\alpha_c)\right] a_k - \gamma_u}
\end{aligned}$$

Proof of Corollary 4 *By differentiating equation (16) with respect to* α_e, α_t, α_c, β_t, β_l, β_h, c, c_c, *and* τ, *it is possible to obtain the following results:*

$$\frac{\partial u}{\partial \alpha_e} = \frac{-\left[c(1-c_c) - (\beta_l+\beta_h)\frac{\partial \varepsilon}{\partial \alpha_e}\right] a_k \gamma}{\left\{\left[1 - (1-\alpha_e-\tau)\, c(1-c_c) - (1-\alpha_c)\,\tau - \beta_l \varepsilon\right] a_k - \gamma_u\right\}^2} \geq 0$$

$$if \qquad (\beta_l+\beta_h)\frac{\partial \varepsilon}{\partial \alpha_e} - c(1-c_c) \geq 0$$

$$\frac{\partial u}{\partial \alpha_t} = \frac{\left((\beta_l+\beta_h)\frac{\partial \varepsilon}{\partial \alpha_e}\right) a_k \gamma}{\left\{\left[1 - (1-\alpha_e-\tau)\, c(1-c_c) - (1-\alpha_c)\,\tau - \beta_l \varepsilon\right] a_k - \gamma_u\right\}^2} \geq 0$$

$$\frac{\partial u}{\partial \alpha_c} = \frac{-\left[\tau - (\beta_l+\beta_h)\frac{\partial \varepsilon}{\partial \alpha_e}\right] a_k \gamma}{\left\{\left[1 - (1-\alpha_e-\tau)\, c(1-c_c) - (1-\alpha_c)\,\tau - \beta_l \varepsilon\right] a_k - \gamma_u\right\}^2} \geq 0$$

$$if \qquad (\beta_l+\beta_h)\frac{\partial \varepsilon}{\partial \alpha_c} - \tau \geq 0$$

$$
\begin{aligned}
\frac{\partial u}{\partial \beta_t} &= \frac{\left[\left(\beta_l+\beta_h\right)\frac{\partial \varepsilon}{\partial \beta_t}\right]a_k\gamma}{\left\{\left[1-\left(1-\alpha_e-\tau\right)c\left(1-c_c\right)-\left(1-\alpha_c\right)\tau-\beta_l\varepsilon\right]a_k-\gamma_u\right\}^2}\geq 0\\
\frac{\partial u}{\partial \beta_h} &= \frac{\left(\varepsilon\right)a_k\gamma}{\left\{\left[1-\left(1-\alpha_e-\tau\right)c\left(1-c_c\right)-\left(1-\alpha_c\right)\tau-\beta_l\varepsilon\right]a_k-\gamma_u\right\}^2}\geq 0\\
\frac{\partial u}{\partial \beta_l} &= \frac{\left(\varepsilon\right)a_k\gamma}{\left\{\left[1-\left(1-\alpha_e-\tau\right)c\left(1-c_c\right)-\left(1-\alpha_c\right)\tau-\beta_l\varepsilon\right]a_k-\gamma_u\right\}^2}\geq 0\\
\frac{\partial u}{\partial c} &= \frac{\left[\left(1-\alpha_e-\tau\right)\left(1-c_c\right)+\left(\beta_l+\beta_h\right)\frac{\partial \varepsilon}{\partial c}\right]a_k\gamma}{\left\{\left[1-\left(1-\alpha_e-\tau\right)c\left(1-c_c\right)-\left(1-\alpha_c\right)\tau-\beta_l\varepsilon\right]a_k-\gamma_u\right\}^2}\geq 0
\end{aligned}
$$

$$
\frac{\partial u}{\partial c_c}=\frac{-\left[\left(1-\alpha_e-\tau\right)c-\left(\beta_l+\beta_h\right)\frac{\partial \varepsilon}{\partial c_c}\right]a_k\gamma}{\left\{\left[1-\left(1-\alpha_e-\tau\right)c\left(1-c_c\right)-\left(1-\alpha_c\right)\tau-\beta_l\varepsilon\right]a_k-\gamma_u\right\}^2}\geq 0
$$

$$
if \qquad \left(\beta_l+\beta_h\right)\frac{\partial \varepsilon}{\partial c_c}-\left(1-\alpha_e-\tau\right)c\geq 0
$$

$$
\frac{\partial u}{\partial \tau}=\frac{-\left[c\left(1-c_c\right)-\left(1-\alpha_c\right)-\left(\beta_l+\beta_h\right)\frac{\partial \varepsilon}{\partial \tau}\right]a_k\gamma}{\left\{\left[1-\left(1-\alpha_e-\tau\right)c\left(1-c_c\right)-\left(1-\alpha_c\right)\tau-\beta_l\varepsilon\right]a_k-\gamma_u\right\}^2}\geq 0
$$

$$
if \qquad \left(\beta_l+\beta_h\right)\frac{\partial \varepsilon}{\partial \tau}+\left(1-\alpha_c\right)-c\left(1-c_c\right)\geq 0
$$

Proof of Corollary 6. *By differentiating equation (17) with respect to* α_e, α_t, α_c, β_t, β_l, β_h, c, c_c, *and* τ, *it is possible to obtain the following results:*

