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Organized crime and foreign direct investment: the Italian case

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Organized Crime and Foreign Direct Investment: The Italian Case

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Abstract

The objective of this paper is to examine the impact of crime on FDI inflows in 103 Italian provinces. The incidence of criminality is measured through the number of complaints for different kinds of crime. The analysis has been conducted using different estimation methods for panel data. The results show how the correlation between organized crime is both negative and significant. This relationship appears strong even when, in specifications, it is considered as an indicator of financial incentives for investment. Furthermore, such a correlation between crime and FDI seems to be valid only for certain crimes, traditionally related to the presence of Organized crime of the *mafia* type. Even if these results suggest that crime is, in itself, a deterrent for foreign investors, this does not exclude the possibility that a high incidence of (certain) crimes may be perceived as a signal of a socio-institutional environment unfavourable for FDI.

JEL Code: F23, R30, R38.

Keywords: FDI determinants, Italy, Mezzogiorno, crime, regional attractiveness.

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1. Introduction

The south of Italy, known as the *Mezzogiorno*, receives a marginal share of foreign direct investment (FDI) inflows in Italy. For instance, in the period 2005-06 the eight southern Italian regions have attracted less than 1% of total FDI inflows. In Campania, the southern region with the best performance, FDI amounted to only 0.2 % of all those received in Italy.

The low degree of attractiveness of the Mezzogiorno area for foreign investors is also illustrated by the “geography” of the multinational firms located in Italy. In 2006, the firms with foreign participation in southern Italian regions amounted to only 5% of the Italian total. For the sake of comparison, simply consider that in Lombardy alone there were ten times as many firms with foreign capital as in the entire area of the Mezzogiorno.

Despite this performance, there are several factors in the Mezzogiorno which, at least potentially, could attract the location of foreign firms. First of all, the Mezzogiorno represents a major share of the domestic market: this area has a population of almost 21 million people, that is 35% of the nationwide total. Secondly, there is a considerable workforce available (many of whom are skilled), while the cost of labour is, on average, lower than the Italian national average. Furthermore, in many southern regions there are extensive uncongested industrial zones which are able to offer business location benefits (IPI, 2005). Finally, firms that invest in the Mezzogiorno — especially in regions included the EU’s “convergence” objective — may benefit from a series of financial incentives provided by EU programmes and by national laws.

However, against such potential benefits, there are several business location disincentives in the Mezzogiorno which limit its attractiveness (Basile, 2001). One of the factors which can negatively affect the choices of potential investors, whether foreign or Italian, is the historically rooted presence of several criminal organisations: *camorra*, *mafia*, *‘ndrangheta*, *sacra corona unita*. The impact of organized crime is particularly high in certain regions, notably in Calabria, Campania, Sicily and Puglia. Crime may be considered an additional risk (or cost) for business activity. Especially if of the *mafia* type, crime may condition business operations in various ways: racketeering; retail market limitations; being forced to take on suppliers of raw materials or being pressurised to employ workers; distortions to the good and correct functioning of markets and local institutions (Centorrino and Signorino, 1993; Centorrino *et al.* 1999). In general, the presence of crime is one aspect of a somewhat unfavourable business climate; as a consequence, it could be a disincentive for foreign and national investments.

Besides having been highlighted many times by scholars, economic operators and politicians, the deterring effect of crime on foreign investment has been amply confirmed in the surveys conducted among foreign investors (Marini and Turato, 2002; GPF-ISPO, 2005).

While the links between crime and regional economic development have been examined in both theoretical and empirical terms, little attention has been paid to estimating the effects on foreign investment. By using data for different kinds of crime, through a panel data analysis, this study analyses the impact of crime in FDI inflow in 103 Italian provinces during the period 2002-2006. The results show how the correlation between organized crime and FDI inflow is both negative and significant. The correlation results as being robust even when, in the regressions, an indicator for financial incentives to investments is included.

In general, the conclusions reached in this study suggest that the quality of the local institutional environment influences the location of foreign companies and also, in the presence of an unfavourable business climate, that the financial incentives and subsidies to firms result as scarcely efficient with regard to FDI. Although our analysis suggests that organized crime is, in itself, a disincentive for investment, this does not exclude the possibility that it may be perceived by foreign investors as a signal of a socio-institutional system that is unfavourable for FDI.

The remainder of the paper is as follows. Section 2 illustrates the regional distributions of FDI inflows in Italy and its determinants. Section 3 offers a brief review of the economic effects of crime. Section 4 describes the data and the results of the empirical analysis. Finally, section 5 contains some conclusive remarks.

2. Distribution and determinants of FDI

2.1. Regional and provincial distribution

In all countries FDI tends to be concentrated in certain areas. In Spain, for example, Madrid and Cataluña are the main destinations of FDI. In France, in Greece and in the UK it is also possible to find clear differences between the various regions¹. In Italy the degree of FDI concentration is very high. As shown by Table 1, Lombardy has received 69% of the FDI inflows in Italy in the two-year period 2005-06, followed by Piedmont (13%) and Lazio (7%). The shares of the other regions are far less. Overall, the Centre-North has received almost all the FDI inflows in the Country. The share of the Mezzogiorno area is residual, amounting to less than 1% of the national total. Equally high regional differences are encountered if we consider

¹ For the French case, cfr. Mayer (2004); for Spain, Hermosilla and Ortega (2003); for Britain, Devereux *et al.* (2006); for Greece, Kokkinou and Psycharis (2004).

the ratio of FDI to GDP. In the five-year period 2000-05, net FDI inflows on average represented 1.6% of GDP in the Northwest, 0.6 in the Central regions and just 0.1% in the Southern ones.

