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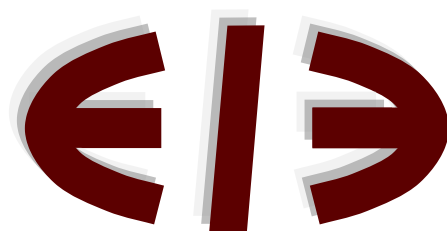
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**Measuring Organized Crime:
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MEASURING ORGANIZED CRIME: STATISTICAL INDICATORS AND ECONOMICS ASPECTS

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Abstract

One of the most negative factors that characterize Italian economy and society is the pervasive and oppressive presence of organized crime, affecting many aspects of the daily live and every sector of business. The data unfortunately show how this phenomenon is increasingly growing and involves more and more aspects of our society (Albanese & Marinelli, 2013).

In recent years there have been peaceful demonstrations but also concrete acts by the police that has made numerous arrests and thwarted many robberies. (Calderoni, 2014). However, the work done in recent years is not sufficient to definitively delete organized crime (OC), even more difficult and targeted intervention by the institutions is needed in order to definitively resolve this question. (Fedeli et al., 2017; Visco of the Bank of Italy, 2014).

This work introduces new indexes that measure and compare organized crime in different territories. We apply then to Italian provinces and we obtain a ranking at national level.

Keywords

Crime severity rate, index of criminality, organized crime, territorial indicators, economic impact, average edictal penalties.

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1. Introduction

Italy is historically the birthplace and some of the most notorious OC in the world (Cosa Nostra, Camorra, 'Ndrangheta). It is not a surprise that the economic literature states that the underdevelopment of the South of Italy has been caused by the presence of these Mafias. Actually, in most of the studies the presence of organized crime is measured either with a regional dummy or with the number of mafia murders.² We agree that the mafia murder can be a valid indicator of the presence of Mafias, even though the same statistics do not measure its intensity in a monotonic way. It is well known that an increase in mafia murders characterizes the periods of expansion of the clans, those in which the State increases its work of deterrence. However, the mafia murders are reduced both in the case where the clan is defeated (infrequent), and when they reach the so-called "pax mafiosa" in which the clans share the territory without conflict.

There is a great need to provide a statistical tool which on a territorial basis can describe the mafia phenomenon, in its different dimensions. The object of the present work is to propose composite indicators on a provincial basis that consider both the control activity of the territory (power syndicate) and the economic dimension (enterprise syndicate) of the OC.

The work is organized as follows: In Section 2 we introduce the economic impact of organized crime; in Section 3 we present statistical indexes for criminality analysis applied to OC; in Section 4 we analyse a two-dimensional approach; then, conclusion are discussed in Section 5.

2. The Economic Impact of Organized Crime.

Organised crime (OC) has a significant economic dimension: Schneider (2010) provides a preliminary estimate of USD 790 billion for worldwide revenues attributed to criminal activities. In the context of supply-side analysis, empirical results seem to support the opinion that OC has a negative impact on the level of economic activity and growth process (Powell et al. 2010; Daniele 2009).

The presence of OCs, like Camorra, Cosa Nostra, 'Ndrangheta in Southern Italy, Yakuza in Japan, or the Triads in China, drastically changes the economic structure of their area. A recent report³ from the Italian Business Group Confesercenti, said that Italian criminal organizations have reached such epidemic proportions in Italy that the four largest traditional mafias rake more than €120 billion each year, 7% of Italy's GDP.

² See Del Monte's recent contribution (2016).

³ SOS Business Report (2011).

They also have cash reserves larger than any bank, so much so that they arrive at about 65 billion of euros of ready money. Because of the financial crisis, these criminal organizations have broken their traditional strongholds of the South and other local regions and are involved in almost all aspects of the Italian economy.

Although criminal organizations differ from each other due to their origins and social and economic characteristics, they share some common traits. Based on the economic literature, Astarita et al. (2018) can define the main characteristics of the criminal organizations as follows:

- ✓ OC tends to act in geographic areas characterized by an institutional vacuum, to fill the gaps left by legitimate authority in regulating relationships between individuals.
- ✓ OC is involved in various activities, both economic and non-economic, both legal and illegal.
- ✓ OC develops various structures to coordinate their affiliates.
- ✓ OC uses violence or the threat of violence to achieve their goals.

The first two traits identify the activities carried out by OC; The first defines the local dimension of OC: criminal organizations find fertile ground where the institutions are lacking, in those realities where there is room to regulate individual relationships, including those relating to property rights. In these cases, OC may provide security services, acting as guarantor and broker in highly uncertain transactions.⁴ An institutional vacuum may be due to: the (geographical, ethnical or social) distance between the State and its population; the occurrence of recent wars, insurrections and other political changes; the presence of widespread illegal activities (Kumar and Skaperdas, 2009). In this context, legal institutions sometimes use criminal organisations to maintain indirect control over the territory.⁵ The second characteristic defines the global and economic dimension of OC. According to Schelling (1971), territorial control is required for a criminal organization to manage its trade; criminal organizations carry out many economic activities, some of which are illegal, such as producing and distributing drugs, human trafficking and counterfeiting. Others are legal, such as of waste disposal (subject widely discussed by Alisa et Alii, 2017). Taken together, these activities sketch an image of the global projection of OC (Fiorentini, 1999). Criminal organizations also operate in the legal sector, laundering money, to make it clean and erase any trace of their crimes.⁶ Through money laundering, OC

⁴ Varese (2001) explains the development of the Russian mafia as the result of the climate of uncertainty and political weakness after the collapse of Soviet Union, when many businessmen asked criminal groups to provide protection.

