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Del Monte, Alfredo and Pennacchio, Luca

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Alfredo Del Monte
(University of Napoli Federico II)

and

Luca Pennacchio
(University of Roma Tre)

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ABSTRACT

The purpose of this paper is to show that in the period after Italian Unification in 1861 two very important criminal phenomena in southern Italy, brigandage and organised crime, became rooted in the structure of rural and land organisation. We use econometrics to show that brigandage intensity was higher in the poorest areas of southern Italy where land ownership was highly concentrated and productivity was low. By contrast, using a different econometric exercise we show that organised crime developed only in the wealthiest areas. Empirical evidence also shows that there was an inverse relation between the intensity of brigandage and that of organised crime in the regions of the *Mezzogiorno*. Therefore, widespread brigandage was not the main cause of the development of organised crime, as suggested elsewhere (Gambetta, 1993; Bandiera, 2003). We develop a simple model to show that organised crime has a greater incentive to offer protection when economic development and land productivity are higher and the state is unable to provide adequate protection for property rights. The model is tested on the provinces in southern Italy in the late nineteenth century and then on Sicilian towns in the early 1900s.

JEL classification: K40, N13
Keywords: Mafia, land productivity, land ownership, Mezzogiorno.

1. Introduction

In post-Unification Italy two major types of criminal behaviour became prevalent in the structure of the rural landscape in southern Italy, namely brigandage and organised crime. Brigandage[1] was a complex phenomenon explained by social, economic and political factors. In our work we focus on economic causes, showing that brigandage was mainly linked to the organisation of rural production. Econometric analysis shows that brigandage intensity was higher in the poorest areas of southern Italy with high land concentration and low productivity. Although the efforts of the deposed Bourbons strongly supported brigand activities, the different extent of this phenomenon in provinces across Italy's *Mezzogiorno*, the existence of brigandage in the very poor region of Sardinia, that belonged to the Kingdom of Savoy, and the absence of leadership at the head of brigand bands refute, in our opinion, the hypothesis often advanced in the literature that brigandage was a regional uprising in favour of Francis II, the deposed King of the Two Sicilies.
With regard to organised crime, or *mafia*[2], it is commonly held that the Sicilian *Mafia* developed to protect land from predatory attack at a time when publicly provided security was scarce and brigandage widespread (Gambetta, 1993; Bandiera, 2003). Our analysis does not find a relationship in southern Italian provinces between intensity of brigandage and organised crime. Instead, we develop and empirically test a simple model which shows that *mafia* has a great incentive to offer protection when economic development and land productivity are high and the state is unable to afford adequate protection for property rights.
The rest of the paper is organised as follows. Section 2 describes the organisation of agricultural production in Italian regions and emphasizes the differences between the various areas in question. Section 3 is devoted to the analysis of brigandage while subsequent sections concern the analysis of organised crime. A further focus in section 3, using an econometric exercise, consists in the causes of different brigandage intensity across southern provinces. In section 4 we develop a simple model for the spread of organised crime. In section 5 we provide descriptive analysis of criminal organisations in southern Italy. In section 6 and section 7 we test empirically our main hypothesis on the rise of organised crime, first on southern Italian provinces in the late nineteenth century and then on Sicilian towns in the early 1900s. Section 8 concludes the paper.

2. Organisation of agricultural production in Italy at the time of Unification

According to Maddison (2001), until the eighteenth century Italy was one of the wealthiest nations in Europe. GDP per capita was higher than that of the United Kingdom and second only to the Netherlands. Other estimates (Malanima, 2003) show that, with regard to northern Italy, the GDP per capita of the UK overtook that of northern Italy only in the second half of eighteenth century.
By the time of Unification the economic development of Italian regions was lower than that of many western European countries. Italy's GDP per capita grew in the period 1820-1870 at 0.6% per year against a western European average of 1% (Maddison, 2001). Most of the Italian (male) population was employed in agriculture (more than 67%) and less than 20% were employed in industry. Most industrial workers were female, employed in the textile industry and working at home. The Italian bourgeoisie was weaker than in other western countries and there were major differences in terms of community spirit, respect for the law, good working of public institutions etc. But such differences were also very marked between Italian regions, the greatest being those between North and South. Such differences could be largely explained by different organisation of agricultural production.

[1] This is a literal translation of the Italian term *brigantaggio*, used to describe the widespread phenomenon of rural banditry in Italy's post-Unification history, especially in the *Mezzogiorno*.
[2] We use the term *mafia* to indicate the phenomenon of organised crime in general, while the term used with the definite article (*the Mafia*) represents the Sicilian criminal organisation.

In northern Italy (Piedmont, Lombardy, Liguria), and in particular in the irrigated plains, the *cascina padana* developed (Bevilacqua, 1989), a real village in the countryside. Inside we find the houses of the salaried workers and cattle drovers, the house of the landlord, the pens for livestock, granaries, haylofts, etc. The *cascina padana* was functional to the existence of very large farms devoted to crop production and pastureland. In the inland hills and mountain zones of the North we find smallholders and peasants under tenancy. In these areas small landlords and tenants lived near their workplace. These land tenure systems encouraged solidarity between the members of these small communities. When large capitalist farms developed in the Po Valley, such personal relationships encouraged the creation of social networks based on common interests such as trade unions, cooperative societies and group membership that are the basis of civic engagement.
In the regions of the so-called Third Italy (Umbria, Marche, Tuscany, Emilia and Veneto) the most important land tenure system was sharecropping. The sharecropper and his family had their own house on the farm; this system helped the sharecropper to maintain his land properly. This system of cooperation between the members of the family helped the development of cooperative relationships also with non-family members and the development of industrial home-working in the textile industry.
The situation in the South was strikingly different: most of the land passed after Unification from the hands of the feudal nobility into the class of bourgeois landowners but the system of farming underwent little if any change. In the inland hill and mountain zones the land under cultivation continued to be divided into small plots leased to peasants under precarious tenancy and sharecropping arrangements, and in summer months cattle and sheep farmers maintained their transhumant practices, with livestock being moved from large farms on low–lying land to upland areas.
In the mid nineteenth century, malaria was still endemic in some of the low-lying coastal and inland zones. Soils were clayey and the climate extremely arid. In these zones we find large farms devoted to extensive wheat production and animal husbandry. These farms were worked by day labourers who supplemented their incomes through the cultivation of small owned and rented plots in the vicinity of the upland villages or towns in which they lived. The conditions of workers in these areas were very poor. In such situations it is very difficult for social relationships to be based on trust. Many situations could be similar to those described in 1950 by Banfield (1958) for the southern Italian village of Montegrano: “Any advantage that may be given to another is necessarily at the expense of one’s own family. Therefore one cannot afford the luxury of charity, which is giving others more than their due, or even justice, which is giving them their due”. In these areas brigandage, as we will see, was quite widespread.
Only some areas in coastal zones were used for more intensive farming such as the cultivation of olives, vines and citrus fruits, and direct investment and management by landowners was associated with significant reorganisation and improvement in agricultural production. In most of these intensively-farmed areas (Palermo, Reggio Calabria, etc.) agricultural productivity was higher than in northern Italy and the average situation of the workers was better than in many northern regions. In such areas society was composed of rich and poor peasants, small and large landlords, with a greater variety of social figures than in poorer areas in the South.

3. The spread of brigandage after Italian Unification

The presence of brigands persisted in all European states for many centuries, favoured by the weak authority of the state and the poverty of the peasants. The latter, oppressed by tax authorities and landowners, applied themselves to robbery and theft. With the end of feudalism and the improvement in living conditions in the countryside, brigandage ceased to be widespread.

This was not the case of Italy where in the first half of the nineteenth century brigandage still persisted.[3] In the Papal States there were bands of roving brigands.[4] In the kingdom of Naples and in Sardinia, the latter a possession of the House of Savoy from 1720, despite the land reforms begun by Charles III, the situation in the countryside, also due the famine in 1763, was far from flourishing and led to the spread of brigandage. Abject poverty in the countryside was an important cause of brigandage. In addition, a peculiar aspect of brigandage in southern Italy was the support that in many periods the Bourbons gave to brigands against internal (more cultivated classes) and to external enemies. The army of Cardinal Ruffo who destroyed the newly established Parthenopean Republic in 1799 comprised many bands of outlaws. Similar human resources were also used against Joachim Murat in the period 1806-1810. After 1810, the French general Manhes put to the sword most of the brigands in the areas of Cilento, Abruzzi and Calabria. However, even after the Restoration of the Bourbon monarchy under Ferdinand IV numerous brigands roamed the Kingdom of Naples[5] and Sardinia.

In 1812 feudalism was formally abrogated in the South and in subsequent years the system of entitlements and primogeniture was abolished. However, the situation of the peasantry, if anything, worsened. With the replacement of the feudal system by private property rights, so-called common uses were abolished and the compensation due to peasant communities was only seldom received, giving rise to considerable hardship and numerous outbreaks of brigandage in the southern Italian countryside. In 1860 the Italian State confiscated the landed property of the church and put it up for sale. The majority of the land was bought by major landowners and the pre-existing rights of the peasantry were abolished without compensation.