Table 1. FDI inflows in the Italian regions in percentage of Italy, 2005 and 2006

Regions	2005	2006	Regions	2005	2006
Abruzzo	0.1	0.1	Piedmont	15.5	11.4
Basilicata	0.2	0.2	Puglia	0.1	0.2
Calabria	0.0	0.0	Sardinia	0.0	0.1
Campania	0.3	0.2	Sicily	0.0	0.0
Emilia Romagna	2.5	3.7	Tuscany	3.6	1.9
Friuli	0.1	0.1	Trentino A. A.	0.2	0.5
Lazio	6.2	7.8	Umbria	1.0	0.8
Liguria	0.5	0.7	Valle d'Aosta	0.0	0.0
Lombardy	69.7	68.2	Veneto	4.3	4.2
Marche	0.1	0.0	<i>Centre-North</i>	<i>99.2</i>	<i>99.3</i>
Molise	0.1	0.0	<i>Mezzogiorno</i>	<i>0.8</i>	<i>0.7</i>

Data refer to FDI gross flows IDE and do not include trade credits and transactions in the banking sector. Source: Italian Exchange Office (UIC).

At the provincial level, the degree of concentration of FDI is even greater. Table 2 reports the first and last ten provinces in the ranking on the basis of FDI inflows in the period 2004-06. Notably, the province of Milan alone absorbs over 66% of total FDI and the top three are provinces with large urban areas. Moreover, the data show that nine of the last ten places are held by provinces in the Mezzogiorno area.

Table 2. Top and bottom provinces ranked for FDI inflows in the years 2004-06, in % of Italy

Rank	Provinces	FDI	Rank	Provinces	FDI
1	Milan	66.46	94	Foggia	0.001
2	Turin	9.25	95	Ragusa	0.001
3	Rome	6.33	96	Reggio Cal.	0.001
4	Florence	3.06	97	Gorizia	0.001
5	Verona	2.86	98	Agrigento	0.001
6	Bologna	2.63	99	Catanzaro	0.001
7	Cuneo	2.03	100	Caltanissetta	0.001
8	Terni	0.99	101	Enna	0
9	Alessandria	0.75	102	Vibo Valentia	0
10	Vicenza	0.56	103	Oristano	0

Source: Calculations on Italian Exchange Office data.

The presence of foreign firms in the Italian regions may be examined in depth by means of data on the number of firms with foreign participation located in Italy. Of over 7,100 firms with foreign participation operating in Italy in 2006, only 318 (i.e. 4.5% of the total) were headquartered in southern Italy (Tab. 3). By comparison, in Lombardy alone the number of firms with foreign-participation was ten times higher than in the entire Mezzogiorno.

Table 3. Number, employees and sales of foreign-participated Italian firms

Years	Firms		Employees		Sales	
	Centre-North	South	Centre-North	South	Centre-North	South
2001	6,359	329	850,698	62,136	315,290	18,611
2004	6,739	347	867,294	60,071	346,353	18,031
2006	6,776	318	811,144	46,895	378,597	15,481

For the region where the firm is headquartered; data refer to January 1st in each of the years considered. *Source:* Elaborations of the REPRINT data base, ICE - Milan Polytechnic.

As observed for FDI flows, the case of Lombardy is striking: the region contains half of the all Italian firms that have foreign capital, and generates over 45 % of employment and sales of all such firms. As observed for FDI inflows, Lombardy is followed by Piedmont, Lazio and Emilia. Overall, firms with foreign participation in the Centre-North generated 95% of sales and employment of all firms with foreign capital in Italy in 2006. These data confirm that the geography of foreign investment in Italy is characterised by profound regional differences and that the Mezzogiorno area is, overall, completely marginal with respect to the dynamics of the passive internationalisation of Italian firms.

2. 2. Determinants of FDI inflows

The empirical literature on the determinants of FDI is very extensive². With particular reference to the European Union, the results of some of principle studies show how the location of foreign firms is guided mainly by the firms' specific characteristics and, to a lesser extent, by observable national or regional factors. Although these factors are diverse, according to the Countries considered, the empirical literature on the determinants of FDI indicates some fundamental characteristics that are common to the Countries or regions in which foreign investors tend to invest (Crozet et al., 2004; Agiomirgianakis et al. 2004; Devereux and Griffith, 2003; Basile et al. 2005). At a national level, FDI tend to locate in certain regions within countries that:

- offer access to a large national market (national market size effect);

² To thoroughly examine the models and studies on determinants and the effects on FDI one can cite, for example, the volume published by Barba Navaretti and Venables (2004).

- have a geographical proximity to or common borders with the home country; have a language (or culture) in common with the home country;
- have a low corporate tax regime;
- have a relatively high level of GDP per capita and a low unemployment level.

Once the Country has been chosen, the localisation of FDI investment tends to be influenced by certain characteristics that are specific to the areas (Barry et al. 2001; Artige and Nicolini, 2005; Devereux et al. 2006; Alegría, 2006). One study on the factors of localisation conducted by the European Commission (2006), on a sample of approximately 100,000 foreign companies, showed how, in the European Union context, the FDI tend to locate in regions with:

- a large share of foreign investors (signal effect);
- good infrastructure and accessibility;
- a highly educated workforce and a high level of R&D expenditure;
- the presence of agglomeration economies, determined by a large presence of competitors, clients and suppliers within the firm's industry.

In order for FDI to constitute an important factor in regional development, many Countries offer incentives or subsidies to foreign companies that invest in disadvantaged areas or in regions that lagging behind in development terms.