⁵ As reported by Hill (2003), in the early 20th century in Japan, political leaders and businessmen have demanded that criminal groups belonging to the Yakuza fight the threat of political radicalism.

⁶ This topic has been discussed in-depth both by Baron et Alii (2017) and by Lavezzi (2008)).

employs the proceeds of crime in the legal economy, infiltrating mainly the traditional manufacturing sectors dominated from small and medium-sized enterprises, low levels of technology and human capital, limited competition on the market and strong public sector presence. In addition, OC damages the economic growth especially of small and medium-sized entrepreneurs, both directly and indirectly. (Gabriel & Rodriguez-Pose, 2017)

The third and fourth traits respectively define the structure and tools used by OC to achieve its goals. As regards the structure concerned, OC uses hierarchical forms of coordination between its members, in particular, when it carries out activities aimed to regulate relationships between individuals and establishing territorial control. More flexible forms of organization prevail for those activities considered more closely based on profit (Paoli, 2002; M. Bouchard & Maloku C., 2014).⁷ Among the instruments used by OC to impose its authority, violence, or the threat of violence, is peculiar to such organizations. Schelling & Thomas (1971) show instead whereas violence is often associated with the adoption of hierarchical forms of coordination and the creation of monopoly or oligopolistic markets. In the literature there are several discussions about this aspect. Recently, Duga et Alii (2017) highlight the social and economic motives under the Mafia murders and list the areas of the city more risky.⁸ Note that the first and fourth characteristics underline the "anti-state" nature of the OC: the state should be the only legitimate subject to regulate individual relationships, using violence, but criminal organizations aim to take its place in regions in which they have strong local roots.

From a demand-oriented approach, as developed by Astarita et al. (2017), we can say that OC is an economic actor interacting with the families, the public sector and businesses, not only in the illicit market but also in legal ones. As shown in Figure (1), on the one hand, extortion, trade in criminal goods and corruption, depresses effective demand in legal markets by draining resources from the economy; on the other hand, money laundering and the consumption of legal goods by criminals increase the same demand.

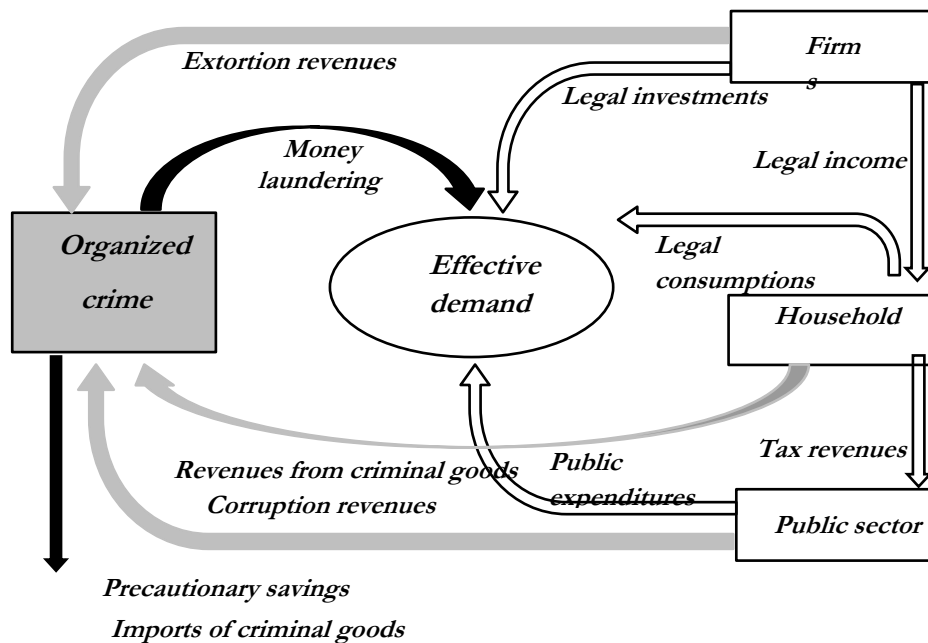
According to a more dynamic approach, developed by Goulas and Zervoyianni (2015) and Daniele (2009), Crime and OC can produce its long-term negative effects through three main channels. The first channel is related to the lower productivity of physical capital due to a decline in foreign savings and investment. In fact, less secure property rights lead to a poor business climate, discouraging innovation and entrepreneurship. The second channel tackles a redistribution of public resources from growth-enhancing policies, related to education and infrastructure, to policies that ensure protection against crime. The third channel is linked to a lower supply of manpower in legal

⁷ The United Nations Office for Drugs and Crime (UNODC, 2002) classifies 40 selected criminal organizations according to the forms of coordination: a rigid hierarchical structure prevails in Chinese and Eastern European organizations, while a Network structure is detected for Mexican and Colombian cocaine cartels.