$$
\begin{aligned}
\frac{\partial g^*}{\partial \alpha_e} &= \gamma_u\frac{\partial u^*}{\partial \alpha_e}+\beta_h a_k\left(\varepsilon\frac{\partial u^*}{\partial \alpha_e}+u^*\frac{\partial \varepsilon}{\partial \alpha_e}\right)\lesseqgtr 0\\
\frac{\partial g^*}{\partial \alpha_t} &= \gamma_u\frac{\partial u^*}{\partial \alpha_t}+\beta_h a_k\left(\varepsilon\frac{\partial u^*}{\partial \alpha_t}+u^*\frac{\partial \varepsilon}{\partial \alpha_t}\right)\geq 0\\
\frac{\partial g^*}{\partial \alpha_c} &= \gamma_u\frac{\partial u^*}{\partial \alpha_c}+\beta_h a_k\left(\varepsilon\frac{\partial u^*}{\partial \alpha_c}+u^*\frac{\partial \varepsilon}{\partial \alpha_c}\right)\lesseqgtr 0\\
\frac{\partial g^*}{\partial \beta_t} &= \gamma_u\frac{\partial u^*}{\partial \beta_t}+\beta_h a_k\left(\varepsilon\frac{\partial u^*}{\partial \beta_t}+u^*\frac{\partial \varepsilon}{\partial \beta_t}\right)\geq 0\\
\frac{\partial g^*}{\partial \beta_h} &= \gamma_u\frac{\partial u^*}{\partial \beta_h}+\beta_h a_k\left(\varepsilon\frac{\partial u^*}{\partial \beta_h}+u^*\frac{\varepsilon}{\beta_h}\right)\geq 0\\
\frac{\partial g^*}{\partial \beta_l} &= \gamma_u\frac{\partial u^*}{\partial \beta_l}+\beta_h a_k\varepsilon\frac{\partial u^*}{\partial \beta_l}\geq 0\\
\frac{\partial g^*}{\partial c} &= \gamma_u\frac{\partial u^*}{\partial c}+\beta_h a_k\left(\varepsilon\frac{\partial u^*}{\partial c}+u^*\frac{\partial \varepsilon}{\partial c}\right)\geq 0\\
\frac{\partial g^*}{\partial c_c} &= \gamma_u\frac{\partial u^*}{\partial c_c}+\beta_h a_k\left(\varepsilon\frac{\partial u^*}{\partial c_c}+u^*\frac{\partial \varepsilon}{\partial c_c}\right)\lesseqgtr 0\\
\frac{\partial g^*}{\partial \tau} &= \gamma_u\frac{\partial u^*}{\partial \tau}+\beta_h a_k\left(\varepsilon\frac{\partial u^*}{\partial \tau}+u^*\frac{\partial \varepsilon}{\partial \tau}\right)\lesseqgtr 0
\end{aligned}
$$