Nevertheless, from empirical studies it emerges that financial incentives (in their various forms) are not a decisive determinant for the degree of attractiveness of a country or region. A study of the Irish case shows that regional policies, despite promoting foreign business location in disadvantaged areas of the country, have acted almost “selectively” on firms with a low technological content (Barrios *et al.* 2003). However, in Italy, as in France, Spain, or the UK, research shows that financial incentives for investments (e.g. grants or easy-term loans), tax relief or EU structural policies do not have a significant effect in attracting foreign investment in underdeveloped regions (Mayer, 2004; Pelegrin Solè, 2002; Devereux *et al.* 2006; Daniele, 2007).

A recent strand of literature has been devoted to the investigation of how FDI is influenced by cross-country differences in political, institutional and legal systems. There are several reasons for which the quality of institutions may be important for FDI. The first reason is that — according to the studies on long-term growth determinants — efficient institutions improve productivity prospects and, consequently, this attracts investors. The second reason is that a poor institutional environment can bring about additional costs for firms: this can be the case with crime and corruption (Broadman and Recanatini, 2000; Wei, 2000; United Nations, 2007). A further reason is that – due to high sunk costs – FDI is highly exposed to uncertainty, including that stemming from poor government efficiency, graft or the

weak enforcement of property rights and of the legal system (Bénassy-Quéré et al., 2005).

Studies generally confirm that a “good” institutional environment is an important determinant of FDI inflows. This institutional environment — or governing infrastructures — includes, for instance, the ease of creating companies, government effectiveness, security of property rights, the efficiency of judicial systems and the lack of corruption (Globerman and Shapiro, 2002; Habib and Zurawicki 2001). The World Bank (2001) has emphasised how the attraction of investments is greater in areas where the public institutions are perceived as being more credible by the community of investors. This means that they are retained to be capable and that they intend to put into practise the policies undertaken, as well as having administrative and judicial approaches that are coherent and foreseeable, together with acceptable levels of crime and corruption. Some case-studies, such as that for Central American countries (United Nations, 2007) and Russia (Broadman and Recanatini, 2001), further suggest that the absence of violence and crime is an important aspect of an institutional environment favourable for FDI. From the international literature it emerges quite clearly, therefore, how the quality of the Institutional system and the business climate influence the decisions regarding the localisation of foreign companies. Such an effect could also be relevant at a regional level when, as in the Italian case, notable differences exist in the quality of the local socio-institutional environments.

3. Crime as an economic disincentive

3.1 The economic effects of crime

In the Italian case, the effects of organized crime on economic development have been widely examined from the sociological and historical points of view, but far less from the economic viewpoint. Often, in fact, economists have concentrated more on the determinants of criminality than on the effects that it produces on the economy (Marselli and Vannini, 2003; Buonanno, 2006). Some recent studies have, however, shown how organized crime can have relevant effects on both economic growth and on the local Institutional system. For instance, Centorrino and Ofria (2008) prove the negative effect of the variable “crime” on the rate of growth of labour productivity, in particular in the Southern regions, while Peri (2004), examining the economic performance of the Italian provinces over the period 1951-93, finds a strong and negative correlation between organized crime (measured as a high murder rate) and economic development. There are many ways in which crime conditions the legal economy. One of the most evident is the racket of extortion. The activity of extortion is typical of the criminal organisations of the *mafia* type. It has two main aims: to ensure a fixed income, generally directed to financing other illegal

activities, and it allows the criminal organisations to exercise a widespread control over the territory in which a clan exercises its power.

Criminal organisations of the *mafia* type also employ indirect forms of control over the local economy. Often, in fact, the clans force the legal firms to purchase raw materials from specific suppliers, and to hire personnel that are linked to the same organisations or to respect obligations or limits to sales markets. The activity of extortion and the control over a part of the legal economy has been well documented in judiciary inquests and the subject of much research (La Spina and Lo Forte, 2007; Parliamentary Commission, 2008)³. Numerous inquests testify how organized crime manages to condition the activities even of large businesses involved in some programmes of public works regarding the Southern regions (Confesercenti, 2007).

In general, crime increases the risks for (and the costs of) investment, and therefore has a depressive effect on the economy. In particular, crime discourages investment by raising the economic risks to company activity deriving from possible attacks, the destruction of property and intimidation. Insurance against such risks implies financial expenses, both in the case of acquiescence (the payment of bribes, being obliged to purchase raw materials from firms with criminal connections), and in the case of self-defence (private police and security measures).

A further depressive effect on the economy derives from the operations of the same “entrepreneurs of crime”. Through the use of violence or corruption to impose monopolies, the criminal ‘firm’ conditions the functioning of the markets and the Institutional system, distorting the allocation of resources and capturing a part of Public Expenditure, including European funds for regional development (Commissione antimafia, 2008). The result is that the functional capabilities of the market and the Institutions are compromised and, therefore, the capacity for development of the same local economies (Centorrino and Signorino, 1993).

The presence of organized crime imposes notable economic (and social) costs in many areas of Southern Italy. One such cost that is rarely considered derives from the fact that the criminal presence tends to discourage both internal and foreign investment. Confirmation of this comes from some surveys directed at potential investors, both Italian and foreign.

One survey conducted by Marini and Turato (2002) on a panel of businessmen from the North-East of Italy, involved in the process of

³ According to the data contained within the Annual Report of the Parliamentary Commission of Inquest on criminal organisations (2008), in the area of the judicial district of Catanzaro, in Calabria, companies which resist the pressures from Organized crime are, practically, non-existent; furthermore, the report carries the denouncements made by the representative of a large Tour Operator, Parmatour, who declared that tourist resort villages in Calabria were systematically subject to extortion.

internationalisation, shows how almost the entire total of those interviewed (92.6%) believed the presence of criminality to be the principal block to investment in the Mezzogiorno area. An enquiry conducted on behalf of the Ministry of Economy in 11 Countries confirms that in the perception of businessmen the Mezzogiorno appears an area lacking conditions of security (Gpf-Ispo, 2005)⁴. The deterrent effect of crime for foreign investors with regard to the Mezzogiorno has been highlighted for years by economists. Sylos Labini (1985), for example, has observed how the presence of organized crime in the South forces companies to transfer elsewhere, discouraging those who intend to invest. Mancur Olson (1984) has underlined how, as a result of organized crime, Southern Italy has accumulated, over a period of time, a vast range of extra-governmental Institutions that have corroded economic space, increasing the risks for investment. For this reason — Olson argues — whoever intends to start a new business in that kind of environment, will need to confront a series of risks that he could easily avoid if he were to start the business in amore less “risky” environment.