⁸ In Naples, Mafia murders represent the majority of the murders committed in Naples, identifying also what are the areas of the city more risky.

activities, as individuals may choose to provide their services in illegal markets.⁹

Figure 1. The working of OC and effective macroeconomic demand.



Source: Astarita et al. (2018).

3. Statistical indexes for criminality applied to OC.

In the literature there are several indexes that try to give a synthetic measure of criminal phenomena, even on a spatial basis. A first step of the analysis is to apply these indicators to the subset of the crimes committed typically by the OCs: murders and attempted murders of the Mafia, mafia-type criminal associations, extortion, damage, fires and damages followed by fires, personal injuries, exploitation of prostitution, production and trafficking of drugs, theft and robbery, computer fraud, counterfeiting, smuggling of goods, money laundering, usury.¹⁰

⁹ See Neumann & Elsenbroich (2017).

¹⁰ For the selection process of the crimes see Asmundo (2011) and Calderoni (2011, 2014).

In this section we applied the following criminality indicators to OC: the crime severity rate (CS), the index of criminality (IC), the correct index of criminality (CIC), the compared index of criminality (CIC*) and the adjusted crime severity index (ACS).

- **Crime severity rate (CS).**

CS is a territorial-type comparison and provides a specific measure of the overall severity of the crimes reported in a year. It is calculated by comparing the number of crimes reported, multiplied by the respective average penalty, with the sum of the crimes themselves

$$CS = \frac{\sum D_i \cdot p_i}{\sum D_i}$$

where

D_i = crime i

p_i = average edictal penalty of crime i

- **Index of criminality (IC)**

IC is a temporal comparison calculated by comparing the total amount of the crimes reported in a year t, multiplied by the corresponding average edictal penalties, with the total amount of the same crimes reported in a year t', multiplied for the corresponding average edictal penalties.

$$IC_t = \frac{\sum_i D_{i,t} \cdot p_{i,t}}{\sum_i D_{i,t'} \cdot p_{i,t'}}$$

$D_{i,t}$ = crime i at time t

$D_{i,t'}$ = crime i at time t' > t

$p_{i,t}$ = average edictal penalty of crime i at time t

$p_{i,t'}$ = average edictal penalty of crime i at time t' > t

- **Corrected index of criminality (CIC)**

As the index of criminality, CIC is a temporal comparison. It is computed multiplying IC for the ratio between the population of the single province at time t' and the population of the same province at the time t < t'.

$$CIC = \left(\frac{\sum_i D_{i,t} \cdot p_{i,t}}{\sum_i D_{i,t'} \cdot p_{i,t'}} \right) \cdot \left(\frac{P_{t'}}{P_t} \right)$$

where

P_t = population at time t

$P_{t'}$ = population at time $t' > t$

We prefer CIC as more reliable than IC that does not consider the demographic difference during the time.

- ***Compared Index of criminality (CIC*)***

CIC* is a spatial comparison, obtained as the ratio between the IC computed for two different regions in the same year. (Giacalone & Cusatelli, 2017):

$$CIC^* = \left(\frac{\sum_i D_{i,a,t} \cdot p_{i,a,t}}{\sum_i D_{i,b,t} \cdot p_{i,b,t}} \right)$$

where

$D_{i,a,t}$ = crime in the first territory

$D_{i,b,t}$ = crime in the second territory

$p_{i,a,t}$ = average edictal penalty in the first territory

$p_{i,b,t}$ = average edictal penalty in the second territory

In Tables 1-4 we apply previous indexes to Italian Provinces Crimes data provided by Istat, for the period 2011-2016.

Table 1. Crime severity rate (CS) 2011, 2016 (top 5 and bottom 5).

PROVINCES	Crime severity rate 2011 (CS)	PROVINCE	Crime severity rate 2016 (CS)
Benevento	10,8168	Asti	11,0000
Caserta	10,814	Lecco	10,8481
Napoli	10,8047	Napoli	10,8347
Lecco	10,7967	Caserta	10,7973
Palermo	10,7496	Foggia	10,7649
<i>L'Aquila</i>	<i>10,2484</i>	<i>Udine</i>	<i>10,3105</i>
<i>Asti</i>	<i>10,2484</i>	<i>Ancona</i>	<i>10,3031</i>
<i>Terni</i>	<i>10,2358</i>	<i>Macerata</i>	<i>10,2230</i>
<i>Belluno</i>	<i>10,2222</i>	<i>Parma</i>	<i>10,2102</i>
<i>Potenza</i>	<i>10,1741</i>	<i>Ragusa</i>	<i>10,1875</i>

Source: Our elaboration on ISTAT data

Table 2. Crime Index for province (IC) (2011-2016) (top 5 and bottom 5).