After Unification brigandage increased. First of all, the phenomenon was caused by the poverty of the peasantry. But there is no doubt that other factors accounted for the growth of brigandage. It could also be seen as a social revolution against the new landowners, who were seen as bourgeois elements in the ancient society of the South (*galantuomini)*, and a rebellion against the Piedmontese government that had imposed conscription. The partisans of the old Kingdom of Naples, clergy and large landlords, helped recruit brigands against the new state. Aid from Ferdinand II, the deposed King of Naples, who resided in Rome after fleeing from Naples, gave strength and legitimacy to brigands. That said, it is highly questionable to state, as maintained by some authors (Agnoli, 2003; Aprile, 2011), that brigandage after unification was a people's war against Piedmont. As noted by Molfese (1964), the total absence of leadership at the head of the bands of brigands substantially reduces the political weight of the phenomenon.[6]

A further argument undermining the hypothesis of brigandage as a people's war is the different intensity of this phenomenon in different areas of southern Italy. If post-Unification brigandage had essentially been a political revolt in defence of the Bourbons, then the distribution of brigands in the South would have been relatively homogeneous. But, as we will show, different territorial intensity has precise socio-economic causes. Already in 1863 Massari in his "Report on Southern Brigandage to the Italian Parliament" recognized that in areas such as Capitanata (Foggia) and Basilicata brigandage was very high, while in others, such as Calabria, it was low, and in some, such as Reggio Calabria and the provinces of Sicily, the phenomenon was nearly absent. The report observed that the causes of the different intensity of brigandage were linked to the kind of organisation of agricultural production and to the form of contracts between peasants and landlords. Where the peasant was in some way linked to the land and the relationship with landowners was

3 In Italy a major difference between North and South was the ability of governments to enforce contracts between private agents and to prevent violation of property rights. In northern Italy, for example in Piedmont and Lombardy, the phenomenon lasted until the end of the eighteenth century.

4 For example, in Romagna Stefano Pelloni, *Il Passatore*, was active between 1842 and 1851, when he died whilst fighting the police.

5 G.Vardarelli in Capitanata (1815-18), Ciro Annichiarico in Salento (1815-1818) and G. Talarico in Sila (1830-1850).

6 Many brigand leaders in 1860, such as Carmine Crocco Donatelli, who operated in Basilicata and was the most representative brigand of the period, La Gala brothers, who operated in Campania between the mountains of Cancello and Taburno, and Nicola Morra and Domenico Trivulzio in Puglia, were ex-convicts.

better, the brigandage was unlikely to develop. In other words, poverty was the main cause of brigandage. The same hypothesis was advanced by Villari (1979) who pointed to the poverty of peasants and the stability of the peasant-land tie as the main causes behind the spread of brigandage.
A more precise analysis of the regional distribution of brigandage can be found in the work of Molfese (1964) who, using different official sources, offers an overview of brigand losses (killed in fights, shot, arrested) by province (Table 1). The figures are more complete than those of the Report on Brigandage which underestimated its intensity in some provinces. In Table 1 we compute two indicators, one that gives brigand losses in absolute values and another that weights the losses by population size. The two indicators show that Potenza, Salerno and Catanzaro were the provinces where brigandage was strongest. In Naples and Lecce the phenomenon was less acute. Given that the report concerned only the mainland areas in the South,[7] Table 1 gives no figures for Sicily or Sardinia.

Table 1. Brigandage intensity in southern Italy in the period 1860-65

(1) Brigand losses in absolute values		(2) Brigand losses per 1,000 inhabitants	
Potenza	2629	Potenza	5.15
Salerno	2052	Salerno	3.79
Catanzaro	1072	Catanzaro	2.60
Caserta	929	Teramo	2.55
Foggia	817	Foggia	2.53
Avellino	745	Chieti	2.14
Chieti	728	Avellino	1.98
Teramo	627	Caserta	1.33
Aquila	412	Aquila	1.24
Cosenza	354	Benevento	0.94
Bari	300	Cosenza	0.80
Campobasso	235	Reggio Calabria	0.66
Reggio Calabria	234	Campobasso	0.65
Benevento	217	Bari	0.50
Lecce	141	Lecce	0.29
Napoli	50	Napoli	0.06

Source: From data gathered by Molfese (1964), pp. 431-461

We develop an econometric model to analyse the determinants of brigandage at provincial level. Given that there were 25 southern Italian provinces, our sample consists of 25 observations. The low number of observations does not allow very robust estimates. Also the availability and quality of the data is quite low. Nevertheless we think that, given the current discussion of the causes of brigandage in southern Italy, such an attempt is worth making.
The dependent variable of our model is obtained by ranking the provinces of southern Italy in seven categories of brigandage intensity on the basis of data reported in column 2 of Table 1. In addition, the Sicilian provinces as well as Cagliari (Sardinia) are included in the category with lowest brigandage intensity. This category also includes Naples, Lecce and Reggio Calabria. The province of Sassari, where many cases of brigandage occurred, falls in the category with medium brigandage intensity. According to this classification we construct a quantitative variable that attributes to each category a value ranging between 0 and 6, with the value of 0 attributed to the provinces without or with low brigandage intensity and the value of 6 to provinces with the highest intensity of brigandage. Provinces with an intermediate degree of brigandage are assigned increasing values,

[7] In Sicily, also due to the hostility of Sicilians to the Kingdom of Naples, brigandage was less widespread. By contrast, it was a major phenomenon in Sardinia, which did not belong to the Kingdom of Naples.

from 1 to 5. Computed in such a way, the variable measures the brigandage intensity in *Mezzogiorno* provinces at the time of Italy's Unification.[8] Our main object is to assess whether the spread of brigandage in the southern provinces depends on socio-economic factors. In particular we refer to the economic conditions of the peasant population, the importance of agriculture in the local economy and the structure of land ownership.

The first factor was considered very important to explain the different intensities of brigandage in southern Italy for several authors, amongst others Massari (1863) and Villari (1979). Although we would expect a direct relationship between brigandage intensity and level of population poverty, unfortunately we do not have the GDP per capita by province. A recent paper (Ciccarelli and Fenoltea, 2010) calculated the value added per head in industry for various years and we consider this variable in 1871 as a proxy of the economic condition of the population (*Industry*).[9] As a further proxy we use the number of priests and public sector workers per thousand inhabitants (*Wealth*). We presume that this category had a relatively high income and the increase in their number is expected to increase the wealth of the population. Given the above discussion we expect for both variables a negative impact on brigandage intensity. The weight of agriculture is proxied by the ratio of the population employed in agriculture to the total population (*Agriculture*). Given that brigandage was a rural phenomenon, we would expect that the higher the share of the rural population, the higher the intensity of brigandage. The degree of land distribution is another variable that we thought might have had a positive impact on brigandage intensity. As an implication of the argument made by Massari and Villari, we expect that the more fragmented was land ownership, the more stable was the tie of peasants to the land and the less intense was brigandage. We approximated this variable by the ratio of the number of taxpayers incurring land tax to the total area (km^2) of the provinces (*Land fragmentation*).[10] The higher the number of landowners, the higher is this ratio. Data for the weight of agriculture and land fragmentation are reported in the Inquiry into agriculture and peasant conditions in Italy (Jacini Inquiry, 1885) while those for the number of priests and workers in the public sector came from the General Census of Population (1871).

We also included in the model three other control variables. The first is the physical distance between the provinces and Rome (*Distance*). The reason is that aid to brigands from the Bourbon royals, who after Unification lived in the Papal States, could get through more easily if the province was nearby. This variable is therefore a proxy for the intensity of aid. The more distant was a province, the more difficult it was to supply men and money to brigands.[11] Therefore we expect a negative relationship between brigandage intensity and distance. The second control variable takes account of the topography of the province: it is easier for brigands to hide in mountainous terrain than in lowlands. The variable is computed as the ratio of mountainous terrain (in km^2) to the total area of the province (*Topography*).[12] Lastly we control for the variable *Illiteracy* that measures the share of illiterates[13] on the total number of provincial inhabitants. Such a variable could be seen both as a proxy of human capital and an indicator of the cultural level of the population. We expect a positive relationship with brigandage intensity.

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[8] See the Appendix for more details.

[9] The variable is a provincial index of relative industrialisation and is computed as the share of the industrial value added, excluding construction, over the share of the male population aged fifteen and over.

[10] This proxy to evaluate the degree of land ownership was suggested on p. 65, Volume I, Jacini Inquiry.

[11] The variable refers to the physical distance in kilometres of routes between the Papal States and the various provinces: the distance is calculated between the city of Rome and provincial capitals, and is expressed in logarithmic terms. In some cases, such as provincial capitals which could be reached by ship, distance in time differs from the physical distance, but for most capital towns the correlation between the two measures is very strong.

12 The source of the data is the 14th General Census of Population and Housing, ISTAT.

13 Source: General Census of Population (1871), "Popolazione classificata per età, sesso, stato civile ed istruzione elementare", Vol II.

The model estimates are reported in Table 2. Given that our dependent variable has a logical order and more than two categories, we estimate an ordered logit model.[14] This model estimates the probability that a province has a high degree of brigandage as a function of the covariates. In Table 2 the coefficients are in log-odds ratio and the standard interpretation is that, for a one unit increase in a regressor, the dependent variable level is expected to change by its respective regression coefficient in the ordered log-odds scale, holding other regressors constant. Looking for instance at column 1, a unit increase in the weight of the farm population increases by 18.96 the log-odds to be in the category of high-intensity brigandage. The coefficients in this model are, in any case, difficult to interpret and in our analysis we will mainly concentrate on the sign and significance of the coefficients.