Although wealthy with implications, the problems raised by Paolo Sylos-Labini and Mancur Olson over twenty years ago have received little attention in economic literature and in empirical literature in particular. Only recently, in fact, have some studies on the determinants of FDI considered the crime rate among the explicative variables utilized in the regressions, showing how, in Italy, high crime rates tend to be negatively correlated with the regional capacity to attract foreign investors (Basile, 2001; Daniele, 2006).

In respect to these studies – that are not expressly aimed at analysing the impact of crime on FDI – our analysis differs both for method and for content. It uses, in fact, panel data for a disaggregated level of territory (103 provinces) and different estimate procedures; furthermore, it considers different measures of criminality, paying particular attention to that of the *mafia* type. As far as we are aware, our research constitutes the first attempt explicitly aimed at estimating the impact of crime on FDI in the case of Italy.

⁴ The issue of security and its importance for internal and external investments in the *Mezzogiorno* has long been part of the political and economic debate in Italy. Recently, a series of events has made this issue one of the most urgent for development in southern Italy. The Federation of Anti-racket and Anti-usury Associations (FAI) has proposed the establishment of a “security tutor” for foreign firms interested in investing in the *Mezzogiorno* (FAI, *Antiracket tutoring, Experimental three-year project*, Naples, 12 December 2007). One of the reasons behind the above project was the declaration made by the President of the Italian Council of Ministers at the Anti-mafia summit, on November 17th 2006, according to which organized crime represents a significant deterrent for foreign firms interested in investing in southern Italian regions.

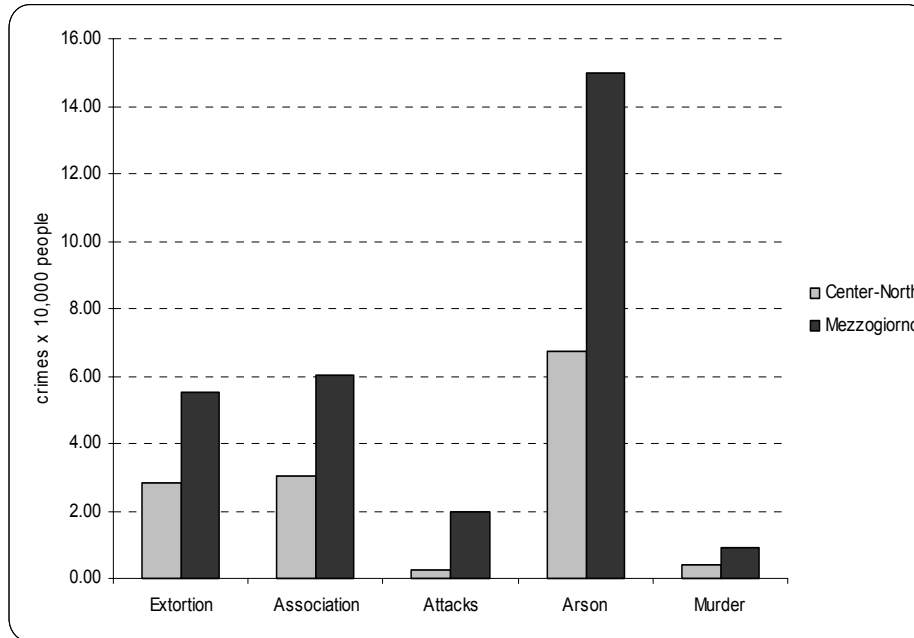
3.2. *Measuring organized crime*

It is not easy to quantify the territorial spread of organized crime (in particular the mafia). Data on the effective dimension of the criminal phenomenon are lacking, in fact. In this study, in order to estimate the incidence of organized crime we have based our calculations on official data relative to different crimes. It is important to make clear that not all offences are typical of organized crime: some, such as theft, corruption, fraud or sexual violence are not, in general, committed by criminal organisations, above all by the mafia. For these reasons, and on the basis of studies of the subject, we have constructed an index of organized crime based only on certain crimes: extortion, bomb attacks, arson, murder and criminal associations.

Extortions represent a typical crime committed by *mafia* organisations. As judiciary inquests testify, a *mafia clan* that does not exercise its power over a territory through the racket of extortion does not exist. However, official data notably underestimate the numbers of crimes committed, and in particular in the southern regions. Whenever extortions are imposed by the *mafiosi*, only a small number of the victims, in fact, denounce the crime. Estimates and the inquiries into victimisation show how in many provinces in the South the spread of the phenomenon is, in fact, much greater than that indicated by the data. According to some estimates the 'racket of kick-backs' touches 70% of Sicilian businessmen, 50% of those in Calabria, 40% of those in Campania, and 30% of those in Apulia, for a total of over 120,000 businessmen involved in these four regions (Confesercenti, 2007). In the case of Sicily, extortions would represent 1.3%, overall, of the regional GDP (Asmundo, an Lisciandra, 2008).