PROVINCES	CRIME INDEX
Rieti	1,495114007
Alessandria	1,475578406
Biella	1,436930091
Taranto	1,379641485
Catania	1,364356215
<i>Parma</i>	<i>0,702954342</i>
<i>La Spezia</i>	<i>0,651898734</i>
<i>Sondrio</i>	<i>0,643019296</i>
<i>Asti</i>	<i>0,616463139</i>
<i>Trieste</i>	<i>0,607249932</i>

Source: Our elaboration on ISTAT data

Table 3. Crime index for provinces (CIC) (2011-2016) (*top 5 and bottom 5*).

PROVINCES	CRIME INDEX (CIC)
Alessandria	1,475159135
Rieti	1,463308101
Biella	1,454428707
Taranto	1,378733537
Catania	1,316347037
<i>Parma</i>	<i>0,671135646</i>
<i>La Spezia</i>	<i>0,647882427</i>
<i>Sondrio</i>	<i>0,639467901</i>
<i>Asti</i>	<i>0,617791262</i>
<i>Trieste</i>	<i>0,602298278</i>

Source: Our elaboration on ISTAT data

Table 4. CIC* for provinces (*top 3 to bottom 3*).

IC	Rieti	Alessandria	Biella	<i>Trieste</i>	<i>Asti</i>	<i>Sondrio</i>
Rieti	1	0,22	0,7	2,64	0,4	0,52
Alessandria	4,65	1	3,25	12,26	1,9	2,43
Biella	1,43	0,31	1	3,77	0,6	0,75
<i>Trieste</i>	<i>0,38</i>	<i>0,08</i>	<i>0,27</i>	<i>1</i>	<i>0,2</i>	<i>0,2</i>
<i>Asti</i>	<i>2,4</i>	<i>0,52</i>	<i>1,68</i>	<i>6,34</i>	<i>1</i>	<i>1,25</i>
<i>Sondrio</i>	<i>1,91</i>	<i>0,41</i>	<i>1,34</i>	<i>5,05</i>	<i>0,8</i>	<i>1</i>

Source: Our elaboration on ISTAT data

From the analysis of Tables 1-3 emerges that the top 5 provinces are ones typically not characterized by the massive presence of Mafia; instead, they are provinces with a high number of robberies.

Excluding robberies (a crime not necessarily due to organized criminal activity, but at most to individual initiatives or small groups) we compute a corrected version of CS.

Notice that the rankings in Table 1 (CS with robbery) and in Table 5 (CS without robbery) are significantly different.

Table 5. Crime severity rate (CS) no robberies, 2011 - 2016 (top 5)

PROVINCES	GRAVITY RELATIONSHIP 2011 (CS)	PROVINCES	GRAVITY RELATIONSHIP 2016 (CS)
Benevento	10,8168	Benevento	10,7008547
Caserta	10,8140	Lecco	10,55421687
Napoli	10,8047	Avellino	10,45728643
Lecco	10,7967	Foggia	10,42727273
Palermo	10,7496	Caserta	10,42337165

Source: Our elaboration on ISTAT data

CS provides a specific measure of the overall severity of the crimes reported in a year (Solivetti, 2016). Therefore, it does not go to identify the provinces with the highest number of crimes, but the incidence of the most serious crimes (in relation to the related average edictal penalties) on a specific territory, which in itself can also have a low overall number of crimes reported (such as Rieti and connecting rod). We can basically say that the crime severity ratio is an index that expresses a territorial comparison (Cicerchia, 1996).

IC expresses a temporal comparison, analysing the incidence of the same crimes, on the same territories, in two different times, t' and t. The correct crime index expresses the same comparison, then, inserting also the population of the territories themselves and the two times previously analysed, t' and t.

On the other hand, the number of crimes reported on a territory is quite different. To determine which provinces are "more virtuous" and those "less virtuous", it is enough to modify the severity formula by eliminating the denominator and multiplying only the sum of crimes reported in a given territory, for the average penalty of the crimes themselves, obtaining so a scale in descending order of the provinces with more (serious) offenses reported. In this way we obtain the Adjusted Crime Severity index (ACS) emerges.

$$ACS = \sum D_i \cdot P_i$$

Table 6. ASC for provinces (2011-2016) (*top 5 and bottom 5*).

PROVINCES	NUM (CS)
Napoli	121996
Roma	89499
Milano	78242
Torino	43191
Palermo	25111
<i>Rovigo</i>	<i>1077</i>
<i>Aosta</i>	<i>871</i>
<i>Isernia</i>	<i>834</i>
<i>Oristano</i>	<i>786</i>
<i>Belluno</i>	<i>552</i>

Source: Our elaboration on ISTAT data

4. The presence on the territory: two dimensional approach.

The previous section presented some crime indexes applied to the study of the Mafia. However, these methods do not seem to give a true picture of the phenomenon for two different reasons. First, the crimes are not the only indicators of the presence of organized crime in the territory but also other context variables or measures of the State fighting against crime should be taken into account. Second, there are at least two different dimensions (power and enterprise syndicates) that explain the phenomenon.