In the first three columns we estimate separately the effect on brigandage intensity of the factors that refers to the agricultural sector, to the economic condition of peasants and to geographic aspects. In column 1 we consider as regressors only the weight of the agricultural sector on the local economy and land fragmentation. The coefficients are statistically significant and the signs are the expected ones. The probability of observing high brigandage intensity increases where the weight of the agricultural sector is high and decreases in the provinces with a more fragmented land ownership. The estimated equation in column 2 appears to confirm that brigandage spread in the poorest provinces. Indeed, the signs of the two proxies for the economic conditions of the population are negative, as expected. Although individually the regressors are statistically insignificant, the test of overall significance indicates that, together considered, the coefficients are not jointly equal to zero. This is a clear symptom of multicollinearity, as confirmed by the high correlation between the two regressors (0.75), and suggests that both variables are good proxies for the economic conditions of the population. We also estimated separately the effect of the regressors on brigandage and in both estimates the coefficients have the expected sign and are significant. R^2 is higher when we only consider the variable *Industry*.

In column 3 the brigandage intensity is regressed on the distance of the provinces from Rome and the topographic characteristics of the terrain. The sign of the coefficients are the expected ones but only the former is statistically significant.[15]

Lastly, in column 4 and 5 we test the robustness of our main results concerning the agricultural sector by controlling respectively for the distance from Rome and the cultural level of the population. The latter regressor shows a negative sign (we expect a positive impact on brigandage intensity) but it is not statistically significant. However, the other results do not change: the signs and the significance of *Agriculture* and *Land fragmentation* variables, as well as that of the *Distance* variable, still corroborate our hypothesis.[16]

The Likelihood Ratio test of the different specifications confirms the statistical significance of the model and the Pseudo R^2 shows that the specification of the model in column 4 has greater explanatory capacity than the others.

Table 2. The determinants of brigandage after Italian Unification

Y = brigandage intensity	(1)	(2)	(3)	(4)	(5)
Agriculture	18.96***			12.33*	20.18***
	(3.41)			(1.90)	(3.62)

[14] With ordinal dependent variables, the assumptions of the ordinary least square estimator are violated (normality and homoschedasticity of the error term) which can lead to incorrect conclusions. Ordered logit and ordered probit models provide a consistent estimator. For more details see, amongst others, Greene (2008).

[15] The not significance of the variable *Topography* may be due to the fact that brigands prefer to take refuge in forests and near rivers. Indeed, the Massari Report indicates the Rivers Fortore and Ofanto as well as many forests (Monticchio, Lagopesole, San Cataldo, etc.) as favourite hiding places. Unfortunately we have no data to account for such factors at Unification.

[16] In these specifications we do not include the variable *industry* that has a strong negative correlation with the regressor that proxies the weight of agriculture.

Land fragmentation	-0.14** (-2.30)			-0.14** (-2.37)	-0.16*** (-2.60)
Wealth		-0.31 (-1.22)			
Industry		-4.39 (-1.47)			
Distance			-1.87*** (-2.57)	-1.77* (-1.71)	
Topography			0.01 (0.92)		
Illiteracy					-25.59 (-1.50)
Observations	25	25	25	25	25
LR χ^2 (p-value)	19.15 (0.00)	11.29 (0.00)	12.11 (0.00)	22.43 (0.00)	21.38 (0.00)
Pseudo R^2	0.22	0.13	0.14	0.26	0.25

***, **, * Statistically significant at the 1, 5 and 10% level.
Coefficients are in log-odds ratio form.
Ancillary parameters are not reported.
z statistics in parenthesis.

The estimates appear to confirm that brigandage was a phenomenon closely linked to agriculture, mainly explained by economic causes. Our results may be seen as empirical evidence to support the hypotheses of Massari and others, that brigandage intensity was increased not only by the poverty of the peasantry but also by unequal land distribution.
The above results are also important for the analysis of organised crime in southern Italy. The different distribution of brigandage in the South implies that there is a different capacity of the state to protect property rights in provinces in the *Mezzogiorno*. As noted by the literature on organised crime, if a government cannot or does not provide adequate protection for property rights, individuals and groups will attempt to provide private protection. Therefore, in the areas where the intensity of brigandage is higher there will be a strong incentive to provide private protection. Where the law is poorly enforced, private protection becomes very important. Indeed, some authors (e.g. Gambetta, 1993) explain the origins and function of the Sicilian *Mafia* as the result of the lack of official policing being replaced with specialized protectors. Following this explanation, we would expect organisations of specialized protectors to be stronger in provinces in southern Italy where brigandage intensity is higher. Instead, we observe that this is not the case but quite the opposite occurs. In the next section we develop a very simple model to explain the paradox, and then we test empirically the implication of the model.

4. A model for the different spread of organised crime in southern Italy

We have seen that brigandage was not uniformly distributed in southern Italy and also organised crime presents different geographical intensities: the *Mafia* in western provinces of Sicily, the Camorra in Naples and the 'Ndrangheta in the province of Reggio Calabria. Considering the Sicilian case, Gambetta (1993) explains that the dissolution of the feudal system resulted in an increase in insecurity and in the number of landowners. Land fragmentation (Gambetta, 1993; Bandiera, 2003) *did* promote *mafia* activity through an increase in the demand for private protection. If we accept this hypothesis we should expect southern Italy's provinces where land is more fragmented to have a higher level of criminal organisation. From the Gambetta hypothesis on the relationship between the level of insecurity and organised crime it follows that brigandage intensity, which is the main source of the insecurity of property rights, is positively correlated with the intensity of criminal associations in the *Mezzogiorno*.

In this section we will develop a simple model that offers a different explanation for the unevenly distributed presence of organised crime in southern provinces. We consider that there are two types of areas, one with extensive crops (i.e. cereals) and one intensively cultivated (grapes, citrus, etc). For each unit of area the revenue is S_i and L is the cost of protection per unit of area. The net income of a landowner who pays for protection is $S_i - L = R_i$.

If the landowner pays for protection he will receive no damage. If he does not pay for protection he will incur damage of value D_i with probability p_r^D and his net income will be $(S_i - D_i)$. It will be worthwhile for the landowner to ask for protection if:

$$(S_i - D_i)p_r^D + S_i(1 - p^D{}_r) \leq S_i - L = R_i \qquad (1)$$

S_i Income per unit of area if the property is not damaged;
L Cost of protection for unit of area;
D_i Value of damage;
p_r^D Probability of damage.

If $p_r^D D_i > L$, or to express it in words, the expected value of the damage is higher than the cost of protection, the landowner will choose to buy protection.

We assume that L is given but its value is linked to the offer of protection. We assume that the specialized protector will gain L less a cost per unit of area, B. If arrested, the protector will receive a punishment whose monetary value is $-F_s$. The probability of being arrested is p_r^C. We assume now that if the specialised protector chooses to behave honestly he will gain, with certainty, a wage w. The specialised protector will find it worth behaving in criminal fashion if the expected value of such activity is higher than w.

$$(1 - pr^c)(L - B) + pr^c(-F_S) > w \qquad (2)$$

From this formula we get L^{mi}, the minimum value needed to make it worth engaging in criminal activity:

$$L^{mi} = \frac{w + (1 - pr^c)B + pr^c F_S}{1 - pr^c} \qquad (3)$$

If the value of L^{mi} is such that $S_i - L^{mi} > 0$ and that $p_r^D D_i > L^{mi}$, a market for the protection will exist (supply and demand for protection).

Let us now examine the relationship between the market for protection and the income per unit of area. Extensive agricultural activity (with subscript 2) will get a much lower income per unit of area than that intensively cultivated (subscript 1), and also the value of damage D_2 is lower than D_1. The damage that could be incurred by an extensive crop (destruction of wheat) is lower than that of an intensive crop that requires long-term investment (cutting of the wines or of the orange trees). It is very likely for the former crop that the two conditions $S_2 - L^{mi} > 0$ and $p_r^D D_2 > L^{mi}$ will not be satisfied, and a market for protection will fail to exist:

$$-p_r^D D_2 + S_2(1 - p_r^D) > S_2 - L^{mi} = R_2 \qquad (4)$$

From expression (4) it is clear that it is not worth the owner of the extensive cropland asking for protection.

By contrast, landowners of the intensively cultivated land will ask for protection. The value of L demanded by the specialised protector may well be very close to the value of S_1. The calculation of income per unit of area will be very easy for an experienced person. Therefore the specialised protector will obtain a large part of the producer surplus.