Appendix II

#	Italian Provinces	R1	R2	R3	R4	R5	R6	R7	R8	R9	CILP
1	Torino	-0.32063	-0.41577	-0.10832	-0.13845	-0.22784	-0.14786	1.1839	0.00342	0.551042	0.042166
2	Vercelli	-0.3476	-0.51527	-0.10832	-0.13845	-0.12835	-0.14786	0.761825	-0.64752	0	-0.14128
3	Novara	-0.38705	-0.44628	-0.10832	-0.13845	0.180953	-0.14786	1.219723	-0.46166	0	-0.03211
4	Verbano-Cusio-Ossola	-0.27127	-0.51527	-0.10832	-0.13845	-0.93963	-0.14786	1.302783	-0.62071	0	-0.15986
5	Cuneo	-0.39648	-0.51527	-0.10832	-0.13845	-0.61715	-0.14786	-0.70305	-0.5863	0	-0.35699
6	Biella	-0.42487	-0.51527	-0.10832	-0.13845	0.919705	-0.14786	0.799803	-0.71602	0	-0.03681
7	Asti	-0.33665	-0.51527	-0.10832	-0.13845	-0.62839	-0.14786	-0.35499	-0.4414	0	-0.29681
8	Alessandria	-0.40587	-0.39973	-0.10832	-0.13845	-0.03854	-0.14786	0.527107	-0.53867	0	-0.13893
9	Aosta	-0.42487	-0.51527	-0.10832	-0.13845	-1.07855	-0.14786	1.307132	-0.45549	0	-0.17352
10	Varese	-0.29443	-0.39919	-0.10832	-0.13845	-0.55579	-0.14786	-0.44756	-0.48526	0	-0.28632
11	Como	-0.2213	-0.08346	-0.10832	-0.13845	-1.092	-0.14786	-2.04834	-0.50247	0	-0.48247
12	Lecco	-0.11098	-0.51527	-0.10832	-0.13845	-0.98125	-0.14786	-1.45572	-0.29221	0	-0.41667
13	Sondrio	-0.36388	2.12696	-0.10832	-0.13845	-1.44239	-0.14786	0.324605	-0.3739	0	-0.01369
14	Milano	-0.12896	0.230167	-0.10832	-0.13845	-0.13698	-0.09526	0.323908	-0.37334	0	-0.04747
15	Lodi	-0.4125	-0.51527	-0.10832	-0.13845	-0.72188	-0.14786	-0.83818	-0.66726	0	-0.39441
16	Bergamo	-0.37601	-0.49181	-0.10832	-0.13845	-0.69576	-0.14786	-0.16445	-0.6453	0	-0.30755
17	Brescia	-0.26969	-0.28963	-0.10832	-0.13845	-0.36454	-0.14786	0.646094	-0.53763	0	-0.13445
18	Pavia	-0.3068	-0.3748	-0.10832	-0.13845	-0.89558	-0.14786	-0.82121	-0.345	0	-0.34867
19	Cremona	-0.40947	-0.51527	-0.10832	-0.13845	-1.12946	-0.14786	-0.28728	-0.55875	0	-0.3661
20	Mantova	-0.39105	-0.45358	-0.10832	-0.13845	-0.66718	-0.14786	-0.93035	-0.58349	0	-0.38003
21	Bolzano/Bozen	-0.42487	-0.51527	-0.10832	-0.13845	-1.30568	-0.14786	-0.17655	-0.43375	0	-0.36119
22	Trento	-0.33968	-0.51527	-0.10832	-0.13845	-1.06756	-0.14786	-0.36686	-0.49731	0	-0.35348
23	Verona	-0.35775	-0.48744	-0.10832	-0.13845	-0.90271	-0.14786	0.326261	-0.65135	0	-0.27418
24	Vicenza	-0.41843	-0.51527	-0.10832	-0.13845	-1.18384	-0.14786	-1.07039	-0.49872	0	-0.45348
25	Belluno	-0.29489	-0.39671	-0.10832	-0.13845	-1.36239	-0.14786	-0.50127	-0.7658	0	-0.41285
26	Treviso	-0.41856	-0.51527	-0.10832	-0.13845	-1.39782	-0.14786	-2.21394	-0.63838	0	-0.61984
27	Venezia	-0.31121	-0.45603	-0.10832	-0.13845	-0.85999	-0.14786	-0.00326	-0.51846	0	-0.28262
28	Padova	-0.41284	-0.51527	-0.10832	-0.13845	-0.73395	-0.14786	-0.11031	-0.61353	0	-0.30895
29	Rovigo	-0.39113	-0.51527	-0.10832	-0.13845	-0.18706	-0.14786	-0.70955	-0.69006	0	-0.32085
30	Pordenone	-0.42487	-0.51527	-0.10832	-0.13845	-1.39756	-0.14786	-1.47143	-0.51631	0	-0.52445
31	Udine	-0.37855	-0.46833	-0.10832	-0.13845	-1.40551	-0.14786	-1.94832	-0.57103	0	-0.57404
32	Gorizia	-0.42487	-0.51527	-0.10832	-0.13845	-0.90052	-0.14786	0.499569	-0.33774	0	-0.23038
33	Trieste	-0.33079	-0.51527	-0.10832	-0.13845	-0.83349	-0.14786	1.436375	-0.18282	0	-0.09118
34	Imperia	-0.3746	-0.40065	-0.10832	-0.13845	-0.1732	-0.14786	1.950833	0.505409	1.102083	0.246138
35	Savona	-0.3958	-0.42688	-0.10832	-0.13845	-0.02024	-0.14786	1.29161	0.288817	0	0.038097
36	Genova	-0.37768	-0.40048	-0.10832	-0.13845	-0.45071	-0.14786	0.150699	-0.23197	0	-0.18942
37	La Spezia	-0.33771	-0.4017	-0.10832	-0.13845	-0.19117	-0.14786	-0.37088	-0.60142	0	-0.25528
38	Piacenza	-0.37642	-0.51527	-0.10832	-0.13845	-0.986	-0.14786	-0.98016	-0.59319	0	-0.4273
39	Parma	-0.38654	-0.51527	0.107603	0.259856	-0.75822	0.011026	0.637857	-0.56819	0	-0.13465
40	Reggio nell'Emilia	-0.42487	-0.51527	-0.10832	-0.13845	-1.09391	-0.14786	0.300684	-0.41003	0	-0.282
41	Modena	-0.42487	-0.47858	-0.10832	-0.13845	-0.67355	-0.14786	0.132329	-0.43539	0	-0.25274
42	Bologna	-0.37097	-0.0495	-0.10832	-0.13845	-0.05258	-0.14786	1.726343	-0.3665	0	0.054685
43	Ferrara	-0.31626	-0.37375	-0.10832	-0.13845	-0.73624	-0.14786	0.710247	-0.36359	0	-0.1638
44	Ravenna	-0.37465	-0.51527	-0.10832	-0.13845	-0.17191	-0.14786	2.04777	-0.39145	0	0.022207
45	Forlì0Cesena	-0.2253	-0.51527	-0.10832	-0.13845	-0.1626	-0.14786	-0.17873	-0.53396	0	-0.22339
46	Rimini	-0.40665	-0.34903	-0.10832	-0.13845	0.667101	-0.14786	3.267299	-0.24382	0	0.282253
47	Massa0Carrara	-0.34295	-0.26619	-0.10832	-0.13845	-0.99298	-0.14786	0.532139	-0.33153	0	-0.19957
48	Lucca	-0.37511	-0.51527	-0.10832	-0.13845	-0.47151	-0.14786	0.653533	-0.3958	0	-0.16653
49	Pistoia	-0.36782	-0.42854	-0.10832	-0.13845	-0.24912	-0.14786	0.550229	-0.55501	0	-0.16054
50	Firenze	-0.39392	-0.46394	-0.10832	-0.13845	-0.37177	-0.14786	1.084931	-0.21128	0	-0.0834
51	Prato	-0.42487	-0.51527	-0.10832	-0.13845	0.693219	0.132763	1.545087	-0.40529	0	0.086541
52	Livorno	-0.41672	-0.51527	-0.10832	-0.13845	-0.82879	-0.14786	2.577061	-0.25727	0	0.018265
53	Pisa	-0.42487	-0.51527	-0.10832	-0.13845	-0.49668	-0.14786	0.685386	-0.3872	0	-0.17036
54	Arezzo	-0.39283	-0.36917	-0.10832	-0.13845	-0.76819	-0.14786	0.800092	-0.66939	0	-0.19935
55	Siena	-0.4043	-0.23387	-0.10832	-0.13845	-0.2041	-0.14786	0.206833	-0.70235	0	-0.19249
56	Grosseto	-0.42487	-0.51527	-0.10832	-0.13845	-0.89853	-0.14786	1.621058	-0.47746	0	-0.12108

Figure 5: Z-score of criminal statistics and the composite index of local presence (CILP) of Organized Crime. Our elaboration on ISTAT data (2008-2010).
R1: confiscated assets; R2: confiscated firms; R3: Mafia-type murders; R4: attempted Mafia murders; R5: extortion; R6: Mafia-type criminal associations; R7: personal harms; R8: damages followed by arsons; R9: city councils dissolved for infiltration by OC.