Asmundo (2011) proposes two different indexes for analysing the presence of OC in Italian Provinces using a selected set of crime statistics for the period 2004-2006 provided by ISTAT:

- *Power syndicate* = index that defines a series of criminal activities related to the control of the territory;
- *Enterprise syndicate* = index that expresses the ability to carry out illicit traffics and investment activities.

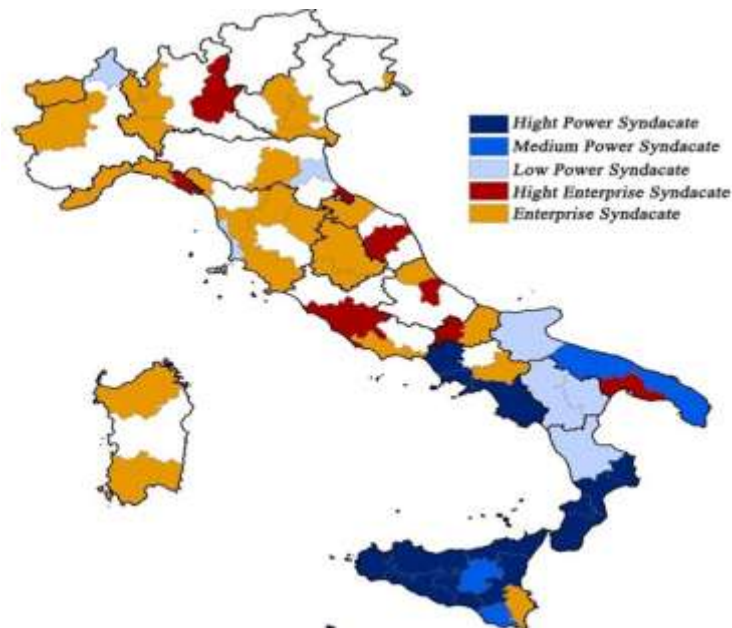
In Table 7 we list the variable used to build the composite indicators and in Figure (2) we present the graphical representation proposed by the author.

Table 7. Power syndicate and enterprise syndicate types

power syndicate	mafia-type association
	mafia-type murder
	Extortions
	number of confiscated assets
	number of municipal council dissolutions
Enterprise syndicate	criminal associations
	association for drug production or trafficking
	Robberies
	Usury
	exploitation of prostitution

Source: Rapport Res 2010, "Alleanze nell'ombra. Mafie ed economie locali in Sicilia e nel Mezzogiorno"

Figure 2. Power syndicate and enterprise syndicate in the Italian provinces (2004-2006)



Source: Asmundo 2011

Starting from the same resource of data, we propose a pair of adjusted indicators for the period 2011-2015: *the Adjusted Power Syndicate Index (APSI)* and *the The Adjusted Enterprise Syndicate Index (AESI)*.

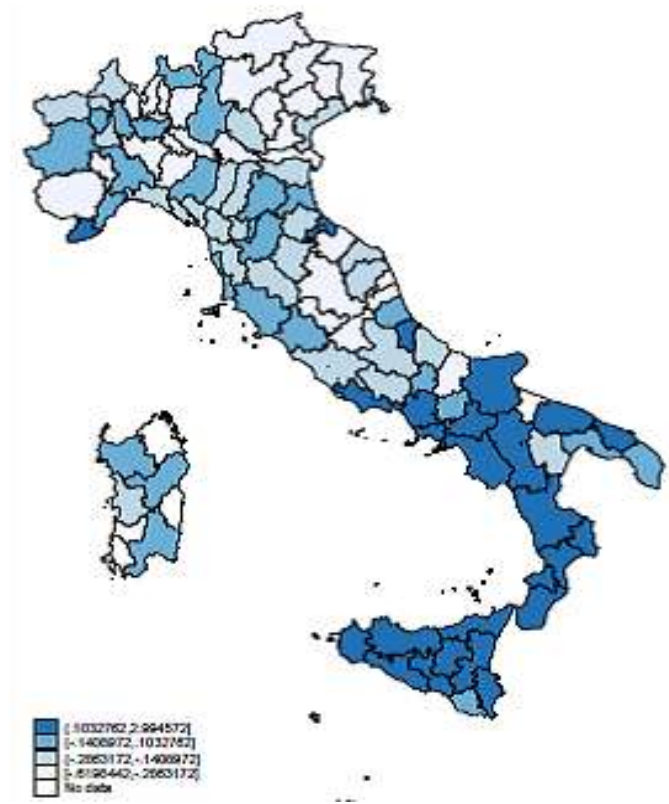
The Adjusted Power Syndicate Index (APSI), takes into account the statistics of: murders and attempted murders of the Mafia, mafia-type criminal associations, extortion, damage, fires and damages followed by fires, personal injuries, municipal councils (LAU 2 administrative units) dissolved by criminal infiltration, real estate confiscated from organized crime.