Our model allows both a free entry equilibrium and a *mafia* collusive equilibrium. The latter is possible if *mafia* is able to prevent entry. Coercion backed by the threat of violence is an obvious way a criminal organisation could use to prevent entry. If there are sunk costs (Anderson and Bandiera, 2002), as we expect, the cost for individuals is higher than that of organised *mafia* (normalized on equal reputation). But technical superiority and the threat of violence are not the only methods that allow *mafia* to prevent entry. In an environment where social values are no real barrier to the development of criminality, strong relationships with public officials could arise and participation within a criminal organisation is not culturally inaccessible to parties who may seem distant or distinct from any "apparent" culture of crime. Therefore, the existence of strong social and economic relationships between organised crime, government bureaucrats, judges etc. could create very strong barriers to entry and allow a *mafia* collusive equilibrium. The existence of such a relationship in Sicily in the second half of the nineteenth century is well documented by Dickie (2007), and — in a different context — in the period of post-communist liberation reforms in Russia by Volkov (2002).[17]

A possible outcome of the model is that, if there is free entry, the high profits from protection increase the number of highly specialized protectors. The entry of new protectors decreases the price of protection, allowing landowners to have a surplus to invest. As a consequence, the economic performance of the economy with respect to a *mafia* collusive equilibrium may improve. This result would be possible if, from a technological point of view, *mafia* and the single protector are equal. But if there are economies of scale, this result does not necessarily hold. The monopoly price of protection could be lower than that of the free entry equilibrium. But, what is more important, the organised *mafia* could set a lower price than that of monopoly because it has a longer time horizon than the single protector (Olson, 2002). Olson says that rational stationary bandits (i.e. criminal organisations) will take only a part of income in taxes (protection revenues), because they will be able to exact a larger total amount of income from landowners if they are left with an incentive to generate income that can be taxed. Therefore, economic development is not necessarily incompatible with strong criminal organisations. The relationship between organised crime and economic development may not be linear and the direction of causality could go in both ways.

The development process has an effect on the parameters that could affect the existence of organised crime. First of all, the development process affects land productivity and hence S_1 and S_2. *Ceteris paribus*, this could also allow the owner of the less productive land to pay for protection and we could have a spread of organised crime.[18] But there are effects also on the offer of protection: we can also expect social values to improve with development and civic virtues to rise in the population. Therefore it will be easier to find people prepared testify in trials against organised crime and the probability of arrest will increase. Economic development could also

[17] In the literature on organised crime in southern Italy is well documented a strong link for electoral reasons between political power and organised crime (Turiello, 1882; Regia Commissione, 1901; Salvemini, 1910).

[18] Dixit (2004) further developed the Bandiera model, showing that the organised *mafia*'s maximised profit in equilibrium has an inverse U shape as a function of w, the bandits' outside opportunities. This is interpreted as a difference across society with different levels of development. If w is small, banditry is attractive relative to outside opportunities. Then there are many bandits and in turn many protectors emerge, making it difficult to coordinate them and get monopoly profits. Conversely, if w is large, there are few bandits, and the potential revenues that can be earned by providing a coordinated protection service are small. Hence organised *mafia* is more likely to emerge during the middle stage of development.

increase the value of the wage honestly earned. Therefore, as an effect of economic development, the value L^{mi} will grow so much that it will no longer be advantageous to be a specialised protector. The above discussion shows that the relationship between organised crime and economic development is quite complex. Our simple model could just give an intuition of the variables that could determine the intensity of organised crime in the different areas.

5. Organised crime in Calabria, Campania and Sicily in the second half of the nineteenth century

As stated above, organised crime is differently distributed over the provinces of southern Italy. In this section we analyse in particular three regions where organised crime was stronger: Calabria, Campania and Sicily. We start from the *Mafia* in Sicily, an organisation running extortion and protection activity in which members were very strictly linked. The authors who analysed the *Mafia* during the period in question (amongst others, see Franchetti and Sonnino, 1877; Villari, 1979; Cutrera, 1900) indicated two factors as the main causes of its existence. The first was the state, which failed to gain monopolistic control over its territory. The second was the very weak belief in the law on the part of Sicilians. Cutrera (1900, p. 38) says: *"People who cannot refer to the state to have some rights respected and to solve litigation, turn to the authority of a person known for their influence or their bullying, and whose energetic, violent behaviour makes their judgement respected".*

In feudal times landowners had their own private soldiers, known as *campieri*, to protect their property. With the abrogation of feudalism, it was the Bourbon government which had to provide adequate protection for property rights. This government was however unable to offer such protection, and Gambetta (1993) suggests that this caused the rise of the *Mafia*. Bandiera (2003) developed a theoretical model suggesting that land fragmentation promoted the *Mafia* activity through an increase in demand for protection. Using a common agency model, the author shows that a rise in the number of landowners for a given area of land increases the competition for protection and hence the profit of the enforcer. Protection involves an externality because, by buying protection, each landlord deflects thieves onto other properties. The model assumes that in a given area the number of bandits are exogenously given. For each landlord, protection is more valuable if he is one of the few who receives it, which implies that each landlord is willing to pay more if only a few receive protection. A first observation on the model is that the degree of lack of security is not exogenous but is controlled by the *Mafia* itself in order to maximise the value of protection. Therefore it is not the level of insecurity that explains the rise of the *Mafia*, but it is the *Mafia* that determines the level of insecurity. Bandiera tests his model by using information on land fragmentation and intensity of the *Mafia* activity in 70 Sicilian towns in the western provinces (Palermo, Girgenti,[19] Caltanissetta and Trapani). The result of the econometric exercise is that the higher was land fragmentation, the higher was *Mafia* intensity.

However, this result could also be explained by the fact, known in the development literature, that in backward countries the value of output per unit of area is inversely related to farm size. The positive effect of land fragmentation on *Mafia* intensity is an indirect effect. The positive effect of farm size on productivity could be first caused by the lower wage paid by small farms, which employ family members whose opportunity cost in backward areas is near zero. Due to the lower labour costs small firms choose more labour-intensive crop type (such as grapes, olive and citrus) than large firms. The unit value of the crop is higher than that of the extensive crop and hence the value of output per unit of area is higher. However, empirical evidence in India, Greece and elsewhere (Yotopoulos and Nugent, 1976) shows that even if output is homogeneous small farms are more efficient than large farms. This could be caused by the supervisory role of the owner-manager and the superior labour of diligent, motivated family members.

[19] The present-day province of Agrigento.

The hypothesis of Gambetta (1993) and Bandiera (2003) that *Mafia* intensity was positively correlated with the level of insecurity which, in turn, was determined by the number of brigands in the area is not confirmed when we consider all southern Italian provinces. To evaluate this hypothesis, using estimates in Table 2, we isolated the political component of brigandage. We consider that spontaneous brigandage is the residual of the regression between the number of brigands per inhabitants and distance from Rome. Then we correlated such residuals with the intensity of organised crime in the southern provinces. The correlation is significant at 5% but with a negative sign (-0.4), when we would expect from Gambetta and Bandiera's hypothesis a positive sign. The above models consider the absence of publicly provided security as the essential element of the origin of *mafia*, when we believe it is only a necessary condition. Therefore they fail to explain why *mafia* is unevenly distributed in areas similar in security terms.

Villari (1979) shows that the *Mafia* is present in western Sicily but not in the east "*The main number of crimes are committed by the inhabitants of Palermo province who, in the most part, are not poor and are often peasants with land that they cultivate very well".*

The difference between Catania and Palermo, continues Villari (1979), "*is the lack, in Catania province, of an intermediate area where rich peasants (tenants or small landlords) could emerge that are the source of predators. In this province we find very poor peasants that are subjected to the same tyranny that we find in Basilicata and in other southern Italian provinces. Sometimes, poverty pushes these peasants to brigandage but cannot give rise to the Mafia*".

The police inspector Cutrera (1900, p. 57) explains the high intensity of the *Mafia* in Palermo province "*Without any doubt the development of Mafia in the Conca d'oro increased and surpassed the Sicilian area when with the development of the trade in citrus trees, at the beginning of the nineteenth century, the cultivation of oranges and lemons strengthened. While this contributed to the wealth of many owners of irrigable fields, it also aided the growth of the Mafia due to the absolute lack of security services. Therefore, there developed the need to have private security guards, which is the indispensable requisite for the Mafia to develop strongly".*[20]

Therefore the more productive crops, such as citrus, that are more easily damageable require a higher value of protection, which encourages the *Mafia* development. On the other hand, the link between the *Mafia* and economic development does not only concern agricultural productivity. There were two provinces in Sicily, Girgenti and Caltanissetta that had a very high *Mafia* intensity, yet with agricultural productivity no higher than other parts of Sicily. *Mafia* organisation in these two provinces was very similar to what we find in the province of Palermo (Cutrera, 1900), but the the *Mafia* members were not peasants.[21] The two provinces were specialised in sulphur production, which flourished until the end of the nineteenth century. They had the highest rate of industrialisation of all provinces on the island, higher even than the Italian average. The members of the *Mafia* were people working in the sulphur industry (mine owners, mine workers, etc.). There was quite a marked division of production phases in the sulphur industry prior to export. This allowed the *Mafia* to enter this production chain through extortion and protection. Sulphur firms operated in a competitive industry: the ability to harness violence in an organised way gave certain firms a competitive advantage. The example of the sulphur industry shows that the existence of *mafia* is linked not only to the existence of very productive land but also to industrialisation.

If we consider the level of per capita taxation as an indicator of per capita GDP, Girgenti and Caltanissetta in the late nineteenth century had an income not very different from that of Palermo and higher than that of Catania and Messina. This confirms our hypothesis that, in a situation in

[20] This argument is not very different from the description of the use of *mafia* in Russia by Volkov (2002). In the process of market transition in Russia the number of property transactions increased dramatically, while the state failed to provide adequate regulations and institutions that could guarantee and enforce property rights. This generated demand for private protection and dispute settlements.