#	Italian Provinces	R1	R2	R3	R4	R5	R6	R7	R8	R9	CILP
57	Perugia	-0.42487	-0.51527	-0.10832	-0.13845	-0.57898	-0.14786	-0.37103	-0.63117	0	-0.32399
58	Terni	-0.42487	-0.51527	-0.10832	-0.13845	-0.78039	-0.14786	-1.8452	-0.68461	0	-0.51611
59	Pesaro e Urbino	-0.37402	-0.3165	-0.10832	-0.13845	-0.42838	-0.14786	-0.8923	-0.55897	0	-0.32942
60	Ancona	-0.41904	-0.51527	-0.10832	-0.13845	-0.01842	-0.14786	0.332323	-0.25304	0	-0.1409
61	Macerata	-0.42487	-0.51527	-0.10832	-0.13845	-0.16	-0.14786	0.451565	-0.5118	0	-0.17278
62	Ascoli Piceno	-0.40349	-0.51527	-0.10832	-0.13845	-0.71014	-0.14786	-0.79122	-0.55657	0	-0.37459
63	Viterbo	-0.38098	-0.43521	-0.10832	-0.13845	0.0263	0.298457	0.397423	-0.54266	0	-0.09816
64	Rieti	-0.42487	-0.51527	-0.10832	-0.13845	-0.99707	-0.14786	-1.44451	-0.65924	0	-0.49284
65	Roma	-0.23779	0.055577	-0.10832	-0.13845	-0.3482	-0.14786	-1.00395	-0.41197	0	-0.26011
66	Latina	-0.14587	-0.23766	-0.10832	-0.13845	0.287818	-0.02162	1.530249	0.104016	0	0.141129
67	Frosinone	-0.28509	-0.46427	-0.10832	-0.13845	-0.37546	-0.14786	0.564908	-0.6039	0	-0.17316
68	L'Aquila	-0.26298	-0.51527	-0.10832	-0.13845	-0.13556	-0.14786	0.460296	-0.55838	0	-0.15628
69	Teramo	-0.22797	-0.51527	-0.10832	-0.13845	-0.25741	0.076137	0.545431	-0.41887	0	-0.11608
70	Pescara	-0.3991	-0.51527	-0.10832	-0.13845	1.114988	-0.14786	1.835693	-0.5705	0	0.119021
71	Chieti	-0.41786	-0.51527	-0.10832	-0.13845	0.256147	-0.14786	-0.92064	-0.35266	0	-0.26055
72	Isernia	-0.42487	-0.51527	-0.10832	-0.13845	0.180023	-0.14786	0.793702	-0.40022	0	-0.08459
73	Campobasso	-0.40069	-0.51527	-0.10832	-0.13845	-0.58221	-0.14786	-1.4236	-0.65964	0	-0.44178
74	Caserta	0.819816	0.966749	2.623755	3.145065	2.706643	4.240449	-0.7475	-0.52246	2.755208	1.776414
75	Benevento	-0.32848	-0.07568	-0.10832	-0.13845	0.549418	0.094671	-0.85602	-0.16331	0	-0.11402
76	Napoli	0.249342	0.482172	2.914432	3.064096	2.328841	2.348665	0.029909	-0.44362	2.204167	1.464223
77	Avellino	-0.34891	-0.11109	-0.10832	-0.13845	0.557078	-0.14786	0.704737	0.000647	0.551042	0.106542
78	Salerno	0.012289	0.515942	-0.10832	-0.13845	0.782912	-0.08484	0.663542	-0.30639	0.551042	0.209747
79	Foggia	-0.09076	-0.4781	1.282529	1.04207	3.233075	-0.04553	1.624112	3.124651	0	1.076894
80	Bari	0.059221	0.133592	0.3053	0.475255	0.733983	-0.0609	0.444809	0.243605	0	0.259429
81	Taranto	0.020651	0.052763	-0.10832	-0.13845	0.268425	-0.14786	-1.26397	1.057156	0	-0.02884
82	Brindisi	1.086378	0.302968	0.127189	0.151295	1.210827	0.198739	-0.53469	1.514472	0	0.450798
83	Lecce	-0.11364	0.202218	0.008244	0.264761	-0.12997	0.109456	-1.2692	0.7237	0	-0.02271
84	Potenza	-0.40326	-0.51527	0.38235	1.946956	0.155267	0.395772	0.343788	-0.39847	0	0.211904
85	Matera	-0.31564	-0.14165	-0.10832	-0.13845	0.00886	-0.14786	-0.89553	-0.34118	0	-0.23109
86	Cosenza	-0.0271	-0.13518	-0.10832	-0.13845	1.19646	0.042346	0.388475	1.139206	1.102083	0.384392
87	Crotone	0.79265	-0.51527	4.819567	4.228265	-0.18284	2.268179	-0.3314	2.2069	0	1.476228
88	Catanzaro	1.055856	-0.23964	5.823033	4.582088	2.236539	-0.14786	0.547401	2.329218	0.551042	1.859742
89	Vibo Valentia	0.340618	1.6097	1.597343	1.07725	1.557192	1.10835	-0.10976	4.763184	2.755208	1.633232
90	Reggio di Calabria	4.005898	2.486594	2.740799	2.035144	0.447122	5.772871	-1.60568	3.353822	7.714584	2.994572
91	Trapani	1.685865	1.287795	-0.10832	-0.13845	0.409805	1.293955	2.075115	2.661809	0.551042	1.079846
92	Palermo	5.80292	5.85963	-0.10832	-0.13845	-0.40928	1.478813	-0.94942	0.767882	0	1.367087
93	Messina	0.414022	-0.09443	-0.10832	-0.13845	1.152348	-0.14786	-0.83723	2.403978	0.551042	0.355011
94	Agrigento	0.49836	0.488536	-0.10832	-0.13845	0.635842	-0.14786	0.418559	2.24062	1.102083	0.554375
95	Caltanissetta	0.545801	0.416681	-0.10832	-0.13845	0.665362	2.932928	1.20946	6.262363	0.551042	1.370763
96	Enna	0.217146	0.802298	1.537817	2.493822	0.961332	0.661046	-0.54776	1.324624	0	0.827814
97	Catania	0.839735	1.329317	1.989516	1.984022	1.438455	0.172961	-1.35043	0.548065	0	0.772405
98	Ragusa	-0.04526	-0.43475	-0.10832	-0.13845	0.194594	0.072313	-0.17842	1.37545	0	0.081907
99	Siracusa	-0.03135	-0.32636	0.12681	0.20635	1.537239	-0.14786	0.437544	2.121709	0	0.43601
100	Sassari	-0.17714	-0.51527	-0.10832	-0.13845	-0.37769	-0.14786	1.454509	0.939708	0	0.103276
101	Nuoro	-0.39302	-0.51527	-0.10832	-0.13845	-0.75095	-0.14786	-1.35096	2.566101	0	-0.09319
102	Oristano	-0.40662	-0.51527	-0.10832	-0.13845	-1.37539	-0.14786	-1.17313	1.452338	0	-0.26808
103	Cagliari	-0.28488	-0.48253	-0.10832	-0.13845	-0.42841	-0.14786	-0.90879	1.250536	0	-0.13874

