The Macroeconomic Impact of Organized Crime: a Neo-Kaleckian Perspective

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Abstract

The paper analyses how organized crime affects the economy through its impact on the effective demand, by following the Neo-Kaleckian approach. From this perspective, the operation of organized crime, on the one hand, tends to reduce the effective demand draining resources through extortion, corruption of public officials and encouraging consumption of criminal goods (illegal goods and goods produced in the underground economy), on the other hand, tends to rise the effective demand using proceeds of criminal activity in the purchase of legal consumption goods and legal 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 influence negatively the economic activity to the extent that the income drained from the legal sector is not reused into the same sector.

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1 Introduction.

The paper analyses the macroeconomic impact of Organized Crime (OC)[1] on the economic system. The operation of criminal organizations like the Camorra, Cosa Nostra[2], and 'Ndrangheta in Southern Italy, the Yakuza in Japan, or the Triade in China, dramatically changes the economic structure of a region. A recent report[3] by the Italian business trade group, Confesercenti, said that the Italian criminal organizations have reached such epidemic proportions in Italy that the four largest traditional Mafias rake in more than €120 billion each year, that is more than 7% of Italy's GDP. Moreover, they have cash reserves of about €65 billion on hand, more than any legitimate bank. As a result of the financial crisis, these criminal organizations 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 label Organized Crime (OC) to define a criminal organization characterized by the following elements:

(i) it acts in a defined geographical area where there is a State vacuum;

(ii) it is involved in multiple legal and illegal activities;

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

(iv) it makes use of the violence or the threat of violence in order to achieve a local control and promote its business.

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

[1] 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".

[2] Cosa Nostra is the Sicilian Mafia; we prefer this label since American and Sicilian Mafiosi refer to their organization by the expression "*cosa nostra (Our Thing)*". Alternatively, the term Mafia can be applied to any criminal organization: for example, to the Russian Mafia or the Nigerian Mafia.

[3] Rapporto SOS Imprese (2011).

[4] Kumar and Skaperdas (2009).

The second characteristic defines the economic dimension of OC which is involved in illegal (production and distribution of illicit drugs, human traffic, counterfeiting of goods, etc.) and legal sectors where criminal revenues are laundered. OC typically penetrates in a legal economy operating in traditional sectors, characterized by firms of small or medium size, 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, 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 groups as part of long-run non-cooperative equilibria, Skaperdas (2001) proposes a model where criminal organizations 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 consider a non-coercive nature of some relationships between OC groups and legal firms, we can not deny that violence threat would be used at least to avoid cheatings and/or against third-parties.

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,

[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).

generating substantial income flows to and from the criminal sector. OC plays a new actor that gets in touch with all the subjects belonging to the legal sector and significantly modifies directions and sizes of any income flow.

According to most studies[7], the presence of criminal organizations in a given region negatively affects the efficiency of the economic system and tends to slow-down economic development. Even though there exists a broad academic and institutional literature on historical and sociological analysis, on empirical evidence of crimes and on their social cost[8], fewer are the contributions that tried to estimate the economic impact of OC. Most of them applied a neoclassical supply-led approach to explain inefficient allocations of resources due to crimes while almost no one, with rare exceptions[9], tried to construct a demand-led theoretical model to describe and forecast a 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 which are 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, the inefficient allocation of resources or the reduction in the 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 operation of OC dramatically changes the economic structure of a region; in particular, we underline the following channels through which criminal organizations interact with the legal economy. First, extortion of protection money from firms, trade in criminal goods[10], and corruption of public officials, are means by which OC generates income outflows

[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 production lost and in terms of jobs lost, 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).

[10] We assume that criminal goods consists of both illegal goods and underground productions According to OECD (2002) definitions, illegal economy consists of productive activities

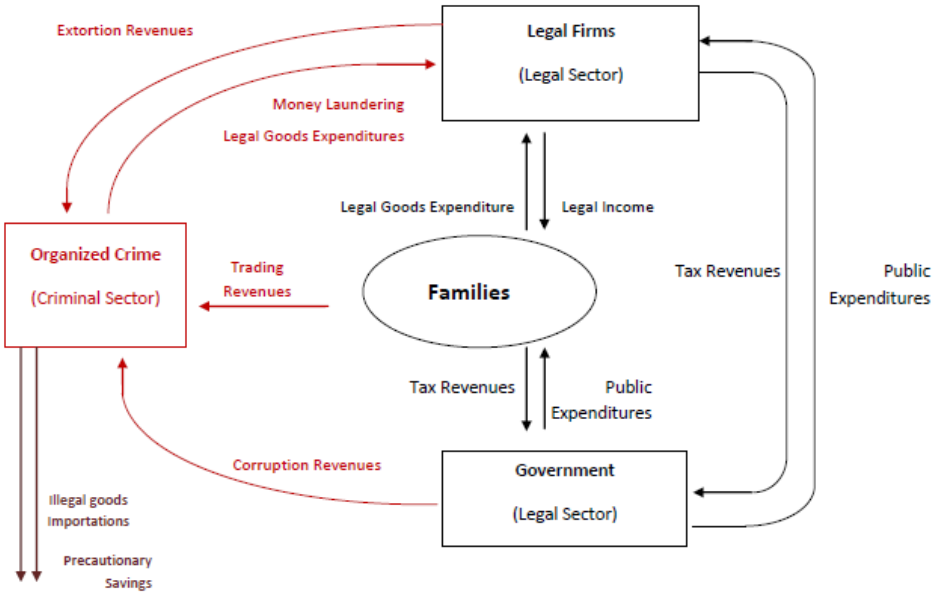

Figure 1: Income flows in an economic system where OC interacts with the legal sector.