[21] The main *Mafia* associations in these provinces were Oblonica (Girgenti), Scattialora (Sciacca province of Girgenti), Scaglione (Castrogiovanni, now Enna, but until the 1920s part of the province of Caltanissetta), and Fratellanza (Favara, province of Girgenti). The report of the trial of Fratellanza di Girgenti, that had more than 500 associates, affords interesting insights into the characteristics of such *mafia*.

which the state is unable to protect property rights, it is the capacity to pay that is the most important factor in the development and success of organised crime.
Analysis of the organised criminal association in Campania, the Camorra, confirms our hypothesis. The main Camorra locations were the prisons, where the association had a monopolistic control on all activities regarding the prisoners. The Camorra controlled, outside prisons, illegal markets (games, prostitution) and in some cases also legal markets (portage, public auction, etc.). The Camorra was mainly an organisation for extortion based on violence but it also performed other activities. According to Villari (1979) *"the members of camorra not only make money with the racket, but threaten and frighten; they oblige other people to commit crimes; they commit crime and oblige others to confess to being the perpetrators; they protect criminals"*.
The Camorra had its root in Naples. The city was divided into 12 quarters, each with its head, and the head of the Vicaria quarter was head of all. The Camorra was present in all quarters but particularly in the poor ones (Marmo, 1985). The control of their territory by the Camorra also in the poorer quarters was less strong than that of the *Mafia* but, as we already stated, the Camorra had a monopolistic control in many legal and illegal markets.
Camorra-type associations existed before 1860 also in Caserta, Castellamare, Salerno and in many towns near Naples. The activity of these groups regarded trade on illegal markets, smuggling and mediation especially in the cattle trade. Also in Campania we find that the poorest provinces are those where brigandage is higher and organised crime lower.
We used the Jacini Inquiry to compute some indicators of relative wealth in Campania. We computed the proxies for agricultural productivity: one is the total value of land tax per unit of farmland and the other is the ratio of the total value of land taxes to the agricultural population. The two indicators show a much higher value for the province of Naples than that of the province of Caserta, ranking second. This is due to high land fertility, but also the higher weight of high-value crops (citrus, olives, grapes, vegetables, etc). The other two provinces of Campania had a lower value for both indicators.
To proxy land fragmentation we used the numbers of payers of land tax divided by the agricultural population. This is a very rough indicator, as we could have similar values for different concentrations of land ownership. We thus computed the number of taxpayers in the high band (taxpayers that paid more than 40 lire of land tax) on total payers of land tax. A high ratio could indicate that there are many wealthy landowners and therefore many average size farms. Because this is a possible conclusion but not the necessary one, we built a third index given by the ratio of the first indicator to the second. The lower is this ratio, the higher is the probability of a more symmetric land distribution. A high value could indicate a situation with a small number of small properties. Computation of this ratio shows that in Naples province there is a more symmetric distribution of land ownership and a very asymmetric distribution in the province of Benevento. Salerno ranks second as a value of this indicator.
As regards the indicators of the degree of economic development we used two proxies: one is the value of land tax and property tax divided by the total population and the other is the industrialisation index (Ciccarelli and Fenoltea, 2010). The two indicators show that, in Campania, the province of Naples is the most highly developed and that, looking at the industrialisation index, Salerno, Caserta, Benevento and Avellino follow in this order. This ranking coincides with that of organised crime intensity in Campania and is inversely correlated with that of brigandage intensity (Table 1). The socio-economic structure of Campania provinces, where Camorra intensity is stronger, seems different from that of Sicilian provinces where the *Mafia* is stronger. We have information that, at least after Unification, the Camorra was active also in rural areas (the imposition of guards at Nola and the activity of extortion of peasants at Frattamaggiore at harvest time) but the control of agricultural activity was partial. The difference between the *Mafia* of the Conca d'Oro near Palermo and the Camorra in the agricultural areas of Naples provinces was due to different kinds of organisation of farm production (Marmo, 1985). In both areas yields are high and land is fragmented, but the crops and the final markets are different. The province of Naples

produced vegetables and fruits, marketed locally; in Sicily citrus fruits were also sold abroad. Therefore in Sicily the damage that could be inflicted was higher, hence the higher willingness to pay for protection. Interestingly, years later, with the growing of more valuable products and market diversification, the Camorra extended its ability to control the markets for farm products.
Also in Calabria we find different intensities of criminal associations between the province of Reggio Calabria and the two other provinces. Criminal associations in Calabria are called "'ndrine" and 'Ndrangheta was the name given about 40 years ago to the complex of these associations. Official documents at the time of Unification, however, used the terms Camorra and *camorristi* to specify the members of these criminal organisations. In the province of Reggio Calabria these associations were able to control agricultural markets. As in Sicily, 'ndrine increased in strength after the abrogation of feudalism. Already in 1861 the prefect of Reggio Calabria signalled the activity of criminal organisations. Two years later the prefect received notice that at Gallico, a town near Reggio Calabria, a band of *camorristi* were operative. In 1869 it was necessary to repeat elections in Reggio Calabria because a band of criminals had affected the results (Forgione, 2008).
In the mid nineteenth century we find criminal associations along the Tyrrhenian coast of Catanzaro (Nicastro, Vibo Valentia, Lamezia Terme). In other parts of the province of Catanzaro on the Ionian coast with its large farms and landless peasants we find no such criminal organisations, nor do we find criminal organisations in Cosenza province, where there were large owners but land was fragmented and small farms were important. The main differences between these provinces is the crop type, mainly wheat and products for self consumption. If we look at indicators similar to those computed for Naples, we find a much higher soil productivity in Reggio Calabria than in Catanzaro and Cosenza. Also value added productivity in industry was higher in Reggio Calabria. In this province the degree of land fragmentation was higher than in the other two. In this province we find olive trees in Aspromonte, historical location of the 'Ndrangheta, also with production for self consumption. But in the plain near Reggio Calabria much of the fruit and olive oil was exported. Land productivity was one of the highest in Italy. In this province we also find factories for food processing and production. In Reggio Calabria family relations were used to widen social ties and to strengthen market relations and make trade safer. Competition was accepted as an important element of trade but participants in the market were not often free to set their price, the type of goods to trade, or sometimes even their trading partners, but had to accept the instructions of the 'Ndrangheta.
To conclude, in this section we used descriptive analysis to show that in Campania, Calabria and Sicily the intensity of organised crime after Unification differed between provinces and that this uneven distribution was linked to the degree of land productivity and economic wealth. In the next section we will use econometrics to test the relationship between economic development and the intensity of organised crime.

6. Intensity of organised crime and economic development in Southern Italian provinces after Unification

In this section we estimate the relationship between the intensity of criminal organisations and the economic wealth of provinces. We use an ordered logit model where the dependent variable has five categories coded by the values 0, 1, 2, 3 and 4 in relation to the intensity of organised crime.[22] Organised crime is mentioned in official reports only for three regions: Sicily, Campania and Calabria. Therefore a value of zero is given to the provinces of other regions, to Benevento and Avellino for Campania, Cosenza for Calabria, and Siracusa for Sicily. Based on the analysis of the previous section, a value of 4 is given to the province of Naples and Palermo, 3 to Girgenti and Reggio Calabria, 2 to Caltanissetta, Trapani, Caserta and Sassari, 1 to Catania, Messina, Salerno and Catanzaro. The regressors of the model account for the degree of industrialisation, the structure of agricultural production, land productivity and public security. The variables are computed as

[22] For the methodological aspect of the model see section 3.

follows. The proxy for the degree of development (*Industry*) is the per capita value added of industry described in the previous econometric model (Ciccarelli and Fenoltea, 2010). *Latifundia* is a dummy variable equal to 1 for provinces with many large extensive farms and 0 otherwise. The sources of the data for this variable are the Jacini Inquiry (1885) and Rossi Doria (1944) that give information on the structure of agriculture in Italian provinces. *Land productivity* measures the productivity of the land according to the data of the Jacini Inquiry and is computed as the average land tax per km^2.[23] As implications of the model developed in section 4 and the descriptive analysis presented in section 5, we expect the intensity of organised crime to rise with the increase in the value added in industry and land productivity, and to fall in provinces with large extensively cultivated estates. A further important aspect that, following Gambetta and Bandiera, could explain the rise of organised crime is the degree of public insecurity. Two control variables account for such a factor: *Brigandage*, an indicator of the brigandage intensity computed according to the data of the Massari report (see Section 3), and *Murders*, that measures the number of male murders per thousand of inhabitants. According to Gambetta and Bandiera, we would expect a positive relation between the level of insecurity and the intensity of organised crime.[24] In Table 3 we present our econometric results. In order to verify our main hypothesis the model is first estimated considering separately the degree of development, land productivity and the presence of large extensively cultivated estates (column 1, 2 and 3). The coefficients are all statistically significant with the expected sign. The full model is subsequently estimated in column 4 where we add the variable for brigandage intensity and consider jointly the other variables.