Since the number of complaints does not represent, if not only very partially, the effective extent of the racket, it is necessary to consider other crimes which, together with that of extortion, are symptomatic indicators of the activities of organized crime in a given territory. Such crimes are bomb attacks and arson, which are carried out to threaten and intimidate the economic operators or politicians and which, because of their characteristics, cannot be concealed by the victims as often happens, however, in the case of extortion. Furthermore, since the clans tend to impose their control over a territory through violence and conflict, we have also considered the incidence of murder in the index. Finally, the last crime we considered regards the number of people denounced for criminal association, including *mafia* type associations, that is those crimes foreseen under Articles 416 and 416-bis of the Italian Penal Code. In summary, the incidence of organized crime is given by the sum of the five crimes (extortion, bomb attacks, arson, criminal association and murder) per 10,000 inhabitants. In the period 2001-05 these crimes represented approximately 1% of the cumulative total of all crimes denounced in Italy.

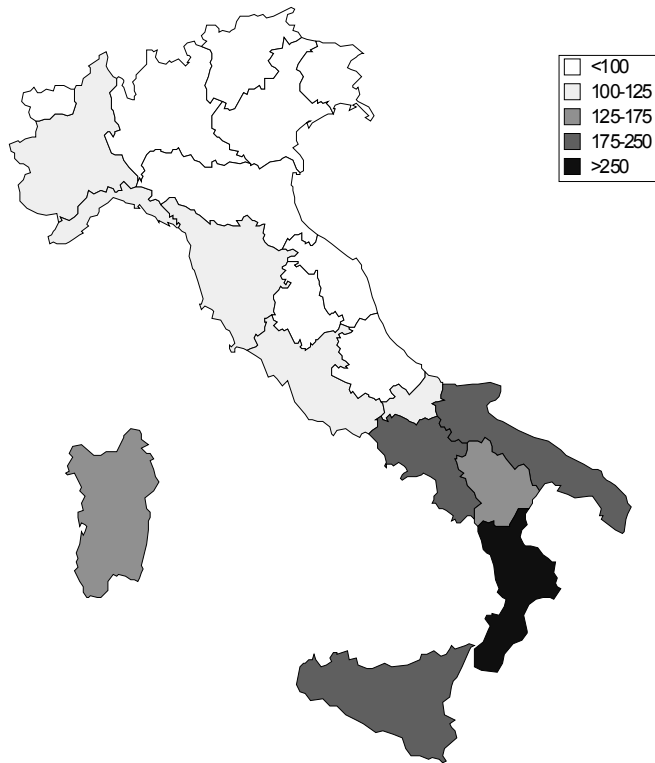
Fig. 1. Crime incidence per 10,000 inhabitants, 2000-05 (cumulated values)



Source: Calculations on Istat data.

In Fig.1 the incidence of the five crimes that we considered is shown. It can be seen how, on average, the number of these crimes for every 10.000 inhabitants is far higher in respect to the rest of the country. Significant differences also clearly exist in the incidence of crime within the Mezzogiorno area. The indices of crime are, in fact, extremely high in Calabria, Campania, Sicily and Apulia, or rather in those regions where the *mafia* organisations, *cosa nostra*, *'ndrangheta*, *camorra* and the *sacra corona unita*, are historically based.

Fig. 2. Organized crime index, 2001-2005. Cumulated values per 10,000 inhabitants (Italy = 100)



Source: Elaborated from ISTAT data, "Territorial information system on justice".

Fig.2 illustrates the "geography of crime" through the index of organized crime as calculated by us. Besides making clear the existence of significant differences between the North and South, the criminal geography illustrated in Fig.2 seems to reproduce fairly faithfully the "map" of the *mafia families* that emerges from judicial enquiries and from reports compiled by the Institutions that deal with criminal phenomena (Commissione Antimafia, 2008). On the basis of these indices we shall examine the impact of crime on FDI in the following paragraph, seeking to verify through the data whether, as the entrepreneurs interviewed in the surveys and numerous economic analysts and politicians maintain, crime is an effective block for potential foreign investors.

4. The empirical analysis

4.1. Methodology and data

Methodology. To estimate the impact of crime on FDI we constructed a dataset comprising observations for 103 provinces for the period 2002-06, obtaining a panel composed of 515 observations. Our empirical exercise uses a log-linear equation that is consistent with the theoretical background on the determinants of FDI inflows. The basis equation takes the following form:

$$FDI_{it} = \alpha_i + \beta_1 X_{it-1} + \beta_2 Crime_{it-1} + w_{it} \quad [1]$$

where i represents province, t time and $w_{i,t} = \varepsilon_i + u_{i,t}$ is the error term, in which ε_i is the cross-section, or individual specific, error component and $u_{i,t}$ is the combined time series and cross-section error component. The dependent variable is the log of FDI inflow in the provinces, $X_{i,t-1}$ is a set of lagged control variables, while $Crime$ is a measure of the incidence of crime. We have estimated Eq.1 by different methods. Other than the pooled OLS method, shown by comparison in Table 4, we used a random effects estimator (RE). The choice of this estimator, rather than a fixed effects (FE) model, was based on a series of heuristic and statistical considerations.

The first consideration regards the efficiency of the estimators. As is known, when N (the number of cross-sectional units) is large, and T is small, the results obtained with FE and RE models can differ greatly. Bearing in mind the assumptions at the basis of the RE model, and in particular the absence of correlation between the individual specific error component ε_i and the X 's regressors, it is possible to demonstrate that in a panel of data where N is large and T is small, the RE estimator is more efficient than the FE model⁵. The second consideration regards the structure of our dataset, which contains a series of variables – such as the economic dimension of the provinces or their infrastructural endowment – that have a negligible or non-existent temporal variation. Since the FE model eliminates cross-sectional variance in the independent errors, this tends to inflate the standard error and may make some standard errors infinite, as in the case of variables that do not vary temporally.