from the legal sector of the economy; in fact, 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, families can decide to consume criminal goods rather than legal ones, the public sector reduces the provision of public goods since a share of tax revenues is diverted to OC. Second, thanks to money laundering, OC generates income inflows into the legal sector to the extent that criminal revenues are allocated to purchase of legal consumption and investment goods. Third, OC generates income outflows from the legal and criminal 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 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 consumption, investments, and public expenditures[11]. From

that generate goods and services forbidden by law or that are unlawful when carried out by unauthorized producers, while 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.

[11] Neo-Kaleckian models share with the post Keynesian tradition the principle of effective

this perspective, the presence of OC, on the one hand, tends to reduce the effective demand by draining resources through extortion, corruption of public officials and trade in criminal goods, on the other hand, it tends to increase the effective demand by using 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 since OC affects directly investment decisions. Overall, the operation of OC tends to negatively influence the economic activity to the extent that the proceeds drained from the legal sector are not reused into the same sector.

The paper is organized as follows. In Section (2) we illustrate empirical evidence on the operation of OC in Italian Provinces; in particular, we construct two different indexes of the presence of OC that measure its local control, and its economic extent In section (3) we introduce the model setting of our theoretical analysis with the focus on typical crimes of OC as extortion, trade in criminal goods, corruption and money laundering. In section (4) we anlyse the impact of OC on the degree of capacity utilization and the growth rate. Finally, section (5) summarizes some conclusions.

2 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 local and an economic one. In this section, starting from official statistics on reported crimes, we try to measure the different intensity of the two components in the Italian Provinces.

We analyze the criminal statistics for Italy as 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 to obtain and maintain the social control of the territory *(the local power of OC)* and (ii) offenses and crimes that measure the presence of criminal organizations 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.[12]

Indeed, we build two composite indexes, which we call "composite index of local presence" (CILP) and "composite index of economic extent" (CIEE) of

demand, they allow to study the role of income distribution in determining economic changes in accordance with its effects on the demand side. For a review of Neo-Kaleckian models see Blecker (2002).

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

criminal organizations, starting from the data of offences and crimes reported by victims to the police[13]. 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[14]. Then, for any selected crime we compute the z-scores 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-scores 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, 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)[15]. 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)[16]. As indicated by the darker color, the index assumes higher values not only in the provinces of Southern Italy but also in the Center and in the North where a more prosperous economy encurages 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.

The two composite indexes, CILP and CIEE, represent two complementary

[13] 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.

[14] 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 justified by the will to avoid structural breaks in the series due to political, legal, social or economic factors.

[15] In Appendix II, Figures *(4)* and *(5)* show the tables with the values of the criminal statistics and the composite index of local presence (CILP) of OC for provinces.

[16] In Appendix II, Figures *(6)* and *(7)* show the tables with the values of the z-score of the criminal statistics used and the composite index of economic extent (CIEE) of OC for provinces.

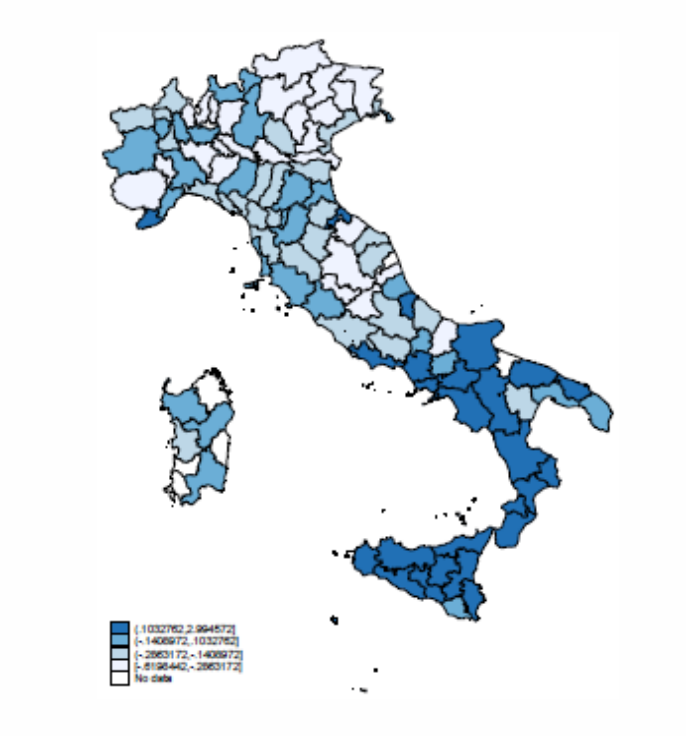

Figure 2: the composite index of local presence (CILP) of Organized Crime. Our elaboration on ISTAT data (2008-2010).