Figure 6: [Continuing] Z-score of criminal statistics and the composite index of local presence (CILP) of Organized Crime. Our elaboration on ISTAT data (2008-2010). R1: confiscated assets; R2: confiscated firms; R3: Mafia-type murders; R4: attempted Mafia murders; R5: extortion; R6: Mafia-type criminal associations; R7: personal harms; R8: damages followed by arsons; R9: city councils dissolved for infiltration by OC.

#	Italian Provinces	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	CIEE
1	Torino	0.352932	1.020005	0.655042	0.502511	0.031181	-0.50404	-0.73112	-0.20696	0.088515	0.687193	-0.89525	-0.45234466	0.045638
2	Vercelli	1.155879	-0.77712	-0.77433	-0.21503	0.142441	-0.67856	-0.93425	-0.41949	-1.45705	-0.42577	-0.83659	-0.45234466	-0.47268
3	Novara	0.656485	-0.43332	-0.32417	0.087733	0.094566	-0.78042	-0.82363	-0.61273	-0.4784	-0.97866	0.10045	-0.36067546	-0.32106
4	Verbano0Cusio0Ossola	-0.13747	-1.33402	-0.83414	-1.01244	-0.33313	-1.02622	-0.96073	-1.10652	-0.56887	0.371748	0.880888	-0.40099996	-0.53849
5	Cuneo	1.743728	-1.00993	-0.67273	-1.0574	0.059125	-1.02738	-0.70089	-0.97123	-0.96783	-1.28501	-1.36771	-0.45234466	-0.64247
6	Biella	4.378961	-1.01807	-0.73879	0.821337	-0.88685	-0.64704	-0.74848	-1.02588	-1.07138	1.576439	-0.64014	-0.45234466	-0.03769
7	Asti	2.123839	-0.59658	-0.52098	0.423154	2.059573	-0.60445	-0.27996	-0.7881	-1.45705	-1.43144	-1.21571	-0.45234466	-0.2275
8	Alessandria	-0.41284	-0.30195	-0.4507	0.367158	-0.39925	-0.26406	-0.81778	0.086709	0.02635	-0.9903	-0.21204	-0.14885268	-0.29313
9	Aosta	-0.05954	-0.80139	-0.80304	0.501189	4.874944	-0.95141	-0.61449	0.308046	-0.8858	-0.66369	-0.08842	-0.32041052	0.041334
10	Varese	-0.1075	-0.56517	-0.52838	-0.55628	-0.37768	-0.55218	-0.82358	-0.61354	-0.04867	0.584947	-1.0644	1.38330301	-0.27243
11	Como	-1.09793	-0.69333	-0.59493	-1.3654	-0.4342	-0.68376	-0.80217	-0.42873	-0.96913	0.637314	-1.21773	-0.15297869	-0.65025
12	Lecco	-1.51231	-0.69306	-0.65975	-0.69023	-0.87623	-1.0311	-0.20615	-0.73266	-1.24387	-1.85899	-1.55132	-0.45234466	-0.95899
13	Sondrio	-0.89986	-1.52492	-0.87724	-0.74631	0.892755	-0.76336	-0.28723	-0.08253	-1.45705	-0.4755	0.586619	0.69169186	-0.4119
14	Milano	0.037447	2.2059	0.766183	0.842012	-0.0943	-0.57467	-0.36946	-0.28279	-0.69078	0.514654	-0.50462	-0.43349541	0.118006
15	Lodi	-0.85569	-0.55953	-0.36315	-0.33089	-1.04632	-0.82084	-0.90171	-0.79652	-1.13829	-1.34583	-1.62094	-0.45234466	-0.85266
16	Bergamo	-0.27968	-0.01696	-0.37902	-0.35439	-0.92066	-0.84965	-0.8798	-0.57916	-0.58481	-0.15179	-1.29392	-0.45234466	-0.56151
17	Brescia	1.49002	0.247712	-0.23878	-0.09852	0.958907	-0.5516	0.02334	-0.24731	-0.51782	0.727585	-0.28787	-0.44566482	0.089083
18	Pavia	-0.35781	0.31769	-0.38687	-0.83221	-0.49611	-0.71098	-0.43931	-0.70139	-0.65216	-0.88472	-1.16306	-0.45234466	-0.56327
19	Cremona	1.209602	-0.62875	-0.53253	-0.19283	1.896369	-1.00244	-0.7702	0.818879	-0.85946	-1.22952	-1.08706	-0.45234466	-0.23586
20	Mantova	0.131826	-0.45496	-0.63274	-0.86205	-0.68378	-1.05693	-0.76038	-0.7456	-1.28248	-1.54387	-0.42859	-0.43218572	-0.72922
21	Bolzano/Bozen	-0.44136	-0.9304	-0.77083	-1.07941	0.042533	-0.74618	-0.95095	-0.81562	-1.45705	0.039799	-0.84676	-0.43583519	-0.69934
22	Trento	-0.65495	-0.83793	-0.74112	-0.85173	-0.25273	-0.86648	-0.90825	-0.92195	-1.04572	-0.47061	-1.39592	-0.45234466	-0.78331
23	Verona	-0.23182	-0.02974	-0.50082	-0.11418	-0.20725	-0.426	-0.90347	-0.69067	0.049053	-1.23775	-0.17319	-0.43414656	-0.40833
24	Vicenza	-0.71896	-0.58368	-0.60337	-0.67602	-0.30441	-1.00262	-0.90264	-1.22111	-0.70555	-1.61426	-0.69764	-0.44273542	-0.78942
25	Belluno	-1.53332	-1.45111	-0.94555	-1.18344	-0.59037	-0.8654	-0.97801	-1.16889	-1.45705	-1.67074	-1.6091	-0.45234466	-1.15878
26	Treviso	-0.98124	-0.79979	-0.77673	-1.33802	-0.96688	-0.84358	-0.95273	-1.10299	-1.45705	-1.67321	-0.71957	-0.44292495	-1.00456