⁵ Taylor (1980) demonstrated that for $T \geq 3$ and $(N-K) \geq 9$, where K is the number of regressors, the statements on random effect model hold.

Furthermore, there is also a big, overlooked issue that consists of the fact that the FE model exacerbates eventual problems of measurement error if the reliability of time-series variation in X_s is poor (Green, 2008). In the comparisons that we carried out it is possible, in fact, to observe how the FE estimate of the regression model tends to furnish results that are distorted and scarcely consistent.

These considerations are validated from the statistical point of view by the standard tests that allow one to choose between two estimators. As is possible to observe in Table 4, the value of the Breusch-Pagan test applied to the pooled OLS model suggests that the random effects model is adequate, while the Hausman test, which allows one to accept the null-hypothesis of the consistence of the GLS model, suggests the use of this estimator rather than the FE model.

Dependent variable. The data on FDI inflow in the Italian provinces is gathered by UIC (the Italian Office of Exchange) in order to compile the balance of payments. In conformity with international definitions, the FDI establish a long-term interest between a company headquartered abroad and one headquartered in Italy. The definitions comprise, therefore, fusions with Italian companies and acquisitions, even partial, by foreign firms and the greenfield investments (although the UIC data do not allow us to distinguish between the two types of direct investment)⁶. Because of the way in which they are collected, the data on FDI present some limitations. The most important of which is the fact that when investment flows transit via one or more intermediaries, the methods of gathering do not allow us to control the final geographical destination. For this reason, the comparison between data on flows and others that measure the level of national or regional internationalisation, such as those relative to the number of multi-national companies, needs great prudence. The FDI data do have, however, the advantage of provincial (and sector) disaggregation and of a wide temporal coverage (other than that relative to their comparability with analogous data furnished by other international Institutions). The use of data on flows in empirical analyses on the determinants of FDI is, in fact, utilised both in empirical studies (Basile, 2004; Bronzini, 2004), and in descriptive research in order to quantify the degree of attractiveness of Italy (Siemens-Ambrosetti, 2006).

Control variables. On the basis of studies on FDI determinants, we have included in the regressions some control variables related to the economic dimension and the provincial economic structure. The size of the market, which as the studies show is the principal determinant of FDI, is approximated by two variables: one is

⁶ According to the official definitions, a direct investment enterprise is an incorporated enterprise in which a foreign investor owns 10 percent or more of the ordinary shares or voting power for an incorporated enterprise or an unincorporated enterprise in which a foreign investor has equivalent ownership (IMF, OECD, 2000).

the log of the local resident population (*Population*) in each province, while the other is given by the share of provincial GDP on that of Italy (*Size*). We have also included the level of openness of the provincial economy, measured by the sum of exports and imports on GDP, generally considered among the determinants of FDI. Provincial economic specialisation and the presence of firms are represented by the number of companies present in the manufacturing sector (*Industry*) and in the service sector (*Service*) on the total number of firms in each province. Since the localisation of companies also tends to be influenced by the accessibility to an area, we have also considered an index of infrastructural endowment (*Infrastructure*). We have then inserted, among the regressors, a proxy of the financial incentives to companies conceded under the Law no.488/92 (*Incentives*) which, in the period under examination, was the principal instrument of incentives for investment in Italy. This variable is inserted in order to evaluate whether the financial incentives and subsidies, conceded in particular to companies that invest in the regions of Southern Italy, are capable of attracting foreign companies to the areas where disincentives tied to the social and institutional context exist. The GDP pro capita has been inserted only in one specification (GMM estimate, par. 4.3), because this variable, being highly correlated with the other regressors, tends to capture a series of regional effects, making interpretation and the results of the estimate difficult (and barely informative).

Crime measures. Crime is measured by different variables. First, we have considered the index of organized crime described in section 3.2, constructed as the sum of the extortions, bomb attacks, arson, murders and crimes of criminal association for every 10,000 inhabitants. As further control variables we have included the number of thefts (Theft) and the total number of crimes committed (Total crime) for every 10,000 inhabitants. These last two variables have been inserted to verify the hypothesis that it is not the crimes in general that discourage the localisation of FDI, but some *specific* crimes that can be associated with the presence of organized crime, in particular the *mafia*. All the data on crime is collected by ISTAT in the Informative System on Italian Justice, regarding a high number of crimes. Table 1 in the appendix describes the data and their sources.

4.2. Pooled OLS and panel estimations

The first three columns of Table 4 show the pooled OLS estimations. The model is sufficiently robust and has a high explicative power (R^2 corrected 0.60). As expected, the population and the dimension of the provincial economy are highly significant. The degree of openness of the economy and the share of manufacturing firms are positively and significantly correlated to FDI, while the presence of companies in the service sector is faintly correlated. The correlation between

infrastructure and investments is positive but weak, while the relationship between financial incentives and FDI is negative, probably because this variable captures some aspects tied to the economy of the less developed regions, where the incentives and subsidies to firms are conceded in greater entity. Finally, the proxy variable for organized crime is strongly and negatively correlated to FDI, while the number of thefts and the total number of crimes do not result as significant. The GLS model seems to furnish even more consistent estimations. Once again, the proxies of the market size and of the economic structure result as highly significant and with a positive coefficient, representing the principal determinants of the provincial distribution of FDI; the infrastructure measure is positively correlated to FDI, while the significance of financial incentives is reduced. These results are in agreement with the empirical literature on the determinants of FDI. Again, the index of organized crime has a negative coefficient, although it now results as borderline significant, while neither theft nor the total number of crimes influence FDI inflows.