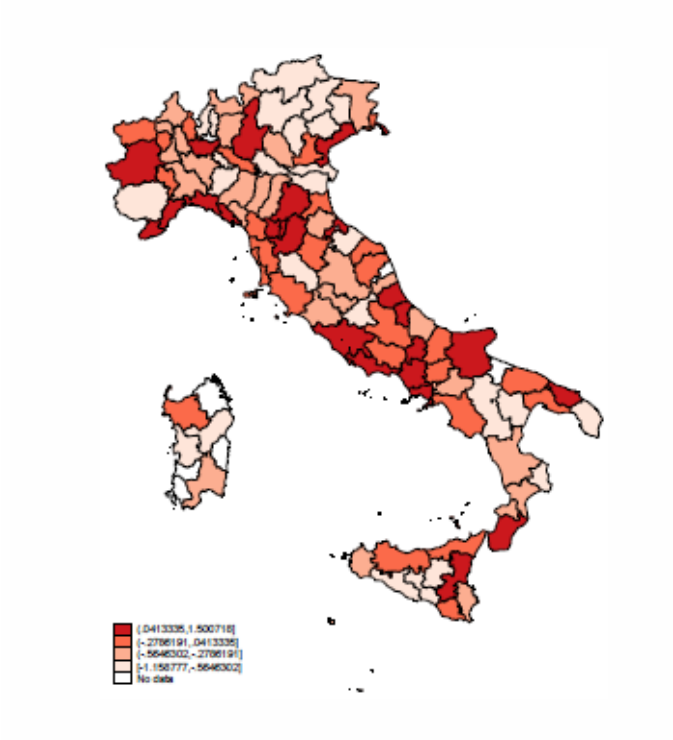

Figure 3: the composite index of economic extent (CIEE) of Organized Crime. Our elaboration on ISTAT data (2008-2010).

aspects of the activities of criminal organizations. With reference to the scatter plot between the two indexes[17] in Figure *(??)*, 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);

[17] Correlations between the two indexes for macroregions are presented in Appendix. Just watching the graph in Figure *(??)* 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.

(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).

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 wealth 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 econometric analysis, which will surely be part of a future development of this work.

3 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 local and economic dimensions of OC. From the perspective of criminal organizations, 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 on legal sectors. In the following we introduce some definitions and empirical evidence.

Extortion. Firms are subjected to extortion if they must pay protection money in order to operate in a given region. This crime, where developed in a systemic form, is one of the most frequent means by which criminal organizations infiltrate the legitimate economy[18]. 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 violent means; labour racketeering, which is the violent negotiation to gain 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. In Italy, a recent study on the perceived dimension of the phenomenon in 2008 says that 10.9% of businesses 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[19] by the Italian business trade group, Confesercenti, said that extortion revenues amount to more than €21billion, about the 15% of the total turnover of OC, second only to revenues from drug trafficking.

Trading in criminal goods Families may buy legal goods produced in the legal economy or criminal goods produced in underground and illegal economies, by enriching criminal organizations to the extent that they control these productions. Focusing only on illegal goods, the drug trafficking[20] is the most

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

[19] Rapporto SOS Imprese (2011).

[20] 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 and amphetamine-type stimulants (ATS), 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).

important activity of OC at worldwide level. In fact, in the late '90s, the period of maximum seizure, it was estimated that the drug business was the third biggest economy in the world with a global turnover worth more than US$1000 billion[21]. After two decades, recent statistics diffused by UNDOC say that the global turnover is decreased and estimated about US$870 billion a year, nevertheless organised criminal network funds are comparable to 1,5% of global gross domestic product, or 7% of the world's exports of merchandise.

The drug trafficking remains the most common form of transnational crime in the EU and the role of Italy is crucial since the country, with an estimated turnover of about €60 billion, 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 affected by the presence of OC. The government makes public expenditures financed through tax revenues; even if we do not consider that OC affects tax revenues[22], the corruption[23] of public officials may raise public goods costs, by redirecting public resources in favour of criminal organizations. Empirical evidence shows 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[24].

Money Laundering. Masciandaro (2007) defines money laundering as an activity whose economic function is to transform the criminal income into effective purchasing power. This phenomenon 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

[21] Coyle (1999).

[22] 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.

[23] 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).

[24] 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.

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 appear legitimate the money they derived illegally. 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 US$2100 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 US$2000 to US$2500 billion in 2005, or Walker (2007), up to US$3000 billion.

In the following we introduce an analytical model describing an economy infected by the presence of criminal organizations. As mentioned before, OC has a twofold dimension: one local and one economic. The first is closely connected with the territorial control of a given region, and displays itself through crimes such as extortion, corruption, and, to a lesser extent, trading in criminal goods and money laundering. The second is strictly connected with investments in legal and illegal activities, inside and outside the ruled region; crimes as trading in criminal goods and money laundering denote its intensity. This paper focuses mainly on the local dimension; with regard to the economic dimension, we take into account only investments inside the ruled region, and assume that the only link outside is represented by the importation of criminal goods. A comprehensive analysis of the economic dimension of OC is beyond the scope of this essay, but it will be the topic of future research; such analysis should be based on a growth model with two regions, and should be focused on how international capital flows connected with the operation of criminal organizations impact on the growth process of these regions.