27	Venezia	0.657113	0.57597	-0.50651	-0.36813	1.235812	2.706986	-0.28654	-0.42203	-0.35996	-0.20458	-0.02109	-0.20780113	0.23327
28	Padova	-0.23363	0.274968	-0.47481	-0.49898	1.103355	-0.54646	-0.86638	-1.04714	-0.91361	2.572898	-0.29044	-0.40719624	-0.11062
29	Rovigo	-1.16045	-0.70541	-0.75132	-0.93277	0.387756	-0.79475	-0.84185	-0.24871	-1.16513	-1.36081	0.139613	-0.45234466	-0.65726
30	Pordenone	-0.13506	-0.79485	-0.83985	-1.13413	-0.78565	-1.03594	-0.88191	-0.75704	-1.45705	-1.77503	-1.81449	-0.45234466	-0.98861
31	Udine	0.182116	-0.775	-0.82614	-1.13711	-0.69343	-0.32209	-0.94561	1.949702	-1.45705	-1.15313	-0.75593	-0.25122481	-0.51541
32	Gorizia	0.117476	-0.82347	-0.78871	-0.33378	0.295625	-0.42176	-0.86725	0.724675	-1.45705	1.438923	-0.88932	-0.21784461	-0.26954
33	Trieste	7.147809	-0.39413	-0.60887	-0.6185	0.710055	-0.69909	-0.60796	1.60333	0.071289	0.067725	-0.1443	-0.24057001	0.524732
34	Imperia	0.33962	0.338597	-0.61894	0.094436	0.925701	1.827616	-0.4437	1.714521	-0.47169	3.028777	5.717905	-0.45234466	0.999959
35	Savona	0.192071	0.266917	-0.39546	1.008052	3.691167	1.88683	-0.76495	-0.62528	0.053817	0.596373	0.327929	-0.27751578	0.496929
36	Genova	0.196609	0.931898	-0.01589	0.07054	2.301162	0.601374	0.211749	5.140145	-0.63901	1.876825	-0.57325	3.26838508	1.114211
37	La Spezia	1.022784	-0.10294	-0.49333	0.062533	2.835758	2.163738	-0.07756	0.063289	-0.80689	1.352382	0.35089	1.26928012	0.63666
38	Piacenza	-0.08183	-0.37454	-0.57816	-1.13055	0.622922	-0.79931	-0.97168	-0.10562	-0.95677	-0.74905	-1.19864	-0.45234466	-0.56463
39	Parma	-0.87709	0.225696	-0.46745	0.045082	0.489848	0.115965	-0.37944	-0.68365	-1.12833	-0.82658	-1.61489	-0.3940372	-0.45791
40	Reggio nell'Emilia	-0.04406	0.225209	-0.43977	-1.1903	-0.49503	-0.92267	-0.64466	-0.8363	-0.35443	-0.81789	-0.03991	-0.38749282	-0.49561
41	Modena	-0.04736	0.940154	-0.32285	-0.49806	-0.64273	-0.78053	-0.90473	0.629805	-1.1463	-0.18584	-0.80039	-0.44038288	-0.34993
42	Bologna	1.565178	1.632458	0.103713	1.661787	0.498291	-0.37126	-0.53706	0.132203	-0.79582	1.242389	-0.60563	-0.32407434	0.350182
43	Ferrara	-0.15389	0.136589	-0.56468	-0.54083	-0.99447	-0.36929	-0.35573	-0.95131	-0.85276	-0.24259	-1.69241	-0.28982237	-0.57335
44	Ravenna	2.280239	0.868568	-0.2508	-0.24908	-0.22872	0.038412	-0.63253	0.112918	-1.27219	0.6681	-1.35864	-0.16988327	-0.01613
45	Forlì0Cesena	-0.10018	-0.11583	-0.59403	0.286408	-0.56177	-0.53174	-0.6694	-0.43609	0.029803	-0.06477	-0.79783	-0.17556943	-0.31092
46	Rimini	1.866112	2.18756	0.320045	0.663673	0.534718	0.705099	-0.71946	-0.59905	1.387127	2.38726	-1.23925	-0.42534547	0.589039
47	Massa0Carrara	-0.10331	-0.07247	-0.56826	-0.7498	3.087006	-0.39649	-0.68442	-0.94945	-1.45705	0.210368	-1.81449	-0.37038575	-0.3224
48	Lucca	0.033586	0.589311	-0.34163	-0.54566	0.424209	-0.01304	-0.86654	0.047768	-0.35019	-0.20707	-0.9158	-0.43110667	-0.21467
49	Pistoia	1.330783	-0.07299	-0.46818	0.102661	-0.15323	-0.36018	-0.80967	0.458517	2.269963	-0.60204	0.750982	-0.36676645	0.173321
50	Firenze	1.320251	0.741022	-0.21564	0.771762	1.240513	0.467636	-0.55904	-0.8292	-1.31177	1.71051	-0.21517	-0.44395626	0.223077
51	Prato	2.115699	0.197233	0.270607	-0.49963	-0.70268	0.13666	-0.09698	-0.85306	-0.28928	1.840244	-1.10541	-0.24994637	0.053621
52	Livorno	-0.75394	0.213024	-0.54022	-0.6163	-1.01919	0.413647	0.70415	-1.18033	0.028192	1.480209	-0.91264	0.3557687	-0.1523
53	Pisa	1.453982	0.778158	-0.46137	0.328593	0.220381	-0.14378	-0.73102	-0.9025	0.981816	0.306835	-0.96758	-0.45234466	0.084265
54	Arezzo	0.657548	-0.83205	-0.65202	0.049468	0.197884	-0.07902	-0.8622	1.218099	0.003251	-0.3554	-0.42176	-0.21154175	-0.10731
55	Siena	-0.8389	-0.99245	-0.8036	-0.19397	0.63618	-0.87873	-1.01164	0.048113	-0.65679	-1.42093	-1.0028	-0.45234466	-0.63066
56	Grosseto	-0.16812	-0.26618	-0.80397	-0.19525	2.015186	0.559568	-0.587	-0.24352	-1.45705	1.17023	0.707164	-0.26765872	0.038617