Table 4. Pooled OLS and panel estimations results

	(1)	(2)	(3)	(4)	(5)	(6)
	Pooled OLS	Pooled OLS	Pooled OLS	GLS	GLS	GLS
const	-17.99*** (-4.572)	-19.58*** (-4.489)	-19.41*** (-4.827)	-15.03*** (-4.032)	-15.05** (-3.722)	-15.29** (-3.932)
Population	1.889*** (6.399)	1.940*** (5.979)	1.929*** (6.284)	1.498*** (5.208)	1.469** (4.791)	1.483*** (4.944)
Size	0.3256*** (2.624)	0.3361*** (2.402)	0.3360*** (2.421)	0.4507*** (2.943)	0.4562** (2.820)	0.4582*** (2.849)
Openness	1.035* (1.915)	1.272* (1.960)	1.267** (1.933)	1.437*** (2.923)	1.569** (3.114)	1.571*** (3.119)
Industry	0.0487 (1.461)	0.0607* (1.663)	0.0610* (1.663)	0.0710*** (2.621)	0.0777** (2.776)	0.0776*** (2.777)
Service	0.0498* (1.865)	0.0533 (1.612)	0.0523* (1.758)	0.0505* (1.857)	0.04807 (1.489)	0.0499* (1.665)
Infrastructure	0.00125 (0.4500)	0.00179 (0.5689)	0.00178 (0.5643)	0.0025 (0.929)	0.00250 (0.8544)	0.00258 (0.9001)
Incentives	-0.0154*** (-3.683)	-0.0174*** (-3.779)	-0.0174*** (-3.809)	-0.004 (-1.248)	-0.0037 (-1.240)	-0.0038 (-1.247)
Organized crime	-0.1172*** (-2.842)			-0.0540* (-1.798)		
Theft		-0.00037 (-0.147)			0.00051 (0.258)	
Total crime			-0.0002 (-0.148)			0.00020 (0.212)
Breusch-Pagan Prob (1)	152.08 [0.000]	188.84 [0.000]	189.02 [0.000]	179.88 [0.000]	216.14 [0.000]	217.97 [0.000]
Hausman Test χ^2				54.04 [0.000]	45.64 [0.000]	44.28 [0.000]
Time dummies				Yes	Yes	Yes
N	515	515	515	515	515	515
R ² adjusted	0.60	0.59	0.59			
lnL	-987.82	-996.06	-996.07	-985.017	-994.00	-994.07

Breusch-Pagan test -Null hypothesis: Variance of the unit-specific error = 0; Hausman test - Null hypothesis: GLS estimates are consistent; for Breusch-Pagan and Hausman tests p-value are reported in square-brackets. Robust standard error; * indicates significance at the 10 percent level; **indicates significance at the 5 percent level*** indicates significance at the 1 percent level. T-stat in parentheses.

4.3. GMM estimations

In this section we consider a dynamic version of the panel model, introducing into the basic equation the lagged dependent variable. We have inserted this variable because, as numerous studies show, foreign companies tend to invest in regions where other foreign companies already exist both because of the presence of agglomeration economies, and since the previous localisation of other foreign firms is a signal of a favourable business environment (so-called signal effect). At provincial level an elevated territorial concentration exists, therefore, which in the regressions can be approximated by the lagged value of the variable dependant, according to the following equation:

$$FDI_{it} = \beta_1 X_{it-1} + \beta_2 Crime_{it-1} + \gamma FDI_{it-1} + w_{it} \quad [2]$$

where X_{it-1} is the vector of the control variables listed previously.

As is known, when the lagged dependent variable is included among the regressors, the OLS estimator is inconsistent and inefficient while the fixed effects and random effects models do not furnish consistent estimations. Estimation models for dynamic panels have been proposed by Anderson and Hsiao (1981) and by Arellano and Bond (1991). In Judson and Owen's study (1999), which compares the performance of different estimators for dynamic panel models, it is shown how for $T \leq 10$ the *one-step* estimator of Arellano and Bond works better than the alternatives, even when one reduces the dimension (the number of lags) of the matrix of instruments. On the basis of such indications, we have estimated different specifications with the one-step procedure. Table 5 reports the standard tests on the model and the results of the estimations.

The results confirm those previously obtained. The index of organized crime has a negative coefficient, and is significant even when we consider the proxy of the financial incentives to investment, and also when we include the per capita GDP (model 5) among the control variables, although in such a case its explicative capacity is notably reduced. The other variables relative to crime are not, however, significant.

Table 5. One-step Arellano-Bond estimations results

Variable	(1)	(2)	(3)	(4)	(5)
Δ Ide(-1)	-0.075 (-1.021)	-0.048 (-0.653)	-0.099 (-1.385)	-0.102 (-1.467)	-0.031 (-0.406)
const	-2.824* (-1.890)	-4.480*** (-2.695)	-1.720 (-0.950)	-1.915 (-1.170)	-14.779** (-2.285)
Ide t-1	-0.241*** (-5.868)	-0.272*** (-6.196)	-0.226*** (-5.409)	-0.223*** (-5.382)	-0.297*** (-5.393)
Population	0.379*** (3.086)	0.555*** (3.825)	0.278** (2.013)	0.286** (2.207)	0.488*** (2.827)
Size	0.010** (2.033)	0.010** (1.9880)	0.011** (2.226)	0.011** (2.217)	0.091* (1.738)
Openness	0.556** (1.976)	0.490** (1.8946)	0.632** (1.985)	0.646** (2.006)	
Industry	0.012 (0.938)	0.006 (0.4723)	0.020 (1.426)	0.021 (1.497)	
Service	0.001 (0.072)	0.001 (0.0607)	-0.013 (-0.808)	-0.018 (-0.975)	
Infrastructure	0.000 (0.339)	0.000 (-0.1125)	0.000 (-0.049)	0.000 (-0.278)	-0.001 (-0.907)
Organized crime	-0.045** (-2.564)	-0.038** (-2.155)			-0.033* (-1.674)
Incentives		-0.008*** (-2.912)			
Theft			0.001 (1.053)		
Total crime				0.001 (1.274)	
GDPpc					1.205** (2.282)
Sargan Test $\chi^2(5) =$	4.689 [0.455]		5.511 [0.356]	5.985 [0.307]	4.619 [0.464]
Wald (joint) Test $\chi^2(9) =$	54.221 [0.000]		37.507 [0.000]	38.297 [0.000]	52.810 [0.000]
Test for AR(1) errors z =	-1.634 [0.102]		1.577 [0.114]	-1.549 [0.121]	-1.274 [0.202]
Test for AR (2) errors z =	-0.942 [0.345]		-1.113 [0.265]	-1.130 [0.258]	-0.704 [0.481]