3.1 The analytical framework

The model describes an economy where a legal sector and a criminal sector interact. In the legal sector, firms produce the legal income (Y), which is equal to the level of effective demand; in this sector families allocate their disposable income to savings or consumption of legal and criminal goods, firms undertake investments, and the government provides public goods financed through tax revenues. In the criminal sector, OC produces the criminal income $\left(\widetilde{Y}\right)$ by performing crimes; in particular, criminal organizations, which consist of a set of criminals, extort money protection from firms, trade in criminal goods, corrupt public officials in order to obtain a share of tax revenues, and launder money in legal activities; they allocate their criminal income to precautionary savings, consumption of criminal goods, or, through the money laundering, to legal activities as consumption or investments. Both the production and allocation of the criminal income affect the legal sector of the economy, with the production determining legal income outflows and the allocation determining legal income inflows. OC, on the one hand, supports an effective demand decrease through

extortion revenues, consumption of criminal goods made by families, and corruption revenues; on the other hand, it supports an effective demand increase through its legal consumption 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 the sum of legal consumption (C_l), legal investments (I_l), and public expenditures (G). Equation (1) describes the legal income determination:

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

Equation (2) defines C_l as legal good consumption made by families $\left(C_l^f\right)$ and criminals, (C_l^o): $C_l^f = (1-\alpha_e-\tau)\, c\,(1-c_t)\, Y$ is a linear function of the legal income, net of extortion and tax payments, where $\alpha_e \in [0,1]$ is the parameter denoting the extorion rate, $\tau \in [0,1]$ is the parameter denoting the tax rate, $c \in [0,1]$ is the parameter denoting the propensity to consume legal and criminal goods out of the legal disposable income, and $c_t \in [0,1]$ is the parameter denoting family preferences for criminal goods; $C_l^o = \beta_l \widetilde{Y}$ is a linear function of the criminal income, 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 first choose the income share to save, and then they allocate their residual income to legal and criminal consumption; instead, criminals directly choose the income share allocated to legal consumption. As the seminal paper of Kaldor (1966) assumes different propensity to consume out of wages and profits, likewise this paper assumes 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 by criminals (I_l^o).[25] Equation (4) defines G as a linear function of tax revenues, where $\alpha_c \in [0,1]$ is the parameter denoting the tax revenue share distorted in favour of OC; 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 officials corruption, thereby 1 unit of tax revenues is necessary to provide $1-\alpha_c$ unit of public expenditures.

[25] If organized crime undertakes legal investments, then criminals will also receive a share of the legal income, and we should take this into account in describing consumption decisions of criminals. However, in equation (2) we have assumed that the propensity to consume only changes according to the kind of income, that is, we have implicitly assumed that criminals behave like families when they receive a share of the legal income.

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 (R_e), trading revenues (R_t), and corruption revenues (R_c). Equation (5) describes the criminal income production:

$$\begin{aligned}
\widetilde{Y} &= R_e + R_t + R_c && (5)\\
R_e &= \alpha_e Y && (6)\\
R_t &= \alpha_t C_t = \alpha_t \left(C_t^f + C_t^o \right) = \alpha_t \left[(1 - \alpha_e - \tau)\, c \cdot c_t Y + \beta_t \widetilde{Y} \right] && (7)\\
R_c &= \alpha_c \tau Y && (8)
\end{aligned}$$

Equation (6) defines R_e as a linear function of the legal income since the protection money is fixed as a given share of the legal income. Equation (7) shows that R_t come from the sale of criminal goods, where C_t defines criminal good consumption made by families, C_t^f, and criminals, C_t^o, while $\alpha_t \in [0, 1]$ is the parameter denoting the profit margin obtained by trading in criminal goods; in fact, we assume that OC does not produce these goods, but it only retails criminal goods purchased abroad. $C_t^f = (1 - \alpha_e - \tau)\, c \cdot c_t Y$ is a linear function of the legal income, net of extortion and tax payments, and $C_t^o = \beta_t \widetilde{Y}$ is a linear function of the criminal income, 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 R_c as a share of tax payments obtained through the corruption of public officials.