Figure 7: Z-score of criminal statistics and the composite index of economic extent (CIEE) of Organized Crime. Our elaboration on ISTAT data (2008-2010).
R1: exploitation of prostitution; R2: thefts; R3: robberies; R4: informatic frauds; R5: digital frauds; R6: counterfeiting; R7: copyright violations; R8: money laundering; R9: usury; R10: drugs crimes; R11: criminal associations (non Mafia-type); R12: smuggling of goods.

#	Italian Provinces	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	CIEE
57	Perugia	1.674033	-0.27865	-0.56444	-0.77989	-1.14075	-0.75924	-0.77499	-0.88756	-1.24112	0.729622	-0.0273	-0.45234466	-0.37522
58	Terni	-0.3318	-0.65111	-0.65008	-0.42463	0.273396	-0.71278	-0.44707	-4.4E-05	-0.52427	-0.09678	0.632686	-0.45234466	-0.28207
59	Pesaro e Urbino	-0.74191	-0.91196	-0.67487	-1.27914	-0.96666	-0.57867	-0.83217	0.137056	-0.69973	-0.42676	-0.20186	-0.45234466	-0.63575
60	Ancona	1.602068	-0.71614	-0.65189	-0.03552	-0.16398	1.070708	-0.3109	-0.51639	0.054466	-0.11038	0.304651	-0.03146492	0.04127
61	Macerata	1.405935	-0.8708	-0.65318	-0.02622	0.125187	0.073091	0.89701	-1.23712	-1.23457	0.784609	-0.04574	-0.40035486	-0.09851
62	Ascoli Piceno	1.244118	-0.53658	-0.58769	-0.45703	-0.86963	-0.11644	-0.08963	-0.71321	-1.08659	-0.41033	0.102209	-0.45234466	-0.3311
63	Viterbo	-0.41481	-0.85115	-0.69229	0.228574	0.693823	-0.26865	-0.48956	-0.76105	-0.08833	0.034886	-0.28252	-0.45234466	-0.27862
64	Rieti	-1.57396	-1.32208	-0.78978	-0.78922	-0.56945	-0.64856	-0.77199	0.234345	-0.99934	-0.1858	-0.71637	-0.39948896	-0.71097
65	Roma	0.159474	1.304106	0.447631	-0.04313	0.499428	2.398133	1.438844	0.302078	-0.30745	0.971988	-0.02756	0.0441139	0.598971
66	Latina	0.299259	-0.33087	-0.36604	-0.09089	-0.51942	0.634169	0.257282	0.609383	1.180745	0.17302	0.755727	-0.45234466	0.179168
67	Frosinone	-0.85039	-1.35137	-0.6394	-0.02245	-0.20568	-0.66655	-0.59271	0.686523	1.305368	-1.14193	4.358048	-0.45234466	0.03576
68	L'Aquila	-0.38001	-1.34145	-0.79475	-0.56361	0.026711	-0.85434	-0.09474	-0.60988	2.751742	0.182311	0.60238	-0.45234466	-0.12733
69	Teramo	1.044007	-0.36176	-0.56229	-0.12858	0.4025	-0.1733	0.380029	-0.68176	1.576728	0.576348	0.584842	-0.42558641	0.185932
70	Pescara	2.092017	0.195831	-0.13091	0.778715	1.998731	-0.5485	0.85961	0.629758	1.933233	0.966038	3.810489	-0.40053463	1.015372
71	Chieti	-0.97858	-0.80631	-0.69423	-0.73002	-0.40824	-1.05174	0.147138	-0.50856	0.9142	-1.2006	-0.48662	-0.45234466	-0.52133
72	Isernia	-0.72477	-1.5525	-0.81084	1.162384	14.48333	1.902588	-0.36756	-0.64999	1.796447	0.584703	1.637769	-0.45234466	1.417435
73	Campobasso	-0.99837	-1.09479	-0.89157	0.083655	-0.56389	-0.80836	-0.42024	0.010479	2.913368	-1.40598	1.595685	-0.45234466	-0.16936
74	Caserta	0.171428	-0.76297	1.278994	0.159775	-0.96225	0.744303	1.300194	0.321266	0.617814	-0.74595	0.024336	-0.02983567	0.176425
75	Benevento	-1.08608	-1.51361	-0.66642	-0.0405	-0.31877	-0.75113	0.157172	-0.70364	3.804758	-1.31831	-0.29264	-0.45234466	-0.26513
76	Napoli	-0.42512	-0.18213	3.558964	3.310037	-0.6637	1.46029	2.588086	1.295022	1.78279	0.624022	1.008174	3.65218886	1.500718
77	Avellino	-0.35515	-1.55651	-0.71763	0.137956	-0.96581	-0.61025	0.529285	-0.54396	0.023813	-1.42662	0.983256	-0.3192866	-0.40176
78	Salerno	-0.72109	-0.97874	-0.40813	0.304356	-0.23508	-0.39206	2.106592	-0.34865	1.090083	-1.02093	-0.18793	-0.44481652	-0.10302
79	Foggia	-0.25593	-0.13958	0.034837	-0.12361	-0.43521	-0.22012	2.087852	2.625689	0.555147	-0.92386	0.500243	-0.26894799	0.286375
80	Bari	-0.48384	-0.01171	0.096993	-0.54727	-0.56789	0.138975	-0.26551	0.451688	1.112857	-0.767	-0.52801	0.2603237	-0.09253