The Adjusted Enterprise Syndicate Index (AESI), takes into account the statistics of: exploitation of prostitution, production and trafficking of drugs, theft and robbery, computer fraud, counterfeiting, smuggling of goods, money laundering, usury and criminal associations, entrepreneurial activity in organized crime on the Territory.

As Asmundo (2011) we analyse the criminal statistics for Italy produced by the Italian National Institute of Statistics (ISTAT) on a provincial basis, and we reconstruct the activities of criminal organizations by distinguishing between offenses or crimes that are made to obtain and maintain control of the territory (the local power of OC) and offenses and crimes that measure their presence in legal and illegal markets (the economic extent of OC).¹¹ We compute for any selected crime the average number of offences reported in the period 2011-2015 on 10000 inhabitants. In this way we obtain ordinal and comparable crime-to-crime indexes. Then, we standardize the average number of any crime and compute both indicators as a weighted average with the edictal penalties as weights.

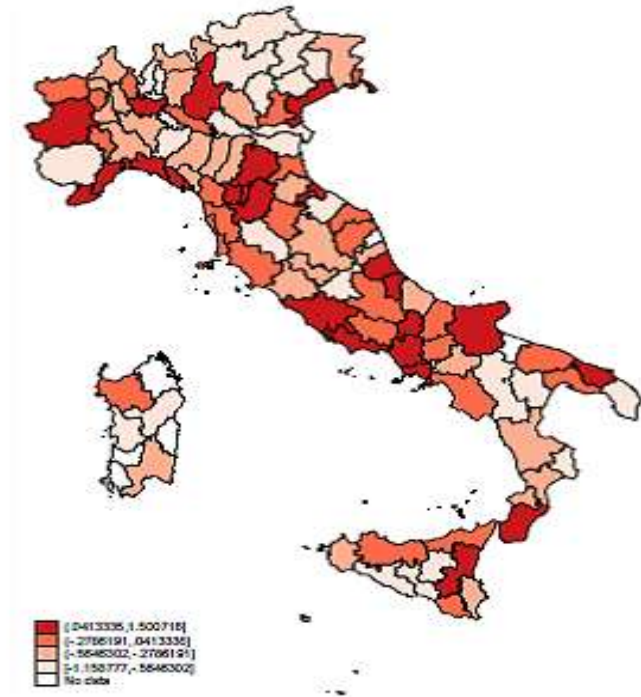
¹¹ These two dimensions, the first local and the second global, have suggested the use by some authors of the term "glocal" to indicate the geographical space of action of OC. The distinction arises from the will to separately measure respectively called "power syndicate" and "enterprise syndicate" of criminal groups (Daniele V., 2009).

Figure 3. *Adjusted Power Syndicate Index (APSI)*



Source: Our elaboration on ISTAT data

Figure 4. *Adjusted Enterprise Syndicate Index (AESI)*

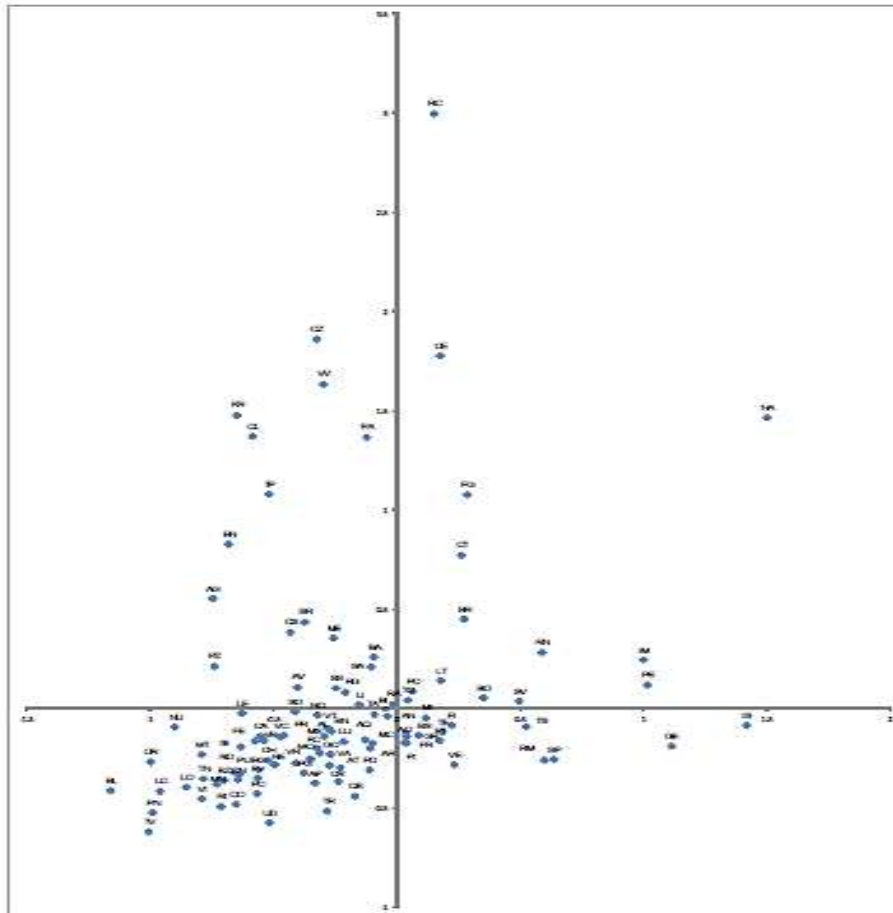


Source: Our elaboration on ISTAT data

By comparing the two indicators, APSI and AESI, one can classify the Italian provinces into four groups:

- Group A: APSI and AESI low (Treviso, Rovigo, Trento, Pordenone, Belluno, etc., mostly in Northern Italy).
- Group B: APSI and AESI low high (Naples, Caserta, Reggio Calabria, Foggia, Brindisi, Catania, etc.).
- Group C: APSI low and AESI high (Milan, Venice, Rimini, Imperia, etc.)
- Group D: APSI high and AESI low (Ragusa, Agrigento, Messina, Crotone, Enna, etc.)

Figure 5. Scatter Plot of the indexes APSI (ordinates) and AESI (abscissas).



Source: Our elaboration on ISTAT data

6. Conclusions and lines of future research

As widely discussed, both within the article and in the literature, criminal associations have a significant impact on the economy of a city and an entire state. Our goal is to provide a general framework, to highlight the Italian cities most affected by this evil using some of the most important statistical indexes present in the literature and applying to real data.

In the first part of this work we propose four indexes (CS, IC, CIC and CIC^{*}) typically used in crime statistics. Even though we select inly the crimes typically affered to OC, these statistics are not always an expression of organized criminal activity: the rankings

made according to the examined four indicators do not show the most dangerous provinces in Italy, but the changes in the time of the crimes and their impact on the territory itself, based on the type of average penalty and the population.

Then, in the second part of this work, according to the economic literature of OC, we propose a territorial analysis of the phenomenon able to exploit the two main dimensions of criminal organizations' activities: the power syndicate and the enterprise syndicate. We propose two separate indexes computed as the weighted average of the z-values of the distributions of any crimes across the Italian Provinces, where the weights are the associated edictal penalties.

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Appendix

In this appendix the data of the ISTAT from which the indices and the tables present in the previous paragraphs have been elaborated are shown.

For the sake of brevity, not all information has been reported because in Italy there are 110 provinces and 8,092 municipalities, but each table is made up only of the provinces that reported the best and worst results (period 2011-2015).

In the following tables there are also the elaborations of Giacalone M. Cusatelli C. (2017) as well as the previously mentioned indexes.

PROVINCES	MURDERS	MAFIA ASSOCIATION	EXTORTION	CRIMINAL ASSOCIATION	DRUGS TRAFFIC	ROBBERIES	USURY	EXPLOITATION OF PROSTITUTION	GRAVITY REALTIONSHIP 2011 (CS)	NUM (CS)	DEN (CS)
Torino	0	0	168	12	1441	2372	20	53	10,62247909	43191	4066
Vercelli	0	0	23	4	88	46	1	5	10,44311377	1744	167
Novara	0	0	37	4	117	131	0	10	10,62541806	3177	299
Cuneo	0	0	51	4	258	118	1	10	10,44570136	4617	442
Asti	0	0	7	14	43	60	1	8	10,2481203	1363	133
Alessandria	0	0	38	9	398	160	2	4	10,33387889	6314	611
Catania	3	5	157	14	741	1329	9	35	10,67030092	24467	2293
Ragusa	0	2	46	23	115	108	0	1	10,50508475	3099	295
Siracusa	2	0	52	3	223	168	2	4	10,57268722	4800	454
Sassari	0	0	38	2	374	108	4	4	10,29433962	5456	530
Nuoro	0	0	14	1	83	69	0	1	10,55952381	1774	168
Cagliari	0	0	41	11	471	238	2	5	10,36848958	7963	768
Oristano	0	0	2	6	56	14	0	0	10,07692308	786	78

PROVINCE	MURDERS	MAFIA ASSOCIATION	EXTORTION	CRIMINAL ASSOCIATION	DRUGS TRAFFIC	ROBBERIES	USURY	EXPLOITATION OF PROSTITUTION	RAPPORTO DI GRAVITA' 2016 (CS)	NUM(CS)	DEN(CS)
Torino	1	0	330	25	1516	1920	17	53	10,62040394	41016	3862
Vercelli	0	0	20	2	91	43	0	3	10,47798742	1666	159
Novara	0	0	75	2	104	96	2	21	10,70333333	3211	300
Cuneo	0	0	54	2	245	117	0	6	10,50707547	4455	424
Asti	0	0	66	1	57	74	0	3	11	2211	201
Agrigento	1	0	61	4	174	94	1	16	10,54415954	3701	351
Enna	0	0	15	1	70	28	3	2	10,32773109	1229	119
Catania	2	5	142	25	683	819	1	13	10,6112426	17933	1690
Ragusa	0	1	35	13	192	49	5	9	10,1875	3097	304
Siracusa	0	1	108	23	292	152	0	12	10,52380952	6188	588
Sassari	0	0	70	7	280	89	0	2	10,47544643	4693	448
Nuoro	0	0	52	0	117	40	0	0	10,68899522	2234	209
Cagliari	0	0	83	5	467	210	0	7	10,46502591	8079	772
Oristano	0	0	27	1	69	15	0	2	10,57017544	1205	114