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

$$\begin{aligned}
Y &= T + R_e + C_l^f + C_t^f + S^f && (9)\\
Y &= \tau Y + \alpha_e Y + (1 - \alpha_e - \tau)\, cY + (1 - \alpha_e - \tau)\,(1 - c)\, Y && (10)
\end{aligned}$$

OC can allocate the criminal income to legal and criminal good consumption, legal investments, or precautionary savings (S^o). Equation (11-12) describe the criminal income allocation:

$$\begin{aligned}
\widetilde{Y} &= (C_l^o + C_t^o + I_l^o) + S^o && (11)\\
\widetilde{Y} &= (\beta_l + \beta_t + \beta_h)\, \widetilde{Y} + [1 - (\beta_l + \beta_t + \beta_h)]\, \widetilde{Y} && (12)
\end{aligned}$$

S^o defines the share of the criminal income that does not come back in neither the legal sector of the economy through legal consumption and investments nor the criminal sector through criminal consumption; 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 precautionary savings consist of criminal income buffers held for precautionary purposes; the working life of criminals tend to be very short since they may be arrested by police or killed by other criminals, so that they try to protect their families by laying up these buffers; moreover, money laundering in the legal sector involves considerable risks because if the criminal income flows are identified criminals may be subject, in addition to the arrest, to the judicial attachment of their assets. On the basis of these arguments seems reasonable to assume that the amount of precautionary savings is far from being negligible.[26]

Equations (11-12) also allow to explain how we deal with money laundering within the model. 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 consumption or legal good consumption and investments, and the value of β_l, β_t, and β_h take account of this; on the other hand, the money laundered can only be allocated to legal consumption and investments, so that 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, where the effective legal output is always less than the potential legal output obtainable by the existing capital stock. Inequality (13) describes the production function:

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

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.

3.2 The relationship between legal and criminal income.

OC draws the criminal income from extortion, trading in criminal goods, and corruption of public officials; and revenues realized through these crimes are connected with legal income outflows from the legal to the criminal sector; therefore, there is a strong relationship between the criminal income and the

[26] On this issue, the judge Nicola Gratteri, expert on criminal organizations operating in Calabria, mantains: *"... Calabrian criminals have the obsession to hide the money. A few years ago, we heard a dialogue between two 'Ndrangheta associates, and one says to the other: 'We had 250€million in cash, but I had to throw 8€million in the litter because they became damp under the ground.*

This episode shows that criminals have so much money that they are not able to spend it or invest it entirely ..." (2011, pp.57; our translate).

legal income. By algebraic manipulation of equations (5-8), it is possible to obtain the following result.

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.*

$$\frac{\widetilde{Y}}{Y} = \varepsilon = \frac{\left[\alpha_e + \alpha_t \left(1 - \alpha_e - \tau\right) c \cdot c_t + \alpha_c \tau\right]}{\left(1 - \alpha_t \beta_t\right)} \tag{14}$$

Proof. *In Appendix* ■

According to equation (14), the ratio between the criminal and legal income only depends on the parameters set, and may vary between zero and infinity, $\varepsilon \in [o, \infty]$. The criminal income is larger than legal income outflows brought about through crimes as extortion, trading in criminal goods, and corruption $\left(\alpha_e + \alpha_t \left(1 - \alpha_e - \tau\right) c \cdot c_t + \alpha_c \tau\right)$, if the following conditions hold: a) a share of legal income outflows is allocated to consume criminal goods, that is, the propensity to consume criminal goods out of the criminal income is greater than zero, $\beta_t > 0$; b) trading in criminal goods is a profitable activity, that is, the profit margin obtained by trading in criminal goods is greater than zero, $\alpha_t > 0$. Under these conditions it follows that the criminal income multiplier is greater than one, $\frac{1}{(1-\alpha_t \beta_t)} > 1$, and the criminal income is a multiple of legal income outflows; moreover, the size of the criminal sector may became larger even than those of the legal sector with the rise in β_t and α_t to their upper limits.

Overall, the criminal income production should be thought of as extracting a rent from the legal sector of the economy; OC acts as a parasite against the legal sector since criminal organizations produce the criminal income only insofar as they can distort legal income flows in favor of the criminal sector; however, until the criminal income is larger than legal income outflows the interaction between the legal sector and the criminal sector cannot be described as a zero-sum game. The operation of the OC consists of both a criminal predatory activity and a criminal economic activity: the first is strictly related to the local dimension of OC, and is mainly witnessed by extortion and corruption, while the second is related to his economic dimension, and may considerably boost the impact of criminal organization on the economy.

By deriving equation (14) with respect to the parameters, it is possible to achieve the subsequent result.

Corollary 2 *The ratio between the legal income and the criminal income is a positive function of α_e, α_t, α_c, β_t, c, and c_t,; while it can be positively or negatively related to τ.*

Proof. *In Appendix.* ■

An increase in α_e has a twofold impact on the criminal income: on the one hand, it rises extortion revenues in proportion to the legal income, on the other hand, it reduces trading revenues in proportion to criminal good consumption

made by families; but the first effect is always greater than the second, and the net positive impact is amplified by the criminal income multiplier. An increase in α_t rises the criminal income multiplier, so that it boosts the impact on trading revenues of criminal good consumption made by families and criminals. An increase in α_c rises corruption revenues in proportion to tax revenues. An increase in β_t rises the criminal income multiplier, so that it boosts the impact on the criminal income of legal income outflows from the legal sector. An increase in c or in c_t rises trading revenues by increasing criminal good consumption made by families. An increase in τ has two opposing effects on the criminal income: on the one hand, it rises corruption revenues in proportion to the tax revenue share distorted in favour of OC, on the other hand, it reduces trading revenues in proportion to criminal good consumption made by families; the net impact of a change in this parameter depends on the balance of these two effects.