T Stat in parentheses. For Sargan Over-Identification test, Wald and AR tests p-value are shown in square-brackets; observations 309, included 103 cross-section units.

5. Conclusive remarks

Using data for 103 Italian provinces, in this study we have examined the impact of organized crime on FDI. After constructing an index of the incidence of organized crime, we estimated different models for panel data. The main results obtained can be summarized as follows:

- we found a significant, negative correlation between the index of organized crime and FDI;

- such a correlation results as significant even when including, among the control variables, a proxy of the financial incentives to investment that are granted, in particular, to firms that invest in the less-developed areas of Italy;
- no correlation was found between FDI and other crimes, such as theft, or the total number of crimes committed in each province.

The results obtained are coherent with those of some surveys that contain the opinions of potential foreign investors regarding the opportunities for investing in the regions of Southern Italy. Said surveys show, in fact, how the presence of organized crime is perceived by those interviewed as a powerful block to investments in the Mezzogiorno area. Our analysis shows, therefore, how organized crime is a factor capable of greatly reducing the degree of regional attractiveness. It is possible to observe how, in some areas, crime is only one aspect – certainly the most evident and dramatic – of a social and institutional context characterised by other forms of illegality that include corruption and, even more widespread, the violation of regulations that are non-penal but important for the good functioning of the economy (La Spina and Lo Forte, 2007). Overall, said forms of illegality determine a socio-institutional context lacking in some fundamental public goods, such as legality and security.

Numerous studies have shown how the national institutional environment is an important determinant of FDI (Globerman and Shapiro, 2002; Bénassy-Quéré et al. 2005). In the case of Italy, an ample economic and sociological literature attests to the existence of significant differences in the “quality” and functioning of the regional socio-institutional systems, in particular between the North and the South of the country: these are historical differences, capable of influencing the long-run economic development (Putnam 1993; Peri, 2004). Since the presence of organized crime in Italy also shows marked regional differences, we cannot exclude that a particularly high incidence of crime, other than discouraging, in itself, investment, is also perceived as a signal of a socio-institutional system (or of a business climate) that is little favourable to business activities, particularly by potential foreign investors who, in general, have less available information in respect to national investors.

In other words, in a situation where perceptions and expectations play a very important role, a high presence of Organized crime could determine a negative image of the Mezzogiorno and, consequently, discourage FDI. In general terms, our analysis suggests that the quality of the local institutional system can influence decisions regarding localisation

by the firms. The policy implications that derive are obvious. In the case of Italy, the improvement of security conditions (and, possibly, of the quality of the local socio-economic context) is a fundamental prerequisite for increasing the regional level of attractiveness and, presumably, to increase the effectiveness of direct policy interventions to attract foreign investment in the less developed areas of the country.

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Appendix

Table 1. Description of variables and sources

Variables	Description	Sources
FDI	Logarithm of the average FDI inflow in the provinces in the period 2004-06. The data refers to the investment flows and does not include commercial credits and banking sector transactions.	Italian Exchange Office (UIC)
Population	Natural logarithm of the resident population in each Italian province. Proxy of the size of the local market.	Elaborated from ISTAT Census data.
GDPpc	Natural logarithm of pro capita GDP. Proxy of the level of development.	Elaborated from ISTAT data.
Size	Provincial GDP on the GDP of Italy. Proxy of the size of the local market.	Elaborated from ISTAT data.
Openness	Import plus Export on GDP	Elaborated from ISTAT data.
Industry	Number of firms in the manufacturing sector as share of the total number of firms	Elaborated from Ministry for Economic Development – Ipi-Print databank
Service	Number of firms in the service sector as share of the total number of firms	Elaborated from Ministry for Economic Development – Ipi-Print databank
Infrastructures	Synthetic index of infrastructure endowment (excluding ports) in percentage terms compared nationwide.	G. Tagliacarne Institute
Incentives	Variable of proxy of the financial incentives granted to firms, given by the logarithm of the incentives for investments granted under Law 488/92. The data refers to the projects to create new production plants in the industrial sector (excluding “special industry” Proclamations)	Ministry for Economic Development – Ipi-Print databank
Extortion	The number of crimes of extortion denounced every 10,000 inhabitants.	Elaborated from Istat data, “Territorial Informative System on Justice” (online databank).
Association	The number of crimes of criminal association denounced, including ‘mafia’ association, every 10,000 inhabitants.	Idem

Attacks	Number of (bomb) attacks, every 10,000 inhabitants.	Idem
ARSON	Number of cases of arson, every 10,000 inhabitants.	Idem
Murder	Number of murder, every 10.000 inhabitants	Idem
Theft	Number of theft, every 10,000 inhabitants	Idem
Organized crime index	Sum of extortion, attacks arson, association, murder (as above defined) every 10,000 inhabitants. Data referred to the period 2000-05.	Idem
Total crime	Total number of crime (with the exception of that included in the “organized crime index”)	Idem

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