PROVINCES	NUM (CS) 2011	NUM(CS) 2016	CRIMINALITY INDEX(IC)
Torino	43191	41016	1,053028087
Vercelli	1744	1666	1,046818727
Novara	3177	3211	0,989411398
Alessandria	6314	4279	1,475578406
Biella	1891	1316	1,436930091
Genova	15244	15077	1,011076474
La Spezia	2369	3634	0,651898734
Palermo	25111	22623	1,109976573
Messina	5885	6979	0,843244018
Catania	24467	17933	1,364356215
Siracusa	4800	6188	0,775694893
Sassari	5456	4693	1,16258257
Cagliari	7963	8079	0,985641787
Oristano	786	1205	0,652282158

PROVINCE	POPULATION 2011	EX. CRIME 2016	EX. QUOTIENT 2016	POPULATION 2016	RATE OF GROWTH 2011/2016	CRIME INDEX (IC)	CORRECT CRIME INDEX (ICC)
Torino	2247780	330	14,5	2275862,069	1%	1,053028087	1,040034677
Vercelli	176941	20	11,5	173913,0435	-2%	1,046818727	1,065044627
Novara	365559	75	20,3	369458,1281	1%	0,989411398	0,978969507
Alessandria	427229	50	11,7	427350,4274	0%	1,475578406	1,475159135
Biella	182192	18	10	180000	-1%	1,436930091	1,454428707
Palermo	1243585	185	14,6	1267123,288	2%	1,109976573	1,089357468
Messina	649824	104	16,3	638036,8098	-2%	0,843244018	0,858822237
Agrigento	446837	61	13,8	442028,9855	-1%	0,958119427	0,968541034
Catania	1078766	142	12,7	1118110,236	4%	1,364356215	1,316347037
Ragusa	307492	35	10,9	321100,9174	4%	1,000645786	0,958236359
Siracusa	399933	108	26,8	402985,0746	1%	0,775694893	0,769820039
Sassari	328043	70	14,5	482758,6207	47%	1,16258257	0,789995367
Cagliari	550580	83	10,8	768518,5185	40%	0,985641787	0,706130877
Oristano	163916	27	18,3	147540,9836	-10%	0,652282158	0,72467649

PROVINCE	GRAVITY RELATONSHIP 2011 (CS)	PROVINCES	GRAVITY RELATIONSHIP 2016 (CS)	PROVINCE	CRIMINALITY INDEX (IC)	PROVINCE	CORRECT CRIMINALITY INDEX (ICC)
Benevento	10,8168	Asti	11,0000	Rieti	1,495114007	Alessandria	1,475159135
Caserta	10,8140	Lecco	10,8481	Alessandria	1,475578406	Rieti	1,463308101
Napoli	10,8047	Napoli	10,8347	Biella	1,436930091	Biella	1,454428707
Lecco	10,7967	Caserta	10,7973	Taranto	1,379641485	Taranto	1,378733537
Palermo	10,7496	Foggia	10,7649	Catania	1,364356215	Catania	1,316347037
Imperia	10,2530	Enna	10,3277	Belluno	0,737967914	Verona	0,74007785
L'Aquila	10,2484	Udine	10,3105	Parma	0,702954342	Parma	0,671135646
Asti	10,2481	Ancona	10,3031	La Spezia	0,651898734	La Spezia	0,647882427
Terni	10,2358	Macerata	10,2230	Sondrio	0,643019296	Sondrio	0,639467901
Belluno	10,2222	Parma	10,2102	Asti	0,616463139	Asti	0,617791262
Potenza	10,1741	Ragusa	10,1875	Trieste	0,607249932	Trieste	0,602298278

PROVINCES	MURDERS	MAFIA ASSOCIATION	EXTORTION	CRIMINAL ASSOCIATION	DRUGS TRAFFIC		USURY	EXPLOITATION OF PROSTITUTION		GRAVITY RELATIONSHIP(CS) 2011 NO ROBBERY
Torino	0	0	168	12	1441		20	53		10,09386068
Vercelli	0	0	23	4	88		1	5		10,23140496
Novara	0	0	37	4	117		0	10		10,33333333
Alessandria	0	0	38	9	398		2	4		10,09756098
Crotone	0	1	16	4	85		0	2		10,18518519
Vibo Valentia	1	2	32	5	69		2	5		10,3362069
Trapani	0	0	53	4	157		1	10		10,36888889
Palermo	2	10	121	9	593		8	7		10,22
Messina	1	1	85	6	264		6	10		10,32171582
Catania	3	5	157	14	741		9	35		10,21576763
Siracusa	2	0	52	3	223		2	4		10,32167832
Cagliari	0	0	41	11	471		2	5		10,08490566
Oristano	0	0	2	6	56		0	0		9,875