Table 3. The determinants of organised crime in southern Italy after Unification

Y = Organised crime	(1)	(2)	(3)	(4)	(5)
Industry	9.83***			8.52***	10.52**
	(3.56)			(2.61)	(2.19)
Latifundia		-2.60**		-2.41*	-4.65**
		(-2.36)		(-1.81)	(-2.10)
Land productivity			0.002*	0.01**	0.02**
			(1.66)	(2.15)	(2.33)
Brigandage				-2.91***	-4.47**
				(-2.57)	(-2.44)
Murders					11.89**
					(2.49)
Observations	25	25	25	25	25
LR χ^2 (p-value)	19.62 (0.00)	6.27 (0.01)	5.85 (0.01)	33.20 (0.00)	44.60 (0.00)
Pseudo R^2	0.30	0.10	0.09	0.52	0.70

***, **, * Statistically significant at the 1, 5, and 10% level.
Coefficients are in log-odds ratio form.
Ancillary parameters are not reported.
z statistics in parenthesis.

The variables *Industry*, *Land productivity* and *Latifundia* are still statistically significant and the coefficients have the expected sign. The variable *Brigandage* shows a negative and significant coefficient meaning that, unlike what was expected from the Gambetta and Bandiera model,

[23] More details on land productivity are on p. 73, volume 1 of the Jacini Inquiry. Instead of *Land productivity* we also considered in our estimates the degree of land fragmentation (*Land fragmentation*) used in the empirical model of section 3. Following Bandiera we expect the intensity of organised crime to rise with the increase in land fragmentation. Our expectation is confirmed but we get a weaker significance of the coefficient than that of *Land productivity* and a lower R^2. On the other hand, we cannot estimate a model with both variables because of the strong multicollinearity.
[24] The number of murders is taken from statistics for the Kingdom of Italy (Statistiche del Regno d'Italia,1867).

organised crime developed in areas where brigandage spread was low.[25] Lastly in column 5 we add the variable *Murders* that has a positive and significant coefficient. However, in interpreting this result one must be very cautious because of the endogeneity problem: it is very likely that part of the homicides could be directly caused by criminal organisations.[26] Hence the specification of the model reported in column 4 is the most satisfactory.
In Table 4 we report the conditional probability of organised crime intensity predicted by the estimated model. The probability that in a province with large estates there is no organised crime is 90.1%, and the probability of having high-intensity crime is very low (1.4%). In provinces with high land fragmentation the probability of there being a high intensity of criminal organisations rises to 13.4%. If we consider the degree of economic development, the probability of having high-intensity organised crime increases with the growth of industrialisation, and in provinces with a high degree of industrialisation we observe a higher than 40% probability of organised crime being widespread.

Table 4. Predicted probability of organised crime intensity in southern Italian provinces

Degree of organised crime	Organisation of agricultural production		Degree of industrialisation[27]		
	Latifundia=1	Latifundia=0	Low	Medium	High
Absent-low	90.1	44.9	97.7	85	14.4
Medium	8.5	41.7	2	13	42.9
High	1.4	13.4	0.3	2	42.7

The estimated model shows that the rise and development of criminal organisations is determined by different factors. The structure of agricultural production, the land productivity and the degree of economic development greatly affect the distribution of organised crime in the *Mezzogiorno* provinces, as suggested by the model in Section 4 and the descriptive analysis in section 5. In addition, our results conflict with the hypothesis that organised crime developed in the areas where brigandage was widespread.

7. *Mafia* and organisation of production: an econometric analysis

Our model predicts that *mafia* intensity depends positively on the willingness to pay for protection which, in turn, is affected by land productivity. This hypothesis was tested in the previous section considering the provinces of southern Italy. Unfortunately the very small sample size (just 25 observations) could cast some doubt on the robustness of our results. In this section we will test our main hypothesis on Sicilian towns in the early nineteenth century, with the advantage of having 291 observations. Data on Sicilian *Mafia* intensity is based on the work of Cutrera (1900) who considers 291 municipalities belonging to all provinces of the island. Cutrera based his analysis of *Mafia* intensity on his experience as a police inspector. We used his evaluation to build a variable with four categories that account for the different *Mafia* intensity in the various municipalities and code such categories with the values 1, 2, 3 and 4. The distribution of municipalities in relation to the different presence of the *Mafia* is reported in Table 5.

Table 5. Intensity of the *Mafia* in 291 municipalities of Sicily at the end of the nineteenth century

	Mafia intensity

[25] We also estimated equation 4 of the model with the regressor *Brigandage* computed according to the data of Molfese (1964) and summarised in Table 2. The coefficient is not statistically significant but the sign is still negative.
[26] Unfortunately we are not able to separate murders and crimes committed by criminal organisations from the total of murders and crimes. If this were possible the endogeneity problem would be merely solved.
[27] The degree of industrialisation is a continuous variable and the predicted probabilities are calculated at the mean value, and at the first and last decile of the distribution.

	Absent	Low	Medium	High	*Total*
Number of municipalities	84	67	71	69	*291*
Percentage	28.87	23.02	24.40	23.71	*100*

For each municipality Cutrera also indicates whether it belongs to areas with low, medium or high land productivity. This distinction roughly coincides with that of the Jacini Inquiry that divided farmland in Sicily into three areas in relation to topography, namely the mountain area, the middle altitude area, and the coastal plain. In the mountain area wheat and barley are cultivated. This is also an area of extensive woodland. Most of such lands belonged to large owners, and peasants lived in villages far away from their workplace. In the middle altitude area wheat was the most important crop though also legumes were cultivated. In this area there were also olive trees, grapes and other fruit trees. Also in these areas we find large properties extensively cultivated with the aid of day workers who lived far away from their workplaces. The third area is that of coastal plains where citrus trees and vegetables were cultivated. In this area we also find grapes, wheat and other legumes. The organisation of landed property was of various types: there were large properties divided into small holdings farmed by present families under sharecropping systems, as well as medium and small owners who cultivated their land directly. The structure of land organisation pushed peasants to live on the cultivated land.
The main share of agricultural land in Sicily was in the medium altitude area (65% – 75 %). In some provinces such as Messina the percentage of coastal plain was quite high (20%). In other provinces such as Caltanissetta, the coastal plain accounted for only 4% of the surface area. Other provinces were in an intermediate position. Productivity in the agricultural provinces was mainly determined by the different distribution of farmland between the three areas. Messina, as shown in Table 6, enjoyed the highest productivity of Sicilian provinces in citrus fruits, followed by Palermo.[28] Caltanissetta, with a very small coastal plain area, produced much less. Agriculture specialisation in different crops of the provinces was also strictly linked to the weight of the different areas. Agricultural productivity is thus determined by environmental conditions and not affected by *Mafia* intensity.

Table 6. Coefficient of specialisation and crop yield per unit of area in Sicilian provinces around 1880; (Sicily =1)

Province	Citrus fruits		Vegetables		Olives		Vines		Corn	
	Spec.	Prod.	Spec.	Prod.	Spec.	Prod.	Spec.	Prod.	Spec.	Prod.
Palermo	1.900	1.207	0.813	1.050	0.639	1.144	1.134	0.946	1.041	0.925
Messina	3.304	1.472	0.926	0.919	1.035	0.858	1.214	0.996	0.512	0.937
Catania	0.366	0.923	1.357	1.003	0.326	0.930	1.205	0.971	0.932	1.307
Siracusa	0.353	0.412	1.181	0.729	3.550	1.001	0.718	0.996	1.001	0.738
Girgenti	0.574	0.292	0.697	0.995	0.425	0.858	0.630	1.046	1.236	0.837
Trapani	0.554	0.663	1.564	0.991	0.775	1.144	1.357	1.086	1.010	1.046
Caltanissetta	0.144	0.609	0.472	1.044	0.171	1.144	0.728	1.012	1.229	1.204

Source: Our computation using data from the Jacini Inquiry for Sicily, Vol. XIII,

Having shown that land productivity is an exogenous variable with respect to the presence of the *Mafia*, using Cutrera's data we estimate a model that assesses the effect of the former variable on the latter. As mentioned above, Cutrera in his book gave a value to each municipality not only for the intensity of the *Mafia* but also for land productivity. It considered three different categories for land productivity that we code with the values 1, 2 and 3, according to low, medium and high

[28] See the Appendix for more details on the coefficient of specialisation and the crop yield reported in Table 6.

productivity (variable *Land productivity*). A preliminary Pearson's test shows that *Land productivity* and *Mafia* intensity are not independent variables. The high value of χ^2 (54.6) and the p-value of 0 exclude statistical independence.

Also in this section we rely on the ordered logit model. Intensity of the *Mafia* is the dependent variable and *Land productivity* is the main variable of interest. We also include, as a further regressor, a third variable (*Sulphur mines*) that accounts for sulphur production: the variable is a dummy equal to 1 for municipalities with important sulphur mines and 0 otherwise. As we already noted, we expect the presence of the *Mafia* to be high in areas with important sulphur mines.[29,]

As further controls we add dummies for the provinces existing in the nineteenth century (Girgenti, Caltanissetta, Catania, Messina, Palermo, Siracusa and Trapani) and a variable that proxies for the presence of civic virtues (*Turnout*). The last regressor is computed as the percentage of voters on the total electors in the administrative election of 1861. The turnout is widely used in the literature on social capital. We expect that the higher the civic virtues, proxied by participation, the lower the *Mafia* intensity.[30] We considered the year 1861, even if the share of potential electors in the total population is quite low (420,580 electors), since we might expect such values not to be affected by *Mafia* intensity in the early 1900s.