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

In order to analyse how OC affects the economic activity level and the growth process, it is necessary to specify a function that describes investment decisions of firms. In this regard, we assume a typical neo-Kaleckian investment function, where investment demand in terms of capital stock $\left(g_l^f = \frac{I_l^f}{K}\right)$ is positively related to the economic activity level. Equation (15) describes the investment function:

$$g_l^f = \gamma + \gamma_u u \tag{15}$$

Firms' investment decisions are a linear function of the ratio between the effective legal income and the potential legal income, that is, the degree of capacity utilization $\left(u = \frac{Y}{Y_p}\right)$; γ_u is the parameter denoting the sensitivity of investment decisions to u, while 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 through changes in the degree of capacity utilization, so that savings equal investments. By algebraic manipulation of equations (1-4, and 9-15). it is possible to obtain the following result.

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

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

Proof. *In Appendix.* ■

Until now the literature has suggested that OC affect negatively the level of economic activity by influencing the marginal productivity of capital and the resources allocation, that is, the supply side of the economy. Otherwise, equation (16) shows that the operation of OC can affect the level of economic activity also through the demand side of the economy; in particular, as subsequent analysis will highlight, criminal organizations can impact negatively or positively on the level of economy activity according to the effect of smoothing or boosting of the effective demand.

Corollary 4 *The degree of capacity utilization is positively affected by* α_t, β_l, β_t, β_h, *and* c; *differently, the impact of* α_e, α_c, c_t, *and* τ *is uncertain.*
Proof. *In Appendix.* ■

The classical outcome of the neo-Kaleckian model of growth and distribution is that the degree of capacity utilization is a positive function of the demand level, which is supported by consumption, investments, and public expenditures. The operation of 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 legal consumption and investments; therefore, the net effect depends on the parameter values. An increase in α_e, α_c, and c_t will decrease u^* if the rise in consumption and investments made by criminals will not offset the reduction in consumption made by families and government public expenditures. The impact of a change in the government size is more complex; an increase in τ positively affects u^* to the extent that the rise in public expenditures net of corruption revenues and that one in investments and consumption made by OC is greater than the reduction in consumption made by families. The parameters α_t, β_t, and c are positively related to u^* because the first two positively affect the criminal income multiplier, while the third positively affect legal and criminal good consumption made by families. Overall, the impact of the operation of OC on u^* will be negative if legal income outflows from the legal sector are not offset by criminal income inflows into the legal sector, that is, when the criminal income allocation does not promote enough effective demand of consumption and investment goods,(β_l, $\beta_h \to 0$). or when criminal good consumption and precautionary savings drain a sufficiently large share of the criminal income ($\beta_t \to 1$, or β_l, β_t, $\beta_h \to 0$).

In order to be more precise about the relationship between the degree of capacity utilization and the criminal income it is useful to analyze the extreme case in which all the criminal income is allocated to criminal good consumption, ($\beta_t = 1 \Rightarrow \beta_l$, $\beta_h = 0$). Under this assumption, and given the legal income outflows, the operation of OC maximizes both the positive impact on the ratio between the criminal and legal income and the negative impact on the degree of capacity utilization; the criminal sector behaves like a leech, it sucks the blood from the legal sector and leaves this sector lifeless.[27]

[27] Note that when precautionary savings are equal to zero, ($\beta_t = 1 - (\beta_l + \beta_h)$), then u and

The growth rate of the economy depends on investment decisions undertaken by firms and criminals $\left(\frac{I_l^o}{K} = g_l^o\right)$; therefore, it is appropriate to include in equation (15) an expression that represents legal investments made by OC in terms of the capital stock.

$$g_l = g_l^f + g_l^o = \gamma + \gamma_u u + \beta_h a_k \varepsilon u \tag{17}$$

By substituting the equilibrium value for the degree of capacity utilization in equation (17), it is possible to obtain the following result.

Proposition 5 *The equilibrium solution for the growth rate is affected by the behaviour of families, firms, the government, and OC; particularly, criminal organizations affects the growth rate both indirectly through their impact on the degree of capacity utilization and directly through their investment decisions.*

$$g_l^* = g_l^f + g_l^o = \gamma + \gamma_u u^* + \beta_h a_k \varepsilon u^* \tag{18}$$

Proof. *See Appendix for the explicit solution.* ■

Equation (18) shows that the growth process is the outcome of investment decisions of firms and criminals: the first are a function of the degree of capacity utilization ($\gamma_u u^*$), while the second are a function of the criminal income ($\beta_h a_k \varepsilon u^*$).