81	Taranto	-0.3711	-0.66868	-0.50738	-0.7108	0.013543	0.72782	1.168784	-0.37751	0.037207	-0.12812	0.000349	-0.26539451	-0.09011
82	Brindisi	-0.54009	-0.63868	-0.44652	-0.35713	-0.69437	2.00859	2.1966	0.111389	1.412348	-0.40166	0.581289	0.04463139	0.273033
83	Lecce	-1.2259	-0.8616	-0.64766	-0.77726	-1.03775	0.171714	0.364066	-1.18522	-1.01341	-0.49649	-0.41124	-0.40102124	-0.62681
84	Potenza	-1.6961	-1.7732	-0.87272	-0.81329	-0.66181	-0.39998	-0.32862	-0.81697	-0.70525	-0.12342	-0.22408	-0.45234466	-0.73899
85	Matera	-1.89966	-1.6269	-0.88705	-1.57819	0.264046	-0.46445	-0.74289	-0.63621	-1.10214	-0.68834	0.34041	-0.45234466	-0.78948
86	Cosenza	-1.04626	-1.08819	-0.57396	-0.81396	-0.37659	-0.50722	-0.03316	0.488391	-0.6697	-0.85938	0.756694	-0.44098382	-0.43028
87	Crotone	-1.29906	-1.66704	-0.72944	-0.17509	-0.8786	-0.26395	-0.65786	-0.99949	-0.62434	-0.47264	0.460656	-0.45234466	-0.6466
88	Catanzaro	-0.48186	-0.82782	-0.71117	-0.15134	-0.27472	-0.41518	-0.35802	-0.21095	0.310349	-0.05939	-0.26482	-0.45234466	-0.32477
89	Vibo Valentia	0.128791	-1.3413	-0.55619	0.104942	-0.82507	0.244439	-0.57382	-0.09333	0.705321	-1.11672	-0.23825	-0.00216521	-0.29695
90	Reggio di Calabria	-0.74826	-1.00901	-0.18336	0.088692	0.368563	-0.31947	-0.2814	1.450982	0.074129	-0.44273	2.678594	0.13679234	0.151127
91	Trapani	-1.30163	-0.57686	-0.51449	-0.66527	-0.47603	-0.56423	-0.6399	-0.53828	0.200241	-0.77935	0.097251	-0.45234466	-0.51758
92	Palermo	-1.46013	-0.08177	0.940801	0.724731	0.053121	-0.4121	0.614897	-0.68471	-0.35507	-0.72379	-0.26446	0.19144317	-0.12142
93	Messina	-0.58324	-0.96538	-0.49206	-0.20683	-0.66962	0.436739	0.034057	-0.26116	0.863305	-0.44719	-0.33864	-0.43957833	-0.2558
94	Agrigento	-0.80968	-1.31521	-0.62755	-1.21502	-1.09509	-0.68997	-0.07065	-0.61919	-0.66158	-1.3325	-0.07741	-0.43397281	-0.74564
95	Caltanissetta	-1.89966	-0.81143	-0.40705	-0.95406	-1.12828	-0.72622	-0.38134	0.040205	0.136309	-1.35019	0.927234	-0.45234466	-0.5839
96	Enna	-1.59802	-1.53993	-0.76246	-1.11638	-0.66575	-0.74013	-0.14541	-0.62988	0.629454	-1.36904	0.213332	-0.45234466	-0.68138
97	Catania	0.045552	0.814142	1.163357	-0.86603	0.534914	-0.24196	0.094168	1.533301	-0.46032	-0.05079	0.530299	0.04701692	0.26197
98	Ragusa	-0.9082	-0.49967	-0.57685	-0.68205	-0.05513	-0.27655	-0.16833	0.052766	-0.76722	-1.01268	2.779503	-0.3726842	-0.20726
99	Siracusa	-0.60364	-0.77334	-0.48442	-0.62619	-0.52699	-0.61833	-0.38696	-0.68101	1.054141	-0.37625	-0.17897	-0.2659128	-0.37257
100	Sassari	-0.43968	-0.89467	-0.66734	-0.66419	-0.44854	0.101216	0.904686	-0.5314	-1.00786	1.795921	-0.72062	-0.38346678	-0.24633
101	Nuoro	-1.10226	-1.33324	-0.5838	-1.35497	-0.7215	-0.30172	-0.37776	-0.47347	-1.18057	-1.76598	-1.14398	-0.45234466	-0.8993
102	Oristano	-1.21366	-1.59195	-0.82482	-1.52783	-0.22396	-0.8947	-0.83956	-0.38815	-0.98128	-1.50113	-1.5256	-0.45234466	-0.99708
103	Cagliari	-0.99002	-1.08564	-0.61882	-0.17225	0.136045	-0.75101	-0.45267	-0.10396	-1.3639	0.139183	-0.90814	-0.45234466	-0.55196

Figure 8: [Continuing] Z-score of criminal statistics and the composite index of economic extent (CIEE) of Organized Crime. Our elaboration on ISTAT data (2008-2010).
R1: exploitation of prostitution; R2: thefts; R3: robberies; R4: informatic frauds; R5: digital frauds; R6: counterfeiting; R7: copyright violations; R8: money laundering; R9: usury; R10: drugs crimes; R11: criminal associations (non Mafia-type); R12: smuggling of goods.

	North	Center	South	Italy
North	0.698148			
Center		0.508262		
South			0.320706	
Italy				0.240298

Figure 9: Correlation Matrix between CILP and CIEE in Italian macroregions. Our elaboration on ISTAT data (2008-2010).