Point estimates of the model are shown in Table 7. The model is first estimated with *Land productivity* as the only regressor (column 1). The other regressors are introduced at a later stage.

The results support our hypothesis. In all specifications land productivity has a positive impact on *Mafia* intensity and is statistically significant at the 1% level. In addition, the coefficient of the sulphur mine variable, as we expected, also shows a positive sign and is significant. The dummies for provinces show that, compared with Girgenti, Palermo has, *ceteris paribus*, a higher *Mafia* intensity and the other provinces have a lower intensity. The variable participation in the election has the expected sign but is significant only at the 10% level, suggesting that the hypothesized inverse relation between civic virtues and *mafia* intensity requires further testing.

Table 7. The determinants of *Mafia* intensity in Sicilian municipalities in the early nineteenth century

Y = *Mafia* intensity	(1)	(2)	(3)	(4)
Land productivity	0.98***	0.98***	0.56***	0.52***
	(6.39)	(6.41)	(2.87)	(2.62)
Sulphur mines		1.55***	2.25***	2.32***
		(3.75)	(4.34)	(4.64)
Turnout				-0.03*
				(-1.76)
Caltanissetta			-2.41***	-2.22***
			(-4.67)	(-4.18)
Catania			-1.21***	-0.98**
			(-2.61)	(-2.02)
Messina			-2.71***	-2.57***

[29] Sulphur production was very important in Sicily at the end of the nineteenth century, there being 886 sulphur mines with more than 38,000 workers. Girgenti and Caltanissetta had the largest concentration of sulphur mines, while production in Catania and Palermo was less important. The most important municipalities for sulphur mines were: Cianciana, Casteltermini, Aragona, Comitini, Racalmuto, Campobello di Licata and Palma di Montechiaro in Girgenti province; Serradifalco, Delia, Sommatino, S. Cataldo, Caltanissetta, Villarosa, Castrogiovanni (Enna), Aidone, Valguernera, Mazzarino, Buteri, Riesi and Campofranco in Caltanissetta; Agira, Assoro, Leonforte and Centuripe in Catania; Lercara Friddi in Palermo.

[30] This variable is one of the four used by Putnam (1993) in the Italian case to build the index of civic virtue of the Italian regions. The variable was computed not by using the data for political and administrative elections but only in the referendum. The idea is that only in referenda is the participation of voter interest-free. Unfortunately in our case we had to use political elections and not referenda.

			(-5.78)	(-5.42)
Palermo			0.05	0.21
			(0.14)	(0.56)
Siracusa			-3.96***	-3.82***
			(-6.71)	(-6.48)
Trapani			0.96	0.88
			(1.19)	(1.57)
Number of observations	291	291	291	291
LR χ^2 (p-value)	43.7 (0.00)	58.8(0.00)	180.2 (0.00)	183.3 (0.00)
Brant Test p-value	0.74	0.88	-	-
Pseudo R^2	0.05	0.07	0.22	0.23

***, **, * Statistically significant at 1, 5, and 10% levels.
Coefficients are in log-odds ratio form.
Ancillary parameters are not reported.
z statistics in parenthesis.

In Table 8 we report the predicted probability of *Mafia* presence in relation to land productivity. If land productivity is low the probability that in municipalities we have no *Mafia* or that *Mafia* is scarcely present is, respectively, 28% and 39%. As land productivity increases, the probability of observing high *Mafia* intensity also increases and the probability of not having *Mafia* falls to 11%.

Table 8. Probabilities of *Mafia* existence in relation to land productivity value

	Land productivity		
Mafia intensity	Low	Medium	High
Absent	0.28	0.17	0.11
Low	0.39	0.36	0.29
Medium	0.24	0.31	0.36
High	0.09	0.16	0.24

8. Conclusion

By the time of Unification, southern Italy's old equilibrium based on a set of societies organised around customary rights and the paternalistic relation between peasantry and nobility was destroyed with the abrogation of feudalism. Industrialisation of the economy, agricultural transformation and increasing commercialisation for farming needed a state able to ensure the security of property and contractual rights. The Bourbons, however, were unable to do this. Where land productivity was low, the conditions of peasants under the class of the large southern landlord worsened. After Unification the situation of peasants did not improve and probably worsened, and brigandage increased. Although the reasons behind this phenomenon were not only economic but also political - Bourbon aid to the brigands was both effective and motivational - our econometric results show that mainly economic reasons explain the strength of brigandage after Unification. The combating of brigandage by the mid 1860s by Italian governments was only a military solution: the socio-economic factors behind the phenomenon persisted. Although the military might of the Italian government and the private police of great landlords were able to repress any riots caused by the abject conditions of the peasantry, problems of insecurity remained in these provinces.
In provinces where land productivity was high and the process of industrialisation more developed, the weight of small and medium farms was higher. The failure of the Italian state to gain monopolistic control of the territory in these areas led to the rise of criminal associations (the *Mafia*,

Camorra and 'Ndrangheta) which offered additional private protection. The higher the land's productivity and the more developed the market relations, the greater was the incentive to offer private protection. Using econometric exercises for southern Italian provinces and for Sicilian municipalities, we showed that the wealth of the area was the main factor that explained the rise of criminal organisations, such as the *Mafia* and Camorra. These organisations arose not where the level of insecurity was higher, as suggested by Gambetta and Bandiera, but where it was more profitable to protect private contracts. This happened in more affluent areas, not in poorer areas. This also explains why, with growing development and with an Italian government unable to provide adequate protection for property rights, criminal organisations spread throughout much of southern Italy.

A major question left untackled in our paper is why successive Italian governments were unable to impose their authority in the *Mezzogiorno*. Of the various answers found in the literature, one (Putnam, 1993; de Blasio and Nuzzo, 2009) attaches importance to the lack of civic virtues due to historical causes. The more traditional explanation of many southern Italian writers (Turiello, 1882; Salvemini, 1910) is that the "intellectual" bourgeois stratum of professionals (doctors, lawyers, public servants, etc.) played a significant role not only in the economic, social and cultural life of each locality, but also in the political life of the *Mezzogiorno*: very often they came to arrangements with criminal organisations to maintain their local powers. We hope in a future paper to be able to test the various hypotheses of the historical reasons for the persistence of criminal organisations in southern Italy with an intensity not known to any other southern European country.

References

Agnoli F.M. (2003), *Dossier Brigantaggio. Viaggio tra i ribelli al borghesismo e alla modernità*, Ed. Controcorrente.

Anderson J.E. and Bandiera O. (2002), Private enforcement and social efficiency, Working paper, Boston College, Boston, MA and London School of Economics, London UK.

Aprile P. (2011), *Terroni. Tutto quello che è stato fatto perchè gli Italiani del Sud diventassero "Meridionali"*, Ed. Piemme.

Bandiera O. (2003), Land Reform, the Market for Protection and the Origins of the Sicilian Mafia: Theory and Evidence, *The Journal of Law, Economics and Organization*, 19, pp. 218-244.

Banfield E. (1958), *The Moral Basis of a Backward Society*, N.Y. Free Press.

Bevilacqua P. (1989), *Storia dell'Agricoltura Italiana*, vol. I., Ed. Marsilio.

de Blasio G. and Nuzzo G. (2009), Historical Traditions of Civicness and Local Economic Development, *Journal of Regional Science*, 20, pp. 1-29.

Ciccarelli C. and Fenoaltea S. (2010), Through the Magnifying Glass: Provincial Aspects of Industrial Growth in Post-Unification Italy, Quaderni di storia economica no. 4, Banca d'Italia.

Cutrera A. (1900), *La mafia ed i mafiosi*, Ed. Alberto Reber, Palermo.

Dickie J. (2007), *Cosa nostra, Storia della mafia siciliana*, 3th edn., Ed. Laterza.

Dixit A.K. (2004), *Lawlessness and Economics*, Princeton University Press, Princeton.

Forgione F. (2008), *Ndrangheta, Prima relazione della Commissione parlamentare Antimafia*, Ed. Boldini.

Franchetti L. and Sonnino S. (1877), *Inchiesta in Sicilia*, Ed. Vallecchi, Florence.

Gambetta D. (1993), *The Sicilian Mafia: The Business of Private Protection*, Harvard University Press.

General Census of Population (1871), Ministero di Agricoltura Industria e Commercio, Ufficio Centrale di Statistica, Vol. II, III.

General Census of Population and Housing (2001), ISTAT.

Greene W.H., (2008), Econometric Analysis, 6th edn, Prentice Hall.

Jacini S. (1885), *Atti della Giunta per la Inchiesta Agraria sulle condizioni della classe agricola 1882-1885*, Vol. VII, IX, XII, XIII, XIV.

Maddison A. (2001), *Dynamic Forces in Capitalistic Development*, Oxford University Press (trad. it "L'economia mondiale. Una prospettiva millenaria" (2005), Ed. Giuffrè, Milano).

Malanima P. (2003), Measuring the Italian Economy 1300-1861, *Rivista di Storia Economica*, XIX, pp. 265-295.