Corollary 6 *As the degree of capacity utilization, the growth rate is positively affected by α_t, β_l, β_t, β_h, and c; differently, the impact of α_e, α_c, c_t, 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 that has come out from the analysis of how the operation of OC affects the degree of capacity utilization, the only difference refers to the role of investment decisions undertaken by OC. The operation of OC impact on the growth process through two channels: first, it indirectly influences investment decisions of firms by affecting the degree of capacity utilization; second, it directly undertakes investment decisions financed by laundering a share of the criminal income. As the previous analysis shows, the parameters α_t, β_t, β_l, β_h, and c are positively related to the ratio between the criminal and legal income and the degree of capacity utilization, thereby they positively affect g_l^* through both the channels. Otherwise, the parameters c_t, α_e, and α_c are positively related to the ratio between the criminal and legal income, but can be negatively related to the degree of capacity utilization; therefore, they positively affect g_l^* only if the rise in legal investments of criminals offsets the

β_t become negatively related, $\left(\frac{\partial u}{\partial \beta_t} \leq 0\right)$; in fact, an increase in β_t implies a contraction in the criminal income share allocated to legal consumption and investments, which is not offset by a rise in the ratio between the criminal and legal income.

contraction in legal investments of firms, that is, if the positive effect connected with the second channel is greater than the negative effect connected with the first. The same arguments apply with respect to the parameter τ, by taking into account, however, that it may be negatively related also to the ratio between criminal and legal income.[28] Thus, OC may induce opposed dynamics in u^* and g_l^*; particularly, criminal organizations may support the growth process, despite their negative impact on the level of economic activity.

5 Conclusions.

The paper introduces a Neo-Kaleckian model to describe the macroeconomic impact of the operation of OC. The evaluations in terms of the degree of capacity utilization and the growth rate are not unambiguous since criminal organizations, on the one hand, tends to decrease the effective demand by draining resources through extortion, trading in criminal goods, and corruption of public officials; on the other hand, it tends to increase the effective demand by using proceeds of criminal activity in the purchase of legal consumption goods and lega investment goods. The model allows to highlight the opposing action of these two forces and to identify 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 since OC affects directly investment decisions. Overall, the operation of OC tends to negatively affect the economy to the extent that legal income outflows from the legal sector are not offset by criminal income inflows 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_l	none	positive	positive
β_t	positive	positive	positive
β_h	none	positive	positive
c	positive	positive	positive
c_t	positive	positive/negative	positive/negative
τ	positive/negative	positive/negative	positive/negative

The previous table summarizes our results. The ratio between the criminal income and the legal income is positively related to α_e, α_t, α_c, β_t, c, and c_t, the

[28] Note that the rise in legal investments of criminals occurs when the opposite changes in the ratio between the criminal and legal income and the degree of capacity utilization imply an increase in the absolute level of the criminal income.

impact of τ is uncertain, while β_l, and β_h, are unrelated; such ratio is costrained between zero and infinity. The criminal income will be larger than legal income outflows connected with extortion, trading in criminal goods, and corruption if β_t and α_t are greater than zero; under these conditions the criminal income will be a multiplier of legal income outflows, and the size of the criminal sector could became larger even than those of the legal sector with the increase in β_t and α_t to their upper limits.

The degree of capacity utilzation and the growth rate are positively related to α_t, β_l, β_t, β_h, and c, while the impact of α_e, α_c, c_t, and τ is uncertain. The operation of OC will tend to affect negatively the level of economic activity and the growth process if the criminal income allocation does not promote enough effective demand of consumption and investment goods (β_l, $\beta_h \to 0$), or criminal good consumption and precautionary savings drain a sufficiently large share of the criminal income ($\beta_t \to 1$, or β_l, β_t, $\beta_h \to 0$). The analytical conditions are more constraining for the growth rate because OC, in addition to influence investment decisions of firms through its impact on the degree of capacity utilization, directly undertakes investments by laundering money in legal activities.

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 between the local and economic dimension of OC.

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Appendix I

Proof of Proposition 1. By replacing equations (6-8) into equation (5), it is possible to obtain equation (14):

$$\begin{aligned}
\widetilde{Y} &= (\alpha_e Y) + \left\{\alpha_t \left[(1-\alpha_e-\tau)\, c\cdot c_t Y + \beta_t \widetilde{Y}\right]\right\} + (\alpha_c \tau Y) \\
\widetilde{Y} &= \alpha_e Y + \alpha_t (1-\alpha_e-\tau)\, c\cdot c_t Y + \alpha_t\beta_t \widetilde{Y} + \alpha_c \tau Y \\
\widetilde{Y} - \alpha_t\beta_t \widetilde{Y} &= \alpha_e Y + \alpha_t (1-\alpha_e-\tau)\, Y c\cdot c_t + \alpha_c \tau Y \\
\widetilde{Y}(1-\alpha_t\beta_t) &= [\alpha_e + \alpha_t (1-\alpha_e-\tau)\, c\cdot c_t + \alpha_c\tau]\, Y \\
\widetilde{Y} &= \frac{[\alpha_e + \alpha_t (1-\alpha_e-\tau)\, c\cdot c_t + \alpha_c\tau]}{(1-\alpha_t\beta_t)} Y
\end{aligned}$$

Proof of Corollary 1. By differentiating equation (14) with respect to α_e, α_t, α_c, β_t, c, c_t, and τ it is possible to obtain the following inequalities; given the value ranges for the parameters, the first six are always satisfied, while the last only if the condition $\alpha_c \geq \alpha_t c c_t$ holds:

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

Proof of Proposition 2 By equating equation (1) to equation (9), and taking into account equations (2-4, and 10-12), it is possible to obtain the following expression.

$$\begin{aligned}
Y &= \left(C_l^f + C_l^c\right) + G + \left(I_l^f + I_l^o\right) \Rightarrow Y - C_l^f = C_l^o + G + \left(I_l^f + I_l^o\right) \\
Y &= T + R_e + C_l^f + c_t + S_f \Rightarrow Y - C_l^f = T + E + C_c^f + S_f \\
C_l^o + G + \left(I_l^f + I_l^o\right) &= T + R_e + C_c^f + S_f \\
\beta_l \widetilde{Y} + \tau Y(1-\alpha_c) + \left(I_l^f + I_l^o\right) &= \tau Y + \alpha_e Y + (1-\alpha_e-\tau)\, c\cdot c_t Y + (1-\alpha_e-\tau)(1-c) Y
\end{aligned}$$

$$\begin{aligned}
\left(I_l^f + I_l^o\right) &= \tau Y + \alpha_e Y + (1-\alpha_e-\tau)\, c \cdot c_t Y + (1-\alpha_e-\tau)\,(1-c)\, Y - \beta_l \widetilde{Y} - \tau Y\,(1-\alpha_c) \\
\left(I_l^f + I_l^o\right) &= (1-\alpha_e-\tau)\, c \cdot c_t Y + \tau Y + \alpha_e Y + (1-\alpha_e-\tau)\, Y - (1-\alpha_e-\tau)\, c - \beta_l \widetilde{Y} - \tau Y\,(1-\alpha_c) \\
\left(I_l^f + \beta_h \widetilde{Y}\right) &= (1-\alpha_e-\tau)\, c \cdot c_t Y + Y - (1-\alpha_e-\tau)\, cY - \beta_l \widetilde{Y} - \tau Y\,(1-\alpha_c) \\
I_l^f &= (1-\alpha_e-\tau)\, c \cdot c_t Y + Y - (1-\alpha_e-\tau)\, cY - \beta_l \widetilde{Y} - \beta_h \widetilde{Y} - \tau Y\,(1-\alpha_c)
\end{aligned}$$

By taking into account equations (13-15), and dividing with respect to K, it is possible to obtain equation (16)

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

Proof of Corollary 2 By differentiating equation (16) with respect to α_e, α_t, α_c, β_l, β_t, β_h, c, c_t, and τ, it is possible to obtain the following inequalities; given the value ranges for the parameters, only those which refer to α_t, β_l, β_t, β_h, and c are always satisfied.

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

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

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

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

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

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

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

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

Proof of Proposition 3. By substituting equation (16) in equation (17), it is possible to obtain the following result.

$$g^* = \gamma + \frac{(\gamma_u+\beta_h a_k \varepsilon)\,\gamma}{\left[1-(1-\alpha_e-\tau)\, c\,(1-c_t)-(1-\alpha_c)\,\tau-\beta_l\varepsilon\right] a_k-\gamma_u}$$

Proof of Corollary 3. *By differentiating equation (18) with respect to* α_e,

α_t, α_c, β_l, β_t, β_h, c, c_t, *and* τ, *it is possible to obtain the following inequalities:*

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

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 4: 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 5: [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	-0.58658	-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	-0.69308	-0.65975	-0.69023	-0.87623	-1.0311	-0.20615	-0.73266	-1.24387	-1.85889	-1.55132	-0.45234466	-0.95899
13	Sondrio	-0.89986	-1.52482	-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	-0.85559	-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	-0.92055	-0.84965	-0.8798	-0.57916	-0.58481	-0.15179	-1.28992	-0.45234466	-0.56151
17	Brescia	1.49902	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	-1.05593	-0.76038	-0.7455	-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	0.138613	-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	-0.26854
33	Trieste	7.147809	-0.38413	-0.60887	-0.6185	0.710055	-0.69909	-0.60796	1.60333	0.071289	0.067725	-0.1443	-0.24057001	0.524732
34	Imperia	0.33862	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	0.586373	0.327929	-0.27751578	0.495829
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	0.225596	-0.46745	0.045082	0.489848	0.115965	-0.37944	-0.68355	-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	-0.54983	-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	2.18755	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	-0.54556	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	0.063621
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	0.034265
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	0.559558	-0.587	-0.24352	-1.45705	1.17023	0.707164	-0.26765872	0.038617

Figure 6: 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	0.273336	-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	-1.57395	-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	0.299258	-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	0.688523	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	-0.60989	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	0.966035	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	0.321265	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	-1.42682	0.983256	-0.3192866	-0.40176
78	Salerno	-0.72109	-0.97874	-0.40813	0.304356	-0.23508	-0.39206	2.106592	-0.34855	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	-0.73898
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	0.489391	-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	-0.80958	-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	-0.37925	-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	-1.21365	-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 7: [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.

CORRELATION	North-West	North-East	Center	South	Islands	ITALY
North-West	0.628638					
North-East		0.797832				
Center			0.506264			
South				0.140142		
Islands					0.331475	
ITALY						0.240298

Figure 8: Correlation Matrix between CILP and CIEE in Italian macroregions (NUTS 1 level administrative units). Our elaboration on ISTAT data (2008-2010).