Marmo M. (1985), *Tra le carceri ed i mercati. Spazi e modelli storici del fenomeno camorrista*, in P. Macry and P. Villani (eds.) Storia d' Italia. Le regioni dall' Unità ad oggi, la Campania, Ed. Einaudi.

Massari G. (1863), *Sul brigantaggio*, relazione parlamentare della Commissione d'inchiesta del 3- 4 maggio.

Molfese F. (1964), *Storia del brigantaggio dopo l'Unità*, Ed. Feltrinelli.

Olson M. (2002), Dictatorship, democracy and development, *American Political Science Review*, 87, pp. 567-576.

Putnam R.D. (1993), *Making Democracy Work: Traditions in Modern Italy*, Princeton University Press.

Regia Commissione d'Inchiesta per Napoli. Relazione sull'amministrazione comunale, 2 vol., Forzani, Rome vol I.

Rossi Doria M. (1944), Struttura e Problemi dell'agricoltura meridionale, Address given at the Conference of studies on problems in the Mezzogiorno, Bari, 3 December 1944. Pubblished in "Riforma Agraria e Azione meridionalista," Associazione per Studi e Ricerche Manlio Rossi Doria, Ancora del Mediterraneo, 2003.

Salvemini G. (1910), *Il ministro della Malavita*, Ed. Bollati Boringhieri.

Statistiche del Regno d'Italia (1867), Vol. Morti Violente, Tipografia Tofani, Firenze.

Turiello P. (1882), *Governo e Governati in Italia*, Ed. Zanichelli, Bologna.

Villari P. (1885), Le lettere meridionali ed altri scritti sulla questione sociale , I Ed. Barca, List. cit. Guida Napoli (1979).

Volkov V. (2002), *Violent entrepreneurs: the use of force in the making of Russia*, Cornell University press.

Yotopoulos P.A. and Nugent J.B. (1976), *Economics of Development: Empirical Investigations*, Harper & Row International Edition, New York.

Statistical Appendix

1. The intensity of brigandage spread

For the spread of brigandage in the southern provinces we rely on two sources of data. The first is the report of the commission of the parliamentary inquiry into southern brigandage "*Il Brigantaggio nelle Province Napoletane*". The Report was presented by the Member of Parliament Giuseppe Massari to Parliament in Turin on 3 and 4 May 1863. The commission of inquiry was elected by the the Italian Parliament on 22 December 1862 and included nine members of parliament of different political parties. His task was to identify the main causes of the brigandage and to indicate the actions able to eliminate the phenomenon. For this purpose the commission visited the *Mezzogiorno* of Italy between February and March 1863, evaluating the different spread of brigandage in the various provinces. The report only provides generic and non-quantitative data and the commission did not visit all the provinces, assuming that in some of them brigandage was completely absent. The second source we use is Molfese (1964), "*Storia del brigantaggio dopo l'Unità*" that provides an accurate analysis of the regional distribution of brigandage. The author, using different official sources, offers an overview of brigand losses by province for the period 1861-1865.

Table A1. Brigandage intensity in southern provinces after Unification

Provinces	Number of brigands	Brigands per 1,000 inhabitants	Number of groups			Massari Report
			Big	Medium	Small	
Teramo	627	2.55	1	1	3	Absent
Aquila	412	1.24	3	4	2	Low
Chieti	728	2.15	4	3	13	Low
Campobasso	235	0.65	2	1	1	Absent
Caserta	929	1.33	8	2	11	High
Napoli	50	0.06	1	1	12	Very Low
Benevento	217	0.94	1	1	10	High
Avellino	745	1.98	2	5	7	High
Salerno	2052	3.79	2	4	8	Medium
Foggia	817	2.53	1	5	6	High
Bari	300	0.5	1	0	3	Medium
Lecce	141	0.29	0	1	3	High
Potenza	2629	5.15	8	7	14	High
Cosenza	354	0.8	0	2	9	Absent
Catanzaro	1072	2.6	0	1	9	Absent
Reggio	234	0.66	1	0	0	Absent
Palermo	NA	NA	NA	NA	NA	NA
Messina	NA	NA	NA	NA	NA	NA
Catania	NA	NA	NA	NA	NA	NA
Siracusa	NA	NA	NA	NA	NA	NA
Caltanissetta	NA	NA	NA	NA	NA	NA
Girgenti	NA	NA	NA	NA	NA	NA
Trapani	NA	NA	NA	NA	NA	NA
Sassari	NA	NA	NA	NA	NA	NA
Cagliari	NA	NA	NA	NA	NA	NA

2. Variables computed in the descriptive analysis on criminal organisations

Per-capita taxation
Per-capita taxation is computed as the total value of land and property taxes in 1880 per unit of population. The data on taxes are reported in vol. 1 while those on population (in the year 1881) are reported in vol. 13 of the Jacini Inquiry.

Coefficients of specialisation
The coefficients of specialisation are computed as:

$$\frac{S_{i,j} / S_j}{S_i / SS}$$

where S is the area in hectares, i indicates the type of the agricultural production and j the province. SS is the total area in hectares of Sicily. The source of the data is vol. 13 of the Jacini Inquiry.

Crop yield per unit of area
The indicator is computed as the ratio, for each crop, of average production of the province to average production in Sicily. The source of the data is vol. 13 of the Jacini Inquiry.

Agricultural productivity
Land productivity is computed in two ways. One is the total value of land tax per unit of farmland and the other is the ratio of the total value of land taxes to the agricultural population. The data are reported in vol. 1 of the Jacini Inquiry and refer to the year 1880 for taxes and to 1871 for the population. The latter data coincide with those of the General Census of Population (1871).

Land fragmentation
For land fragmentation we use three proxies. The first, a very rough indicator, is computed as the numbers of payers of land tax divided by the agricultural population. The second is the ratio between the numbers of taxpayers that paid more than 40 lire of land tax (the higher tax band) and total payers of land tax. The last proxy is the ratio between the first and the second. The data are reported in vol. 1 of the Jacini Inquiry and refer to 1880 for taxpayers and 1871 for the population.

Economic development
Economic development is proxied with two variables. The first is the industrialisation index described in the section on brigandage. The second is computed as the value of land and property tax divided by the total population. The data are reported in vol. 1 of the Jacini Inquiry and refer to 1880 for the taxes and 1871 for the population.

Table A2. Descriptive statistics of some economic variables in southern provinces after Unification

Provinces	Population (1871)		Area in Km^2	Taxes (1880)			Numbers of taxpayers		Number of taxpayers incurring tax		
	Total	Employed in agriculture		Property	Land	Total	Land	>40 lire	Property	Land	Total
Teramo	246004	122418	3324.7	183180	888749	1071929	27204	2079	21454	45132	66586
Aquila	332784	96354	6500.0	386236	1180574	1566810	84318	6645	61698	120932	182630
Chieti	339986	128553	2861.5	375519	1140376	1515895	66203	3030	44392	100172	144564
Campobasso	364208	159457	4603.9	442990	968177	1411167	68860	3088	61417	104980	166397
Caserta	697403	234447	5974.8	1047601	4545899	5593500	88729	11374	87632	132798	220430
Napoli	907752	73842	1065.6	6492951	3029981	9522932	25069	7024	60042	48637	108679
Benevento	232008	88605	1782.5	293948	1010003	1303951	43413	3563	33990	64197	98187
Avellino	375691	151461	3649.2	451038	1962009	2413047	62606	7715	54061	93786	147847
Salerno	541738	225636	5505.9	809365	2313031	3122396	58182	7368	84384	94518	178902
Foggia	322758	92748	7648.4	869732	2278324	3148056	27004	3486	37444	49558	87002
Bari	604540	165137	5936.9	1533627	3186675	4720302	66767	11059	63660	117944	181604
Lecce	493594	166312	8529.8	999037	2922211	3921248	54941	7378	66803	112207	179010
Potenza	510543	167768	10676.0	753408	2236927	2990335	89810	6300	90179	155632	245811
Cosenza	440468	112606	7358.0	393489	1617867	2011356	56966	5443	62619	85903	148522
Catanzaro	412226	133974	5975.1	490214	1859610	2349824	48930	3945	70699	85177	155876
Reggio	353608	57333	3924.0	369721	1236508	1606229	43469	6033	59312	74150	133462
Palermo	617678	105757	5086.9	1968282	1966488	3934770	90668	7178	94313	144496	238809
Messina	420649	72704	4579.0	648316	1106256	1754572	82825	3717	67619	118564	186183
Catania	495415	90175	5102.2	833554	1625615	2459169	85294	6779	95327	108928	204255
Siracusa	294885	61942	3697.1	424250	1419236	1843486	35709	2538	64355	56568	120923
Caltanissetta	230066	46946	3768.8	474527	907144	1381671	33060	2381	54002	58822	112824
Girgenti	289018	56051	3861.7	452752	1015866	1468618	43862	3479	64651	69805	134456
Trapani	236388	47338	3145.5	430819	681646	1112465	47761	3866	35104	56548	91652
Sassari	243452	45113	10726.7	485618	1046657	1532275	40397	3433	39540	72360	111900
Cagliari	393208	77950	13615.4	573984	2080086	2654070	83892	7134	73317	143041	216358